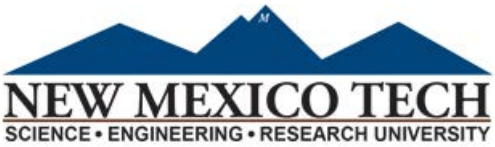

New Mexico Tech

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The University

An Overview of New Mexico Tech

https://www.nmt.edu/aboutnmt/

New Mexico Institute of Mining and Technology, commonly known as New Mexico Tech, is devoted to excellence in education and research. The atmosphere is casual, and each student can expect to be recognized as a distinct individual.

New Mexico Tech students may choose from programs in the Earth Sciences, Physical and Biological Sciences, Engineering Disciplines, Technical Communication, Mathematics, Management, Computer Science, and Information Technology. In addition, breadth and enrichment are provided by supporting programs in the arts, humanities, and social sciences. The New Mexico Tech student gains liberal education, as well as a thorough stem education in science, mathematics, and engineering education.

At New Mexico Tech there is no artificial distinction between pure and applied research and no sharp dividing line between teaching and research. The New Mexico Tech student is challenged to learn, to think in the abstract, and to bring abstractions to bear on practical situations. Employment of students in the many research facilities and in departmental research is central to New Mexico Tech's programs.

Undergraduate students can choose from among two dozen Bachelor of Science programs or pursue a degree in general studies. Graduate programs extend through the doctoral level and contribute to the research atmosphere that also benefits undergraduate instruction. Many graduating seniors continue their studies in graduate or professional schools.

With an enrollment of more than 800 undergraduate students and more than 450 graduate students, New Mexico Tech offers the advantages of small classes— the student to faculty ratio is about 10:1.

Students participate in a rich variety of intramural, club, and individual sports activities. Student organizations cater to professional, hobby, religious, and social interests.

The University

Campus Facility

New Mexico Tech's beautifully landscaped campus is an oasis of green in the desert, with tall trees, grassy lawns, and flowerbeds. The central section of 320 acres contains academic buildings, laboratories, residence halls, family housing, and recreational areas. An additional 40 square-mile area adjoining the main campus is used for research and testing activities. Socorro Peak, with an elevation of 2,208 m (7,243 ft) above sea level, is immediately west of the campus quadrangle and contains a mine now used for seismic studies. Recreational areas on campus include the Joseph A. Fidel Student Services Center, Student Activities Center (SAC), Swim Center, tennis courts, Macey Theater/Conference Center, the Etscorn Campus Observatory, the Gymnasium, and an 18-hole Golf Course.

The University

A Brief History of New Mexico Tech

Campus History

What began over a century ago as a mining school has evolved into an important research and educational institution. New Mexico Tech was founded as the New Mexico School of Mines in 1889, when it was established by an act of the Territorial Legislature. Over the years, Tech's emphasis has expanded, first into the area of petroleum engineering, and then, in the 1940s, into physics research. Today, New Mexico Tech is known for its expertise in highly specialized areas such as earth and atmospheric sciences, astrophysics, testing of energetic materials, and such engineering fields as chemical, civil, electrical, materials, mechanical, environmental, petroleum, and mineral engineering.

In addition to the educational arm of the Institute, New Mexico Tech has numerous research and service entities, including the New Mexico Bureau of Geology and Mineral Resources, the Research and Economic Development Division, the Petroleum Recovery Research Center, the Energetic Materials Research and Testing Center, Optical Surfacing Technologies, Langmuir Laboratory for Atmospheric Research, the Institute for Complex Additive Systems Analysis, and Incorporated Research Institutions for Seismology.

In recognition of the growing role of the Institute, the State Legislature changed the name in 1951 from "New Mexico School of Mines" to "New Mexico Institute of Mining and Technology," which is still the official name. The name "New Mexico Tech" came into common use in the 1960s.

The graduate program was begun in 1946 and involves staff and facilities of the entire Institute.

The University

Our Mission

Mission of NMT

New Mexico Tech leads education and research in science, technology, engineering, entrepreneurism, and mathematics (**STE2M**) for New Mexico.

• We educate a diverse student body in foundational and collaborative student-focused programs.

• We expand the body of knowledge through cross-disciplinary, culturally relevant, and challenging discourse in an inclusive setting.

• We forge scientists, engineers, and leaders for the future.

• We pioneer innovation through leading edge research and creativity, and entrepreneurship.

• We serve the public through research, scientific knowledge, economic development, and **STE2M**

The University

Our Vision

NMT Vision

To be an inclusive, distinguished, and vibrant community of scholars dedicated to education, research, and innovation to meet the science, technology, engineering, entrepreneurism, and mathematics (**STE2M**) challenges of tomorrow.

The University

Shared Values

Shared Values (5 E's):

New Mexico Tech's shared values inform the actions the University community will undertake in fulfilling our mission and in accomplishing our vision.

• **Excellence in Teaching, Learning, Research, and Integrity:** We pursue excellence and distinction in our academic, intellectual, creative, and personal pursuits with the highest integrity.

• **Empowering Student Success:** We provide engaging and comprehensive educational experiences that facilitate our students' growth, development, and ability to serve their profession, community, and society.

• **Entrepreneurial and Innovative:** We are creative and innovative problem solvers whose solutions advance disciplines and promote economic impact.

• **Engaging the Community:** We serve the communities we live in, our professional communities, and the public mission of the institution.

• **Equitable, Inclusive, and Collaborative:** We all have a stake in and responsibility for NMT's continual achievement of DEI excellence and in creating an environment where anyone can come and achieve their goals.

The University

Equal Opportunity Policy

The New Mexico Institute of Mining and Technology is committed to the policy that all persons shall have access to its programs, facilities, and employment without regard to race, age, religion, color, national origin, ancestry, sex, sexual orientation, physical or mental handicap or serious medical condition, spousal affiliation, or gender identity, as required by the New Mexico Human Rights Act, Title VI and Title VII of the 1964 Civil Rights Act as amended, Civil Rights Act of 1866, Executive Order 11246, Section 503 and 504 of the Rehabilitation Act of 1973, The Americans with Disabilities Act, The Age in Employment Discrimination Act of 1990, Vietnam Era Veterans Readjustment Assistance Act of 1974, Title IX of the Education Amendments Act of 1975, Immigration Reform and Control Act, or by other applicable laws and regulations. Inquiries regarding compliance may be directed to: Randy Saavedra, Director, Affirmative Action , Room 20D Brown Hall, New Mexico Institute of Mining and Technology, 801 Leroy Place, Socorro, New Mexico 87801; telephone 505.835.5005.e-mail: Randy.Saavedra@nmt.edu.

Proviso

The provisions of this catalog are not to be regarded as an irrevocable contract between the student and New Mexico Institute of Mining and Technology. New Mexico Tech reserves the right to change any provisions or requirements at any time within the student's term of residence.

Assurance of Learning

New Mexico Tech is committed to achieving the learning goals set forth by academic degree and co-curricular programs that correspond to the School's mission and values. The purpose of the assurance of student learning is to support and improve student learning by developing methods to: articulate the goals of each academic program, gain feedback on each unit's progress toward achieving those goals, and use the feedback to modify the academic and co-curricular programs to ensure that the goals are effectively achieved. Individual student learning results achieved through coursework are for the exclusive use of NMT to improve our programs.

The University

Accreditation

New Mexico Tech is accredited by the Higher Learning Commission (HLC) as a doctoral degree-granting university. Its credits are accepted by leading colleges and universities throughout the United States. It is approved by the Attorney General of the United States for the attendance of non-immigrant students, by the United States Department for Exchange Visitor Program P-I-1282, and by the Veteran's Approval Division of the Office of Military Affairs for attendance by students entitled to veteran's benefits.

HLC Contact Information:

Higher Learning Commission

230 South LaSalle Street

Suite 7-500

Chicago, IL 60604

800-621-7440

https://www.hlcommission.org/

NMT Contact Information:

New Mexico Tech

801 Leroy Place

Socorro NM 87801

575-835-5434

www.nmt.edu

The Bachelor of Science (BS) programs in Chemical Engineering, Civil Engineering, Electrical Engineering, Environmental Engineering, Materials Engineering, Mechanical Engineering, Mineral Engineering, and Petroleum and Natural Gas Engineering are accredited by the Engineering Accreditation Commission of ABET, under the commission's General Criteria and Program Criteria for Engineering programs, www.abet.org.

The Bachelor of Science program in Computer Science is accredited by the Computing Accreditation Commission of ABET, under the commission's General Criteria and Program Criteria for Computer Science and Similarly Named Computing Programs, www.abet.org.

The Undergraduate Program

At New Mexico Tech, the undergraduate program has two principal objectives:

1) to provide a strong general education in:

a) the humanities and social sciences, and

b) the basic sciences and mathematics; and

2) to offer specialization appropriate to a chosen major field of interest.

Specific requirements for each major are listed under the academic department concerned. It is your responsibility to work out with your advisor a program that meets both the general degree and major specific requirements. In some instances, wide flexibility is allowed in choosing electives; in others, the choice of electives is restricted.

Time Limit

Students have a maximum of ten years to complete their undergraduate coursework under degree requirements in effect at the initial term of matriculation. Students experiencing a break in enrollment who are readmitted to the institution are held to the curricular requirements in place at the term of readmission. Students maintaining continuous enrollment but who do not complete their degree requirements within ten years, may petition the appropriate academic dean to complete their degree requirements under the curricular requirements in effect during the term of admission.

Undergraduate Admission:

- Applying to New Mexico Tech
- Regular Admission of First-year Freshman
- Home-Schooled Students
- Transfer Students
- International Students
- Non-Degree Students (Undergraduate Level)
- Admission Denial Appeal Procedure

Undergraduate Student Status

Undergraduate Student Status

NMT offers many opportunities as an undergraduate student. Enrollment opportunities include: (clickable links)

- Degree-Seeking
- Classification of Degree-Seeking
- Certificate-Seeking
- Non-Degree Seeking
- Transfer
- Veteran
- Change of Student Status

Dual-Credit Program

For information regarding NMT's Dual-Credit program please follow the below link.

Dual Credit Program for High School Students

Accelerated Master's of Science Programs

New Mexico Tech offers programs that allow advanced undergraduate students to earn both a Bachelor's and Master's degree possibly within five years. Please refer to the catalog section on **Accelerated Master's Option** for more details about who qualifies. Not every program has an Accelerated Master option. If the department you are interested in offers this option they may also have additional requirements on top of what is described in the graduate section of the catalog.

Research Opportunities

Undergraduate Research Opportunities

Tech has a wealth of research projects on campus, many of which employ students for pay or class credit. Since over 99 percent of our faculty have Ph.D.s and conduct research, many professors hire undergraduate students to assist them. In addition, Tech has several divisions dedicated to research.

Study Abroad Opportunities

Arrangements for all types of study abroad are made through the Office for International Programs (Joseph A. Fidel Student Services Center, Suite 262). To be eligible to apply for participation, students must, at a minimum:

- be full-time, degree-seeking student at Tech for at least one year,
- completed at least 30 credit hours at Tech,
- have a cumulative G.P.A. of at least 2.5,
- be in good academic standing,
- have a clean disciplinary record,
- and be in good financial standing.

The Undergraduate Program

International Student Exchange

New Mexico Tech has exchange agreements in place with multiple universities, allowing students to study in various countries around the world. Information about these opportunities is available in the Office for International Programs (Fidel 262).

The Undergraduate Program

International Exchange through NMIEC

Through the New Mexico International Education Consortium, students at any of New Mexico's public universities may gain access to study abroad programs available at other New Mexico universities. Students who participate in study abroad through NMIEC will pay tuition and fees to the New Mexico host university, not to New Mexico Tech

Applying to New Mexico Tech

Welcome to Admissions

https://www.nmt.edu/admission/

The following is a summary of undergraduate admissions standards and policies. If you have not applied for admission, please apply through our website https://apply.nmt.edu/register/application_undergrad_admission.

New Mexico Tech seeks to admit students who have demonstrated, through previous education, aptitude tests, and interests, that they are qualified to complete a degree. Tech subscribes to the National Association for College Admission Counseling's Statement of Principles of Good Practice. All official documents sent to New Mexico Tech become the property of the college and will not be returned, nor can copies be provided to entities other than the student.

Applying to New Mexico Tech

Regular Admission of First-year Freshman

Regular Admission

Freshmen/First-year Admission Requirements

First-time, entering students must meet the following minimum admission requirements:

1. The student must be a graduate of an accredited high school with a minimum grade-point average (GPA) of 2.5 (on a 4.0 scale) in high school course work **or** have passed the general equivalency diploma (GED) examination with an average score of 500 **or** greater **or** achieve a HiSet combined score of 75 or greater to demonstrate College and Career readiness.
2. The student must have successfully completed the following high school courses (one unit equals one year of high school study):
    - English: a minimum of four units with at least one unit earned in composition at the junior or senior level.
    - Science: a minimum of two units of sciences, with laboratories, chosen from among biology, physics, chemistry, and earth science.
    - Mathematics: a minimum of three units chosen from among Algebra I, Algebra II, Geometry, Trigonometry, or higher mathematics. Pre-calculus and calculus are recommended.
    - Social Science: a minimum of three units, one of which must be history.
3. The student must submit an official ACT, Inc. (formerly American College Test) or SAT (Scholastic Aptitude Test) score reports. Normally, an ACT composite score of 21 or higher or a combined SAT Critical Reading and Math score of 1070 or higher is required. (Recent ACT scores for entering freshmen averaged 26; SAT, 1080.) ACT and SAT scores are also used for course placement and advising purposes. ACT/ SAT scores are not required for adult learners over the age of 23.

Test Optional Admission

The minimum admission requirement for a student classified as a first-time freshman using test optional admission.

1. A high school GPA of 3.0 **without** ACT or SAT scores.

- Students will need test scores to be considered for scholarships.
- Math Placement test eill be madatory prior to entry of first term.

Applying to New Mexico Tech

Home-Schooled Students

Home-Schooled Students

In order to qualify for admission to New Mexico Tech, the home-schooled student:

1. Must supply documentation of courses completed. The student must be a graduate of an accredited home-school with a minimum grade-point average (GPA) of 2.5 (on a 4.0 scale) in high school course work or have passed the general equivalency diploma (GED) examination with an average score of 500 or greater or achieve a HiSet combined score of 75 or greater to demonstrate College and Career readiness.
2. Must have successfully completed the following courses (one unit equals one year of study):
    - English: a minimum of four units with at least one unit earned in composition at the junior or senior level
    - Science: a minimum of two units of sciences, with laboratories, chosen from among biology, physics, chemistry, and earth science
    - Mathematics: a minimum of three units chosen from among Algebra I, Algebra II, Geometry, Trigonometry, or higher mathematics. Pre-calculus and calculus are recommended.
    - Social Science: a minimum of three units, one of which must be history.
3. The student must submit an official ACT, Inc. (formerly American College Test) or SAT (Scholastic Aptitude Test) score reports. Normally, an ACT composite score of 21 or higher or a combined SAT Critical Reading and Math score of 1070 or higher is required. (Recent ACT scores for entering freshmen averaged 26; SAT, 1080.) ACT and SAT scores are also used for course placement and advising purposes. ACT/SAT scores are not required nor reviewed for adult learners over the age of 23.
4. If you are deemed academically qualified, then you will receive a letter of admission and the *Acceptance of Admission* form. You must complete this form and return it with the non refundable admission fee of $100 to the Office of Admission before you are allowed to register for classes.

Test Optional Admission

The minimum admission requirement for a student classified as a first-time freshman using test optional admission.

1. A high school GPA of 3.0 **without** ACT or SAT scores.

- Students will need test scores to be considered for scholarships.
- Math Placement test eill be madatory prior to entry of first term.

Applying to New Mexico Tech

Transfer Students

Transfer Students

You will be considered a transfer student if you have a minimum of 30 credit hours transfer from an accredited college or university you have attended after graduating high school or completing your GED. (If you have fewer than 30 credit hours of transfer credit, or if you completed college credit as dual credit, follow the regular Freshman/first-year Admission section above.)

Admission Requirements

The minimum admission requirements for a student who is classified as a transfer student are as follows:

- The student transferring from another college or university must have completed the same high school coursework requirements as freshman/first -year student admission (either from high school or from equivalent courses taken since high school).
- The applicant must present official college transcripts showing a cumulative GPA of 2.0 or better.
- The applicant must place in Math 1240 (Pre-Calculus) or higher.
- The student must be in good academic standing at the last institution attended.
- The student must be eligible to re-enroll at the institutions from which they wish to transfer. An applicant who cannot re-enroll at that institution is not eligible to enter New Mexico Tech.

Procedure

To be considered for admission, a Transfer student applicant must:

1. Complete an Application for Undergraduate Admission and Scholarship.
2. May be asked to provide an official high school transcript at the discretion of the Office of Admission (although a high school transcript may not be needed for the admission process, an official High School transcript showing date of graduation will need to be provided to the Office of the Registrar; required of all students)
3. Provide official transcripts from all colleges attended, (official awarding of transfer credit cannot be completed until the university has received the official college transcripts)
    - Coursework completed at universities/colleges outside of the United States, will require transcripts to be submitted through WES: https://www.wes.org/ for a Comprehensive Course by Course Report. In addition course information in English may be requested
4. May be asked to provide an official ACT or SAT student Profile Report; and
5. If you are deemed academically qualified, then you will receive a letter of admission and the Acceptance of Admission form. You must complete this form and return it with the non refundable admission fee of $100 to the Office of Admission before you are allowed to register for classes.

Applying to New Mexico Tech

International Students

International Students

New Mexico Tech is authorized under federal law to enroll nonimmigrant alien students.

International Undergraduate Admission Requirements

1. International students must meet the basic secondary-education requirements for entering first-year students:
    - Science: at least two years of science (biology, physics, chemistry, earth science), with laboratory work
    - Mathematics: at least three years, including algebra, geometry, trigonometry, or higher mathematics. Pre-calculus and calculus are recommended.
    - Social Science: at least three years, one of which must be history.
    - Language: at least four years of language instruction in the native or national language.
2. The student's grade average must equal at least a GPA of 2.5 on a 4.0 scale.
3. A student whose native language is not English must submit a TOEFL score of at least 76 or an IELTS of at least 6.5. Information and application forms for this test may be obtained from: The College Board at https://www.ets.org/toefl
4. An international student transferring from another US post-secondary college or university must have completed the same secondary coursework as required of incoming first-year students. If all application materials are submitted before the deadline, official transcripts from previous post-secondary institutions will be evaluated for possible credit transfer before enrollment.

Medical Insurance

International students are required to show proof of medical insurance coverage before registration each semester. Specific requirements for students entering on J1 visas are explained at the time of admission. Failure to provide proof of insurance can lead to disenrollment.

Applying to New Mexico Tech

Non-Degree Students (Undergraduate Level)

Non-Degree Students (Undergraduate Level)

New Mexico Tech accepts, on a non-degree basis, part-time undergraduate students who are not pursuing a degree program. Non-degree seeking undergraduate students may take up to 6 credit hours or two classes (whichever is greater) per semester. International students in F or J status must be degree-seeking and full-time students.

Applicants for non-degree undergraduate admission who wish to take academic courses for college credit and who have previously attended an institution of higher education must have a transcript or letter sent from the registrar of their most recently attended institution. This letter, addressed to the New Mexico Tech Office of Admission, should attest that they are in good standing at that institution. Students under probation or suspension at New Mexico Tech or any other institution of higher education will not be admitted as non-degree students except by appeal to the Academic Standards and Admission Committee.

Appeals should be addressed to the committee in care of the Office of the Registrar. To review the appeal process, please see page

Non-degree students not seeking a bachelor's degree from New Mexico Tech are expected to meet the prerequisite or corequisite requirements of academic courses but are otherwise free to choose program courses best suited to meet their individual needs with approval from the Associate Dean of Student Success

Non-degree seeking students who have a bachelor's degree are regarded by New Mexico Tech as Non-degree Graduate Students. Non-degree Graduate Students will be charged tuition at undergraduate rates for courses numbered less than 3000 and graduate tuition for all courses numbered 3000 and above.

Non-degree students who wish to begin a degree seeking program must apply for regular degree-seeking admission. To apply for admission please review the Admission policies and Application of Admission on page

Applying to New Mexico Tech

Admission Denial Appeal Procedure

Appeal of Admission Decisions

If you have been denied admission to New Mexico Tech, but believe that you have the skills to succeed at New Mexico Tech, you may appeal your admission decision.

To appeal an admission decision please provide supporting documents to the Director of Admission to include:

- A completed Application forAdmission and Scholarship with supporting documents. These supporting documents must include:
    - Letter of appeal (A statement from you indicating why you believe that you should be considered for admission and why you can succeed at Tech)
    - A minimum of two letters from people (e.g., high school science and math teachers) who are very familiar with your potential for study at a technical university; and
    - Other documentation (e.g., participation in science fairs, Science Olympiad, and other relevant technical activities) that you believe bears on the matter of your preparation for bachelor's-level study
- Official HS transcript if needed
- Official college transcripts if the student has taken any college courses
- SAT/ACT score report if needed

Student Status

Degree-seeking Students

Undergraduate students who are pursuing a degree program are classified as regular students. Full-time regular students are those who enroll for 12 or more credit hours during the fall and spring semesters; part-time regular students are those who enroll for fewer than 12 credit hours. (This designation does not apply to graduating seniors.) These students shall be subject to the following:

- Part-time students will be eligible for financial aid only in proportion to their course loads and will be subject to restrictions imposed by federal and/or state guidelines.
- In order to maintain satisfactory progress and remain in good standing, the part-time student must meet the same standards as full-time regular students.

Student Status

Non-Degree Students

Students who are not pursuing a degree program are classified as non-degree students. While non-degree students are free to choose program courses best suited to meet their individual needs, they are expected to meet the prerequisite or corequisite requirements for chosen academic courses. Non-degree undergraduate students may enroll for no more than six credit hours per semester. Non-degree students must change to regular status in order to graduate.

Student Status

Classification of Degree-seeking Students

Undergraduate students are classified by the number of credit hours they have completed:

	Freshman	0 to 29 credit hours
	Sophomore	30 to 59 credit hours
	Junior	60 to 89 credit hours
	Senior	90 credit hours and above

Student Status

Transfer Students

Students in good academic standing at other colleges and universities (2.0 minimum GPA) are eligible for transfer admission to New Mexico Tech. Credits taken at another institution will be evaluated and transferred on a course-by-course basis. See transfer section for information on how to apply for admission and transfer of credit.

Student Status

Veterans

The Veterans Administration requires students on the GI Bill to carry a minimum of 12 credit hours (6 credit hours in summer) to qualify for full benefits. The minimum credit hours must apply toward the student's degree requirements. Physical Recreation (PHED), Studio Arts (ARTS), and Community Education (designated by the letter "C" in the course number) courses do not count toward the minimum credit hours for veterans.

If, for some reason, the student desires to drop a course during the semester that would bring the load below 12 credit hours, permission must first be obtained from the student's academic advisor. NMT's VA Representative must be notified that the student is dropping from full-time enrollment at the time the change of program card is returned to the Office of the Registrar.

Further information can be obtained from the VA Representative, located in the Office of Registrar Office. Joseph A. Fidel Student Services Center, Suite 288.

In accordance with Title 38 US Code 3679(e), this educational institution adopts the following additional provisions for any students using the U.S Department of Veterans Affairs (VA) Post 9/11 G.I Bill® (Chapter 33) or Vocational Rehabilitation & Employment (Chapter 31) benefits, while payment to the institution is pending for VA.

This educational institution will not:

- Prevent the student's enrollment;
- Assess a late penalty fee to the student;
- Require the student to alternative or additional funding;
- Deny the student access to any resources (access to classes, libraries, or other institutional facilities) available to other students who have satisfied their tuition and fee bills to the institution.

However, to qualify for this provision, such students may be required to:

- Produce the student's enrollment;
- Provide a written request to be certified;
- Provide additional information needed to properly certify the enrollment as described in other intuitional policies.

GI Bill® is a registered trademark of the U.S Department of Veterans Affairs (VA). More information about education benefits offered by VA is available at the official U.S. government website at https://www.benefits.va.gov/gibill

Student Status

Certificate-seeking Students

Undergraduate certificates are available to degree and non-degree seeking students. Certificate applicants must meet the certificate admission requirements. Completed applications are submitted to the Community Education program. For Admission information to the certificate program, please refer to the Community Education Program.content

Student Status

Change of Student Status

Non-degree to degree-seeking Status

To change from non-degree to regular student status, the student must meet all regulations governing regular admission and must submit an *Application for Undergraduate Admission and Scholarship* through the Office of Admission. Students admitted under non-degree status, who do not otherwise qualify for regular admission, may apply to the Office of Admission for degree-seeking status after successful completion of 30 credit hours at Tech.

Degree-seeking to Non-degree Status

A degree-seeking student who is no longer pursuing a degree program may petition to change to non-degree student status at the Office of the Registrar.

Dual Credit Program for High School Students

Dual credit is a program that provides public high school students the opportunity to receive credit for both a high school course and a college course by taking a single qualifying course. Dual credit is a state statute, revised in 2007 by the State Legislature – Senate Bill 943, Statutory Authority, Section 9-25-8 NMSA (01/01/08). Concurrent enrollment functions similarly but does not require that the college course be aligned with a corresponding high school course. Consequently, the student is not guaranteed that the high school will accept the college credit toward the high school graduation requirement.

The primary purpose of the Dual Credit Program at New Mexico Tech is to increase the educational opportunities and options for high school students and increase the overall quality of instruction and learning available through secondary schools. The Dual Credit Program allows students to earn credit at the secondary and postsecondary levels simultaneously and provides students an early glimpse of college life and college-level studies. Enrolling in college coursework is a commitment of your time and energy. Please consider whether enrolling in the Dual Credit Program is a realistic option based on your extracurricular activities and family schedules.

Students interested in participating in the Dual Credit Program at New Mexico Tech must be prepared for the following:

- Students are responsible for their own transportation to and from New Mexico Tech's campus.
- Students are expected to adhere to New Mexico Tech's student handbook while on New Mexico Tech's campus and attend the class or classes in which they are registered even if the high school is not in session that day.
- New Mexico Tech's academic calendar starts and ends differently than most high school calendars.
- Students who take courses that are not part of the approved course list agreed upon between the District and New Mexico Tech will be responsible for all costs of attendance including tuition, fees, and textbooks.
- Students must follow New Mexico Tech's Registration schedule each semester.
- Students are required to participate in the Dual Credit Program Orientation the first semester they participate in the Dual Credit Program.
- Grades earned through the Dual Credit Program at New Mexico Tech are part of your permanent academic record.

Types of Dual Credit

Dual credit courses provide an accelerated path to success in college or career. Developmental or remedial courses and physical education courses cannot be taken for dual credit.

College Offered

1. One form of dual credit, referred to as college-offered, requires that the student attend regularly scheduled New Mexico Tech courses, either on campus or at an off-site location, which may include the high school site after hours.
   School Offered
2. Another form of dual credit, referred to as school-offered, allows students to receive college credit for courses they are taking at the high school.

Eligibility & Application Process

Admission to the dual credit program does not constitute regular admission to New Mexico Tech. To be considered for dual credit or concurrent enrollment it is necessary for the student to meet the following minimum eligibility requirements:

To qualify for college-offered or school-offered dual credit, a high school student must:

1. Be a public high school, private high school, or home school student;
2. For college-offered courses, be at least 16 years old (exceptions can be made in certain situations with approval of a parent, high school principal, and college dean or Associate Vice President for Academic Affairs);
3. For college-offered courses, achieve minimum qualifying score on the ACT, PSAT, SAT, or take the appropriate departmental placement exam;
4. For school-offered courses, there are no age or grade restrictions; and
5. Have a minimum 2.5 GPA;
6. Submit the following each semester:

- Completed Dual Credit Request Form (signed by your high school counselor)
- Current official high school transcript
- Family Educational Right to Privacy Act Release Form (signed by the student and the student's parent/guardian) Copies of the forms are available at the high school counseling office.

Students who are denied participation in the dual credit program may appeal through the same process as regular NMT students, or through the New Mexico Public Education Department's Dual Credit Committee.

Procedures for Dual Credit Application and Registration

1. The Socorro HS student meets with the HS Dean of Students (who certifies the HS student's eligibility).
2. The PED Dual Credit Form is initiated at the HS and includes the student's SSN and STARS ID along with the requested class (that satisfies HS requirements).
3. The completed form and official HS transcript is sent to NMT's Dean for Student Success Initiatives. Additionally, if there is a need to request accommodations, it is recommended that the student's IEP be included with their paperwork. NMT's Dean for Student Success Initiatives will connect the student to Student Access Services who can discuss requested accommodations and the necessary steps to request them at NMT (as the process in K-12 schools is different from higher education institutions).
4. NMT's Dean for Student Success Initiatives reviews the form. If there are any questions, they will contact the student (e.g., regarding their course request, math placement).
5. Once approved, NMT's Dean for Student Success Initiatives registers HS students for the appropriate courses. They will also send the registration information to Socorro HS's Dean of Students.
6. An official transcript is sent to Socorro HS by NMT's Office of the Registrar at the end of the semester.
7. Pending successful completion of the first semester, students may enroll in up to two courses in subsequent semesters.

Continued Eligibility

In accordance with the New Mexico State Public Education Policy & Procedures for Dual Credit, in order to maintain dual credit eligibility, students must:

continue to demonstrate readiness for college coursework;

make continued progress toward high school graduation;

maintain half-time high-school enrollment until graduation requirements are completed;

obtain a course grade of C or better for each course taken, not obtain withdrawals or incompletes for dual credit courses, and not enroll in a dual credit course to audit or for an S/U grade.

If these conditions are met, students may enroll in two dual-credit courses per semester (including recitation and labs) until all core high school graduation requirements (other than electives) are completed. Students who have completed all core high school courses may enroll in up to four dual credit courses. Home school and private school students are limited to two courses per semester according to the New Mexico Public Education Department's Dual Credit Policy & Procedures.

Students who have not met the above requirements will retain "provisional dual credit eligibility." Students with provisional eligibility may register and enroll in one dual credit course per semester until they meet the above requirements.

Financial Aid

Dual Credit students are not eligible for federal financial aid.

Course Selection

Course selection will vary based on the Master Agreement with each high school district and New Mexico Tech. Students interested in enrolling in a math class are required to take the Math Placement Exam to determine course placement prior to registering for the class. Students are also required to meet with the Associate Dean for Student Success at New Mexico Tech prior to enrolling in any course and must satisfy prerequisite/corequisite requirements for the class.

Accelerated Master's of Science Programs

New Mexico Tech offers programs that allow advanced undergraduate students to earn both a Bachelor's and Master's degree possibly within five years. Please refer to the catalog section on **Accelerated Master's degree** for more details about who qualifies. Not every program has an Accelerated Master option. If the department you are interested in offers this option they may also have additional requirements on top of what is described in the graduate section of the catalog.

Research Opportunities

Tech has a wealth of research projects on campus, many of which employ students for pay or class credit. Since over 99 percent of our faculty have Ph.D.s and conduct research, many professors hire undergraduate students to assist them. In addition, Tech has several divisions dedicated to research.

Study Abroad Opportunities

Arrangements for all types of study abroad are made through the Office for International Programs (Joseph A. Fidel Student Services Center, Suite 262). To be eligible to apply for participation, students must, at a minimum:

- be full-time, degree-seeking student at Tech for at least one year,
- completed at least 30 credit hours at Tech,
- have a cumulative G.P.A. of at least 2.5,
- be in good academic standing,
- have a clean disciplinary record,
- and be in good financial standing.

International Student Exchange

New Mexico Tech has exchange agreements in place with multiple universities, allowing students to study in various countries around the world. Information about these opportunities is available in the Office for International Programs (Fidel 303).

International Exchange through NMIEC

Through the New Mexico International Education Consortium, students at any of New Mexico's public universities may gain access to study abroad programs available at other New Mexico universities. Students who participate in study abroad through NMIEC will pay tuition and fees to the New Mexico host university, not to New Mexico Tech

The Graduate Program

(www.nmt.edu/gradstudies)

The graduate program provides opportunities for advanced study and research in the Basic Sciences, Computer Science and Mathematics, the Earth Sciences, and several Engineering fields at both the Masters and Doctoral level. Our Master of Science for Teachers program provides a growing number of New Mexico secondary school teachers with science and mathematics tools to challenge students in their classrooms. The Master of Engineering and Professional Masters programs provide a unique opportunity for working engineers and scientists to obtain the skills needed for expanding responsibilities in the technology fields. Students are provided the opportunity to learn the spirit as well as the methods of productive scholarship.

Graduate Admissions

Applying for Graduate Admission

Regular Admission (Degree-Seeking)

Interested persons who have completed or will complete a Bachelor's degree prior to admission and have a record that indicates good potential for advanced study (undergraduate GPA of 3.0 is used as a general guideline) and research in Tech's programs are encouraged to apply for admission to graduate study. All applications for degree seeking admission must be submitted via our online system found at www.nmt.edu/gradstudies. Questions about NMT's graduate school can be directed by e-mail to graduate@nmt.edu.

For full consideration for assistantships and fellowships, completed applications must be received by listed for the individual departments as listed on https://www.nmt.edu/gradstudies/programs.php

To be assured of consideration for admission, completed domestic applications must be received no later than August 1 for the fall semester, January 2 for the spring semester, and May 1 for the summer semester. To allow enough time for the admission decision and the acquisition of passports and visas, international students are advised to make sure their application, supporting documents, and application fee are in the Center for Graduate Studies by March 15 (for summer and fall semesters) or by September 15 (for spring semester).

Admission to graduate study at New Mexico Tech and the award of financial aid are made to qualified individuals without regard to race, color, creed, sex, or national origin.

Graduate Admissions

Non-degree or Pre-degree Admission

Those who have earned Baccalaureate degrees and wish to earn graduate credits without immediately pursuing a graduate degree may apply as non-degree or pre-degree seeking students. The application process does not require the submission of official academic credentials, reference letters, or test scores; however, transcripts from prior institutions are required for review. Non-degree or pre-degree applicants must submit unofficial transcripts showing completion of a Bachelor's degree or higher from a U.S. regionally accredited institution or from an international institution officially recognized by that country.

Admission as a non-degree or pre-degree student does not guarantee registration in specific courses or acceptance of these courses for credit toward future degree programs. Students are encouraged to contact the department offering the courses they are interested in to determine eligibility and any additional requirements.

Non-degree or pre-degree students are not eligible for most forms of financial aid, including assistantships, fellowships, and student employment. International students on an F-1 visa typically do not qualify for in-person non-degree or pre-degree study.

If non-degree or pre-degree students later decide to pursue a formal degree program, they may apply for degree-seeking status using the online application system found at www.nmt.edu/gradstudies.

Admission as a non-degree or pre-degree student does not guarantee acceptance into a degree program.

Graduate Admissions

Application Requirements

Students seeking regular admission are required to provide, in addition to completed application forms, the following:

1. Transcripts
    - Unofficial transcripts may be uploaded to the online application system but official transcripts are required before matriculation.
    - Official transcripts from universities in the United States are to be submitted directly to the online system.
    - Sealed, official transcripts of all international college work must be mailed directly to the Center for Graduate Studies at the address above. Need the address.
2. References from three professors and/or employers familiar with the applicant's academic, professional, and/or research performance. The following programs have the following exceptions
    - Master of Science for Teachers (MST) only two letters of reference are required, preferably at least one from the student's department chair or principal, indicating the student's interest and abilities related to the pursuit of their MST degree.
    - Master of Engineering Management (MEM) it is preferred to have at least one reference out of the required three forms/letters be submitted by a past or current supervisor. If the applicant is an entrepreneur with no supervisor, a reference form/letter from a business associate is acceptable.
    - For Certificates only two reference letters are required.
3. The required application fee.
4. Official Graduate Record Examination (GRE) scores. Please refer to the listings at http://www.nmt.edu/gradstudies/programs.php for the GRE general examination requirements for each program. If the student's GRE scores are required by the program to which the student is applying, but they are no longer available because they were taken too long ago, the student must retake the GRE examination. (Unofficial copies may be used for application, but official copies are required before matriculation.) A few departments may also require a subject test score. Information related to departmental requirements for the subject GRE may be on the programs page listed above. The subject test must be in the same field in which the applicant intends to major. GRE is not required for the Master of Science for Teachers
5. A statement of the applicant's goals. This short (two pages or less) statement should summarize the applicant's career goals and briefly describe what they seek to gain by pursuing their specific program of interest.
6. Domestic applicants seeking financial aid of any kind are strongly encouraged to submit a completed Free Application for Federal Student Aid (FAFSA) form. The FAFSA form is available online from http://www.fafsa.ed.gov/ .

International Students

New Mexico Tech is authorized under federal law to enroll nonimmigrant alien students. International applicants whose native language is not English are required to take, in addition to the GRE, one of the following:

- The Test of English as a Foreign Language (TOEFL). An internet-based TOEFL (iBT) score of 76, computer administered score of 207 or paper-administered score of 540; Or
- The International English Language Testing System (IELTS) examination. IELTS score of 6 is used as a minimum for admission.

Financial statements need to be uploaded in the online application system as part of the admission process. Applications from international students, complete with supporting documents, and application fee must be submitted by March 15 (for summer and fall semester) or by September 15 (for spring semester) to allow enough time for the admission decision and the acquisition of passports and visas. To be assured of consideration for assistantships and fellowships, completed applications must be received by the appropriate deadlines as listed on https://www.nmt.edu/gradstudies/programs.php Tuition and fees are payable upon registration. Deferred payment plans are available for those holding assistantships.

Admission Types

Regular

Degree seeking applicants that meet admission requirements and have been accepted into a degree program are classified as regular students.

Provisional

Applicants for regular admission may be granted provisional admission if their previous work is deficient in either quality or quantity. Subject to the major department's approval, students admitted provisionally may be advanced to regular graduate student status after one or more semesters of satisfactory academic performance and completion of the designated deficiencies. Credits earned for designated deficiencies may not be used towards a graduate degree. Students admitted or placed on provisional status must advance to regular status before a degree can be conferred. Students admitted or placed on provisional status are not eligible for financial support including assistantships and cannot work on campus.

Non-Degree or Pre-Degree

Those who have Baccalaureate degrees and who wish to earn graduate credits as their qualifications warrant may be admitted as Non-Degree or Pre-Degree Graduate students. If a student identifies either a certificate or a degree program that they would like to pursue eventually they will be considered pre-degree graduate students and will help their advisor guide them through the process of transitioning towards a regular status and how to pursue either a certificate or a degree program. Requests for transfer to regular status must be made using the application for regular admission. No more than 6 credit hours earned as a Non-Degree or Pre-Degree graduate student may be applied toward a graduate program.

Accelerated Master / Dual Registration

Simultaneous registration as a graduate student and undergraduate student may be approved subject the following conditions:

1. Admission to an Accelerated Master's Program:
    1. The student must have a minimum grade-point average of 3.0, and
    2. The student must apply to one of the approved Accelerated Master's programs and be admitted to the graduate program.

Once admitted to the graduate program, the Accelerated Master's student will spend his or her senior year as a dual registered student. After completion of the undergraduate program and earning the bachelor's degree the student transitions to graduate student standing and will be eligible for graduate assistantships.

2. In the last semester before graduation, any student may apply for dual registration in his or her last semester before graduation under the following criteria:
    1. The student has applied for admission and been accepted to the graduate program;
    2. The student is within nine credit hours of the undergraduate degree;
    3. The required undergraduate credits must be completed in the first semester;
    4. The student has a minimum grade-point average of 3.0; and
    5. Where more than one department is involved, the approval of the undergraduate's major department must be obtained.

Dual registration students and Accelerated Master Students are charged undergraduate tuition and are not eligible for assistantships and fellowship appointments but may have work authorizations.

Graduate Cost and Assistance

Cost of Attendance

Visit the web page at NMT Tuition and Fees for up to date information on costs. In-state tuition rates, which reduce the total amount due, are available to non-resident and international students only if they:

- Have been granted assistantships,
- Have been selected for qualified fellowships that cover the entire period of the semester, or
- They request participation in the Western Regional Graduate Program with their acceptance of admission and are documented residents of a state in the Western Interstate Commission for Higher Education: Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, North Dakota, Oregon, South Dakota, Utah, Washington, Wyoming, the Commonwealth of Northern Mariana Islands, or Guam.

Financial Assistance for Graduate Students

The majority of regular graduate students at New Mexico Tech receive financial aid in the form of assistantships, fellowships, study grants, or part-time employment. Requests for financial support should be made on the application form or in writing to the department if the student is already registered.

To qualify for these aids, the student must first be admitted as a *regular full-time student*. Continuation of the award is contingent upon the student maintaining the minimum level of registration (at least 12 credits each fall and spring semester and 3 credits during the summer semester; 3000-5000 level courses; courses such as physical recreation, health and wellness, fine arts, and community education never count toward full-time or contract (12 credits) registration.) and satisfactory academic progress as described below.

A student failing to complete the length or terms of his or her contract forfeits the right to obtain a new or replacement contract during the interval covered by the original contract. A student failing to maintain registration requirements while on contract forfeits the right to obtain a contract during the *next registered semester*. A student failing to satisfactory academic progress forfeits the right to all funding support and may or may not be funded subject to determination of the sponsor. Fellowships are grants-in-aid for full-time study and research leading to an advanced degree. Assistantships normally require half-time service in teaching or research. Quarter-time appointments may be made in some cases. Students holding assistantship appointments qualify for resident tuition.

Assistantships and fellowships are awarded to qualified U.S. citizens and international students to support them in their educational objectives. The advisor, the department chair, and the Dean of Graduate Studies must approve any additional employment or remuneration.

Graduate Cost and Assistance

Assistantships

Teaching Assistantships

Teaching assistants are typically appointed for nine months at competitive stipend levels. Additional teaching duties or research opportunities during the summer available. Teaching assistants will have from six to ten contact hours per week plus preparation and grading of assigned recitation, laboratory, or tutorial duties. The maximum teaching load for regular instructional duties is six credit hours. Students with teaching assistantships must attend teaching training the week before the fall semester begins.

Research Assistantships

Many graduate students are supported on grants, contracts, or division research funds under the supervision of a faculty member. Research done under the assistantship may or may not be applicable to thesis or dissertation requirements. Research assistants commonly receive summer appointments as well as nine-month academic year appointments.

Assistantship Eligibility

Regular, full time graduate students are eligible for assistantships. Part-time students, dual- registered, 5-year, provisional students, and Non-Degree and Pre-Degree graduate students are not eligible for assistantships.

Causes for Revocation

A graduate student may lose their appointment if they are placed on warning, if they take a leave of absence, or if they do not adequately perform their required duties. Upon the students return from a leave of absence, they must reapply for the assistantship. A graduate student may also lose their appointment by exceeding the financial time limits for completion of the requirements for their degree (1.5 times the credits required for the student's degree). If the student has been making good progress and has the support of their advisor and department chair, the Graduate Dean may authorize an extension of support.

Graduate Deferred Payment Plan

To lessen the amount of money required for tuition and fees at the beginning of each semester, graduate assistants may elect to take advantage of the Graduate Deferred Payment Plan. This plan allows eligible students to distribute payment of tuition and some fees over the course of the semester.

Graduate Student Appointments

Appointments are processed electronically. Once fully signed the student will get a copy with all the relevant information regarding when they will be paid, number of pay periods, and the amount of each payment. Pay will not commence until after the appointment form is fully signed and eligibility requirements have been met.

Annual Leave

Graduate students on twelve-month assistantship or fellowship contracts are allowed two weeks of annual leave. Scheduling of the vacation period will be worked out with the advisor. Teaching assistants follow the regular academic calendar, with some variation in programs that hold special summer sessions.

Academic Freedom and Tenure

Graduate student teaching and research assistants are included in New Mexico Tech's academic freedom and tenure policy.

Graduate Cost and Assistance

Employment

Part-time, on-campus employment is sometimes available to regular, full-time graduate students for up to 20 hours per week. Hourly campus employment requires a minimum registration of six credits in the fall and spring semesters, while assistantships require a minimum registration of 12 credits. Students who are not progressing towards their degree over the summer may have campus employment if they are pre-registered full-time for the fall semester.

Graduate Cost and Assistance

Financial Aid for Graduate Students

For the most up to date information please visit the page for Financial Aid or visit their webpage at https://www.nmt.edu/finaid/

Graduate students who are U.S. citizens or resident aliens are eligible to apply for Direct Stafford Unsubsidized Student Loans and Direct Graduate PLUS Loans. Regular graduate students must be registered for at least six hours per semester to be eligible for federal aid.

Satisfactory Academic Progress for Financial Aid

Financial Aid offices are required to have a policy regarding Satisfactory Academic Progress. The purpose of this policy is to measure a student's academic progress in both a quantitative and qualitative way. This is done by measuring both credit hours earned and cumulative grade point average. To continue receiving Federal Financial Aid students must meet the minimum requirements set in New Mexico Tech's Satisfactory Academic Progress Policy. Be aware that these standards are not the same as New Mexico Tech's standards for academic probation and suspension.

At New Mexico Tech, satisfactory academic progress is reviewed at the end of each payment period (semester). The Satisfactory Academic Progress Policy applies to graduate students that participate in the Federal Work Study, Federal Direct Loan, or Federal Direct Grad PLUS Loan programs.

To be in good standing for Financial Aid purposes a graduate student must earn at least 67% of the hours they attempt with a cumulative GPA of at least 3.0. If a graduate student falls below this standard, the student will be placed on financial aid warning for the following semester. During this semester, the graduate student will still be eligible to receive aid. To get back in good standing, the graduate student will need to meet the policy requirements by the end of the working semester. If the graduate student does not meet the policy requirements by the end of the warning semester, the graduate student will be placed on financial aid suspension. Once a student is on financial aid suspension, he/she is not eligible for any Federal Financial Aid until the standards of the Satisfactory Academic Progress Policy have been met or an appeal is approved.

Students have the opportunity to appeal the determination that they are not making satisfactory academic progress. To appeal the student will need to complete an Appeal Form. On that form the student will need to explain why he\she failed to meet our Satisfactory Academic Progress standards and what has changed that will allow him\her to meet the standards by the end of the next semester. If an appeal is approved the student's Satisfactory Academic Progress status will change to either Probation (1 semester of eligibility) or Probation with a plan (Continued eligibility as long as conditions of individual plan are met).

There is also a maximum financial aid timeframe that a student has to complete a graduate degree. The maximum is 1.5 times as many credit hours as the minimum required for the specific degree. This includes all hours attempted at that level.

Fellowships

Fellowships for the support of graduate students are available from the Institute, professional and industrial organizations, and certain federal agencies. Amounts range from those covering tuition and fees to full support including monthly stipends. Fellows must devote full time to studies and research.

Graduate Research Opportunities

Research Opportunities

Outstanding opportunities for a wide range of field investigations in the sciences and engineering disciplines are made possible by New Mexico Tech's location in the Southwest. Langmuir Laboratory, at an elevation of 3,240 m (10,630 ft) in the nearby Magdalena Mountains, is a unique facility for the study of thunderstorms and other atmospheric phenomena.

The Very Large Array (VLA) radio telescope on the plains to the west of Socorro and the Magdalena Ridge Observatory located on the mountain near the Langmuir Laboratory, provide extraordinary opportunities for astronomical research. Headquarters for the VLA and Very Long Baseline Array (VLBA) radio telescopes are located on campus (the VLA and VLBA are facilities of the National Radio Astronomy Observatory, distinct from New Mexico Tech). Graduate students in the earth sciences are afforded expanded research and funding opportunities through the National Science Foundation research consortium, the Program for Array Seismic Studies of the Continental Lithosphere (PASSCAL), located on campus and tasked with exploring the Earth's interior through the collection, distribution, and analysis of seismic data.

Present on campus are the New Mexico Bureau of Geology and Mineral Resources and the Petroleum Recovery Research Center, making New Mexico Tech especially attractive for graduate study in the Earth, mineral science and engineering fields.

The Energetic Materials Research and Testing Center provides opportunities for graduate work in Materials and mineral engineering, mechanical engineering, chemistry, physics, geophysics, computer science, and applied mathematics. The Playas Training and Research Center provides a unique setting for research related to urban combat, drug interdiction and border security training programs, complete with state-of-the-art surveillance and monitoring equipment.

The Institute for Complex Additive Systems Analysis (ICASA) is dedicated to studying the behavior, vulnerabilities, and predictability of complex systems. ICASA's unique, interdisciplinary, strategic approach harnesses information-age relevant research, application of that research to real-world problems, development of key enabling technologies, and training and education of our nation's next generation of critical systems thinkers.

The Computer Science and Engineering Department in collaboration with ICASA has been designated as a National Center of Excellence in Information Assurance Education and Research by the National Security Agency and the Department of Homeland Security. The associated Scholarship for Service program provides funding for student education and training in cyber security to prepare them for government service in the broad transdisciplinary field of cybersecurity.

Faculty and facilities from all divisions of Tech provide advanced courses and research opportunities for graduate students.

Graduate Program Policies & Procedures

HERE YOU WILL FIND INFORMATION REGARDING GRADUATE PROGRAM POLICIES AND PROCEDURES OF THE FOLLOWING.		
• Graduate Student Status • Changing Student Classification • Changing Departments or Majors • Advisor and Advisory Committee • Registration & Enrollment • Readmission	• Time Limits • Leave of Absence • Graduate Co-op Experience • Graduate Degrees for Faculty & Staff • Satisfactory Academic Progress • Thesis, Independent Study, & Dissertation	• Transfer Credits • Tuition & Fees • Appeals • Work Authorizations • Postdoctoral & Visiting Scholars • Research Integrity Policy

Graduate Student Status

Regular

A regular graduate student is a degree-seeking student admitted to a graduate degree program at New Mexico Tech.

Regular Full-Time

A regular full-time student is one enrolled for nine to thirteen credit hours per fall or spring semester (three credit hours in the summer semester). In the fall and spring semesters, graduate students may register for a 13th credit of Community College or Physical Recreation courses at the 1000-2000 levels. Such registrations carry no additional tuition charge. Courses numbered 3000 level or above to be counted for the graduate degree, non-credit Community College classes and 1000/2000- level classes required as deficiency courses do not qualify for the tuition free 13th credit. Graduate students on assistantships must register for 12 qualifying credits in fall and spring and 3 credits in summer (3000-5000 level).

Regular Part-Time

A regular part-time student is one enrolled for eight or fewer credit hours per semester and is *not eligible* for financial support. To be admitted as a part-time graduate student, an applicant must meet the same standards for admission as a regular full-time graduate student. Changes in full-time/part-time status are only granted in extraordinary circumstances for students who are in good standing, with the exception of students who have completed all degree courses and credit requirements, who may request becoming part-time with the approval of their advisor. See the student handbook for details on changing status.

Regular Distance

A regular distance student is one admitted to one of the graduate degree programs that incorporate distance delivery as a major component of its instructional offerings. Distance graduate students are typically place bound or employed full-time. To be admitted as a regular distance graduate student, an applicant must meet the same standards for admission as a regular full-time or part-time graduate student.

Distance students register for as many credits as are necessary, but typically not for more than 13 credits. Each distance student must register for at least one semester in each academic year to be regarded as a continuing student. Failure to do so will require that the student reapply for admission to the graduate program and if readmitted, the student will be required to meet the requirements of the current catalog.

Provisional

Provisional (full-time, part-time, or distance) graduate status may be granted to students whose previous work is deficient in either quality or quantity. Subject to the major department's approval, students admitted provisionally may be advanced to regular graduate student status after one or more semesters of satisfactory academic performance and completion of the designated deficiencies. Credits earned for designated deficiencies cannot be used towards a graduate degree. Students admitted or placed on provisional status must advance to regular status before a degree can be conferred. Provisional students are not eligible for financial support and cannot work on campus.

Non-Degree or Pre-Degree

A non-degree or pre-degree graduate status provides an opportunity for those who have baccalaureate degrees to earn up to nine graduate credits hours per semester. Students in either of these statuses are not degree candidates and are not eligible for assistantships, fellowships, and student employment. The Graduate Dean will either serve as the advisor for non-degree and pre-degree graduate students or designate a faculty member as advisor. Requests for transfer to regular status must be made using the application for regular admission. This status does not guarantee registration in certain courses. The student may need to contact the department offering the courses they intend to take to ensure eligibility.

No more than 6 credit hours earned as a non-degree or pre-degree graduate student may be applied toward a graduate program.

Changing Student Classification

Part-time to Full-time

A student in good standing (cumulative GPA of at least 3.0 and not on warning), may petition the Center for Graduate Studies to be changed from part-time to full-time. The petition must bear the endorsements of the student's advisor and department chair.

Full-time to Part-time

A great deal of importance on getting graduate students through their programs quickly as full- time students so that they can begin their careers. A graduate student's chances of earning their degree are dramatically reduced if they depart Tech before they have completed all requirements and have their completion signed off on.

Changing to part-time status is available after all coursework for the student's degree has been completed if and only if the student's advisor approves this change and the student is not receiving financial support for their degree. To request this change, write a petition requesting the change. The petition must bear the endorsements of the student's advisor and department chair.

If extraordinary circumstances suggest that a student might better complete their degree as a part-time student, the student may request a change in their status. If the student is in good standing (cumulative GPA of at least 3.0 and not on warning), the student may petition the Dean of Graduate Studies to be changed from full-time to part-time. To receive consideration, the petition should explain the student's extraordinary circumstances, why the student finds it necessary to prolong their studies and details the student's plan for completion. The petition must bear the endorsements of the student's advisor and department chair.

Provisional to Regular

After at least one semester of satisfactory academic progress, a student may petition the Dean of Graduate Studies for a change in status to regular graduate student status. Ideally, the student's department will have specified the conditions required for admission to regular status at the time a student was admitted to provisional status. Such specific conditions must be met prior to conversion to regular graduate student status. The petition must be endorsed by the student's department chair.

Regular to Non-Degree or Pre-Degree

If a student has been dropped from their graduate program for academic reasons and they are a US Citizen or Permanent Resident, they may apply to the Center for Graduate Studies for non-degree or pre-degree student status. This is not done automatically. There is a limit of 6 credits taken as a non-degree or pre-degree graduate student that may apply, with committee approval, to any graduate program.

Non-Degree or Pre-Degree to Regular

If a student was not previously in a graduate degree program at Tech, they must apply for regular admission and be accepted by the department where they would like to study.

If a student seeks readmission to a graduate degree program, their requirements for readmission depend on their status before they transition to non-degree or pre-degree status (i.e., whether the student is full-time or part-time). If the student was full-time, they must first complete six credit hours within a single semester in courses approved for the degree program with a grade-point average of 3.0 or better and no grade less than C. If the student were part time, they must complete two or three credit hours within a single semester with a grade-point average of 3.0 or better and no grade less than C. The petition for readmission will then be considered by the department the student wishes to rejoin. The request must be approved and endorsed by the department chair before it will be considered by the Dean of Graduate Studies.

Graduate Program Policies & Procedures

Changing Departments/Majors

If a student is admitted to one program and later decides that they would like to change to another program, they may do so, but there are some requirements. If the student is in good standing in their current program, they may transfer departments with the approval of their advisor, department chair, and the Dean of Graduate Studies as long as the new program has granted them admission. This requires an application to the new program.

Should the student wish to change departments after being dropped from a program, they must wait one semester before the new department may consider their application. During this waiting period, the student may enroll in classes at New Mexico Tech only as a pre-degree student.

Graduate Program Policies & Procedures

Advisor and Advisory Committee

Each regular and provisional graduate student will be assigned a temporary advisor by the department from the student's major field of study at the time of first registration. The student's academic advisor must be a ***regular faculty member*** (tenured, tenure-track, or emeritus) of the department in which the student is pursuing their degree.

The full time student in a research-based program will formalize a thesis, dissertation, or independent-study advisor and an advisory committee by the end of the student's second semester of residency. Part-time and distance education students must formalize their committees by the time they complete 18 credits. The student's academic advisor must be a ***regular faculty member*** (tenured, tenure-track, or emeritus) of the department in which the student is pursuing his or her degree. The academic advisor will typically serve as the student's research advisor, however, in some cases a separate research advisor may be designated. The research advisor is responsible for guiding the student to the completion of their research project and for supervision of the preparation of the research report (thesis, dissertation, or independent study paper). A research advisor need not be a regular departmental faculty member. Regular faculty members from the department or interdisciplinary program may not be in the minority on a committee. The department chair and the Graduate Dean must approve the advisor and members of the advisory committee. Committee forms are available in banweb under the Student and Financial Aid tab after login.

At the Master's level, the advisory committee consists of at least the academic advisor and two other members. At the doctoral level, the advisory committee consists of at least the advisor and three other members; one of these members must be from outside the department and must be assigned or approved by the Dean of Graduate Studies. Some departments require five members on the doctoral advisory committee. The academic advisor serves as chair of the advisory committee. The student should meet with his or her advisory committee at least once a year.

All graduate committees must be approved by the Department Chair and the Dean of Graduate Studies.

Students enrolled in graduate certificate or professional master's programs are only required to have an academic advisor and do not have graduate committees.

Although a graduate student has an academic advisor and an advisory committee, they are responsible for making sure that they meet all of the requirements for graduation. The student's committee committee and academic advisor should review the student's progress towards their degree and inform them if they notice missing requirements; however, the academic advisor and committee members are not at fault if they fail to notice a missing requirement. If the student has any concerns, they need to meet with their academic advisor. The academic advisor is responsible for helping the graduate student satisfy requirements. The student's course program will be checked when they submit it to the Center of Graduate Studies to ensure their approved program meets the degree requirements.

Graduate Program Policies & Procedures

Registration and Enrollment

Course Program

Courses to be used towards each of the graduate degrees at New Mexico Tech must meet the requirements of the degree being pursued and must have prior approval of the student's advisory committee. These courses constitute the student's Course Program. The approved Course Program must be on file in the Center for Graduate Studies no later than the middle of the semester before the semester of graduation for Masters students and by the fifth semester for Doctoral students (prior to candidacy). Part-time and distance education students must formalize their committees by the time they complete 18 credits. The course program is reported on a form, available online and from the Center for Graduate Studies. Graduate course programs must be approved by the Dean of Graduate Studies.

Course Load

Regular and provisional full-time and part-time graduate students are required to continue registration each semester until certified for the degree. Regular distance students must register for a minimum of one semester each academic year (summer, fall, and spring) and their registrations must conform to the plan of study developed with their advisory committee and on file in the Center for Graduate Studies. Students whose registration lapses will be required to meet the requirements of the current catalog if they are readmitted to a graduate program. The minimum course load for a full-time graduate student is nine credit hours (12 credit hours if on support) per fall or spring semester; three credit hours during the summer semester if they are progressing towards the degree. Part-time graduate students normally register for eight or

fewer credits per semester, but may register for more as offerings and time permits. Credits taken to satisfy minimum registration requirements must be numbered 3000 or above and must be applicable to the graduate program as determined by the advisory committee. Written permission from the advisor, the department head, and the Dean of Graduate Studies is required for exceptions to the described course load. Regular and provisional graduate students registered for other classes may audit at most one class and associated lab if applicable. Audit credits apply to the semester credit requirements, but do not earn credits toward a degree, and are limited to three credits or four if the audited course has an associated laboratory. All course credits counted toward credit hour requirements in graduate programs must be earned with letter grades (A-F), except for independent study, thesis, and dissertation (e.g., 30 credits for Masters degree). Some programs require seminar courses, which may be graded S/U, but do not count toward program credits hours.

For resident students, part-time status may be granted after a student has completed all required courses and credits while completing the final research requirements leading to their degree, but only with the approval of their advisor. A full-time graduate student in good standing who has two or more years of residence, has completed all coursework, has filed an Intent to Graduate, and who has no assistantship or fellowship support, may request reduced registration for only one semester. The request is accomplished via a reduced registration request form, available in the Center for Graduate Studies and online, which must be approved by the advisor (acknowledging that it is expected that the student will finish in that semester) and the Dean of Graduate Studies. While in this category, the student must enroll for at least three credit hours of thesis, independent study, or dissertation.

After successful defense of the thesis or dissertation, with advisor approval, and the dean of Graduate Studies a full-time student may register for one credit for one semester only to complete corrections to the thesis or dissertation.

Students with an approved reduces registration are allowed a one-time work authorization See the Center for Graduate Studies web page for all graduate deadlines (http://www.nmt.edu/gradstudies).

Grades and Eligible Credits

At the time of graduation, the cumulative GPA must be 3.0 or higher for all 3000-level courses or above. Only 3000-5000 level courses with a grade of "C" or higher may count towards the graduate degree (courses that are numbered using four digits and start with 1 or 2 will not count as they are considered 1000- or 2000-level, respectively). Independent study (5900), thesis (5910), or dissertation (595) courses will be graded with either PR (progress) or U (unsatisfactory). A student will be placed on probation for earning a "U" in independent study, thesis, or dissertation. A second "U" in independent study, thesis, or dissertation may result in dismissal from graduate school. Only those credits graded PR (progress) accumulate toward the minimum required number of credits for research. Directed research (5000) and courses taken on a S/U basis may not be used to fulfill graduate degree requirements, with the exception of the required research course for research based degrees, specifically independent study (5900), thesis (5910), or dissertation (5950).

Continuous Registration

If a student is admitted to a degree program, they are required to maintain continuous enrollment until they have completed the degree. The student may not elect to take a semester off, even if all they have to complete is writing their thesis. Under certain circumstances, the student may qualify for a Leave of Absence for a semester. If the student fails to maintain continuous enrollment, they must apply for readmission and they must meet all of the requirements of the new catalog if they are readmitted.

Summer Registration Requirements and Employment

New Mexico Tech requires that graduate students register for the summer semester if they are in residence. A graduate student is "in residence" if they are making progress toward their degree or using the facilities (i.e., library, computers, lab, office) or staff (i.e., advisor, committee) of the Institute. If the student will be receiving an assistantship, fellowship, or other support that is disbursed to them through NMT, they must register.

If a graduate student is:

1. Not in residence for the summer (see above), but they are
2. pre-registered as a full-time student for the fall semester, they may qualify for a Work Authorization (on-campus employment up to 40 hours per week) for the summer. The student and their academic advisor must indicate that the on-campus employment is unrelated to degree progress and that the student will not be using the facilities or staff of the Institute to progress toward their degree during the summer semester. The job may be related to the degree program, but not directly related to their degree progress or research project.

Graduate assistants may be registered full-time and carry full-time (40 hour) contracts during the summer session.

Students may also consider summer off-campus employment. If the student decides to take the summer off from their studies and get a job in an area unrelated to their interests, they don't need to register. If the student is working off-campus on a summer job that is related to completion of their degree (i.e., at a research lab at Sandia, Los Alamos, or even a private company), they are required to be registered.

Lower Level Courses

Generally, a graduate student will be granted permission to register for lower level courses if they are pertinent to their graduate program; however, these courses may not be used toward the students graduate requirements. The student is required to return and have approved by the Graduate Dean a completed Lower Level Class Approval form in the Center for Graduate Studies before taking a lower level course.

Graduate students who are registered for 12 credits of approved coursework for a given semester, may register for a 13th credit of classes without completing the Lower Level permission (i.e., graduate students may take a physical recreation, health & wellness, or fine arts class).

Registration Check

Graduate students are responsible for proper registration. Failure to properly register can lead to the cancellation of all forms of financial aid and/or an academic warning/probation.

The Center for Graduate Studies may check the students registration each semester. A registration hold may be put on the student's account if any of their forms are late, missing, or if there are discrepancies in their records. Be sure to inform the Center for Graduate Studies of all changes. Approximately one week after the close of registration, the Center for Graduate Studies may check student registration.

Graduate students may audit one course with up to three or four credit hours per semester (this may be a course with a lab), but because audits are not graded, they cannot be used toward the 30 credit hours required for graduation. Community college and physical recreation and similar courses do not count toward full-time registration and may not be used to complete degree requirements. It is up to the student and their academic advisor to see that they meet requirements and that their progress is updated on the Advisory Committee Form (forms for certificate, MS, Professional Masters, and PhD are located at https://www.nmt.edu/gradstudies). The form must be present at each advisory committee meeting; get it from the Center for Graduate Studies before, and return it after each meeting.

Graduate Program Policies & Procedures

Readmission

A student who is readmitted is subject to all university requirements at the time of readmission and is required to complete her or his degree under the current catalog unless an appeal is granted based on severe extenuating and documented circumstances.

A student who has not been continuously enrolled (excluding summer session) must submit an application for readmission to the Center for Graduate Studies. In addition to the application, a student who left while on academic probation or suspension must submit the following documents:

- A one-page appeal letter that persuasively makes a case for readmission and documents the student's plan for success;
- A supporting letter or email from the student's advisor;
- A supporting letter or email from the student's department chair; and
- Any other relevant documents, such as medical documents or letters of support from faculty or counselors.

A student in good standing will be readmitted by the Center for Graduate Studies. Students who left while on academic probation or suspension will not be readmitted without supporting letters from the academic advisor and the department chair. Application and material submitted by a student who left while on academic probation or suspension will be reviewed by the Dean of Graduate Studies and written notice of the decision will be given to the petitioner. Students who left on probation or submission will be readmitted on probation if readmission is granted. Readmission materials may be submitted via email to graduate@nmt.edu

A student who has abandoned their studies may return to those studies only after successfully seeking readmission to the program. In the readmission process, the student should expect to provide all of the information required of any applicant. The department may or may not readmit the student. If the student is readmitted, they will be required to follow the current NMT Program and Course Catalog requirements, which may include course work and/or research beyond that expected of under their original catalog.

Graduate Program Policies & Procedures

Time Limits

Master Degree

There are limits placed on a graduate student's time here at New Mexico Tech. The master's degree represents at least 30 credit hours (for Master of Science, this includes research) of approved courses beyond the bachelor's degree. A Master's degree is traditionally regarded as a two-year degree, but the student's degree program might take longer. After the student's initial graduate enrollment, they have three years to complete a Master's degree.

PhD Degree

The doctoral program represents the equivalent of at least three years of full-time study and research. This normally requires from 48 to 66 credit hours of courses beyond the bachelor's degree and a minimum of 24 hours of dissertation credit. Typically, earning a doctorate degree takes significantly longer than this minimum. If the student enters the doctoral program with a master's degree, they have up to five years to complete their degree; if they have not yet earned their master's degree, they have eight years.

Funding Limits

Funding offers for graduate students holding fellowship or assistantship appointments are typically two years for a master's level degree or four years for the doctoral degree. Funding is limited to three years for a master's level degree or three years beyond the masters for the doctoral degree. Consideration for extension beyond these limits can be given through petition to the Dean of Graduate Studies.

Extension of Degree Time Limits

Extensions of these time limits can be made in special cases, but only with approval by the student's academic advisor, their department chair, and the Dean of Graduate Studies. Time limits and extensions for part-time students are considered on a case-by-case basis. To be considered for any extension, a student must be making satisfactory research progress and demonstrate a plan for completion including a reasonable timeline. To request an extension, write a memo addressing the student's reason for taking longer, their plan, and their timeline, have the memo endorsed by their academic advisor and department chair, and deliver it to the Dean of Graduate Studies for consideration.

Graduate Program Policies & Procedures

Leave of Absence

All regular graduate students are required to register every fall and spring semester and in summer semesters, when in residence, until certified for their degree. Occasionally, factors make it necessary for a graduate student to interrupt their studies for a short period of time. If they find themselves in one of these situations, they may request a leave of absence if they are in good academic standing and have written approval from their advisor, the department chair, and the Dean of Graduate Studies. There is no established form for a leave request. The leave request may be a memo or letter on paper or in digital form (an email). The request must include an explanation for why the leave is needed, and a time frame (calendar) for their return to complete all remaining degree requirements. This should be routed to the Dean of Graduate Studies via the advisor and department chair with endorsements added by each.

During the student's leave of absence, they do not have access to the staff (their advisor and committee members) or facilities of the institute, and it is assumed that they are not progressing towards their NMT graduate degree. Normally leaves are approved for one semester, but may be approved for up to one year. If the student takes a leave of absence, their assistantship will not necessarily be held for them. The student should consult with their department and supervisor to discuss possible arrangements for support on their return.

If a student does not register as required and no leave of absence is requested prior to non-enrollment or such an approved leave expires, the student will be removed from their graduate program for failure to enroll. After such failure to enroll, the student must apply for readmission to resume the graduate program and if readmitted will have to meet the requirements of the newest catalog for the program.

Graduate Program Policies & Procedures

Graduate Co-op Experience

Graduate students may choose to gain research experience as part of their graduate program by performing sponsored work away from campus. To be involved in co-op experiences students must:

1. Submit a letter of application to the Dean of Graduate Studies with supporting letters from the student's advisor or graduate committee;
2. be a regular full-time student in the semester of application;
3. enroll in a Directed Research course (5000) in their department during the co-op period, maximum of 12 months;
4. provide a final report and any other requirements placed on the student to their graduate committee on completion of the co-op experience.

The student is responsible for arranging the co-op experience with both their advisor and with the work sponsor.

Graduate Program Policies & Procedures

Graduate Degrees for Faculty and Staff

Instructors in the College Division and staff members of the Bureau of Geology and Mineral Resources, Petroleum Recovery Research Center, Institute for Complex Additive Systems Analysis, and Research and Economic Development Office who are not on tenure may pursue programs leading to Master's or Ph.D. degrees. NMT policy does not permit administrative officers and members of the faculty with the rank of assistant professor or above to take advanced degrees. Employees who wish to pursue a degree program should apply for admission to the department desired by using standard applications available online. Time limits for degree programs apply.

Graduate Program Policies & Procedures

Satisfactory Academic Progress

To demonstrate satisfactory academic progress, each regular graduate student must:

1. Maintain an overall GPA of 3.0 or better.
2. Earn no grade less than "C" for courses using a standard letter grade.
3. Earn a PR or S for research courses (independent study, thesis, dissertation and directed research).
4. Formalize their committee (unless pursuing a Graduate Certificate or in a course-based only program)
    1. Full-time Masters's student must formalize their advisory committee by the end of their third semester.
    2. Full-time PhD students must formalize their advisory committee by the end of their third semester.
    3. Part-time students must formalize their advisory committee before the completion of 18 credits.
5. Formalize their course plan
    1. Full-time Master's students must formalize their Course Plan no later than the middle of the semester before graduation, e.g., mid-term of the Fall semester for graduation in the following Spring semester.
    2. Full-time PhD students must formalize their Course Plan no later than the third semester.
    3. Part-time students must establish their Course Plan before the completion of 18 credits.
6. Satisfactorily complete sufficient credits
    1. Full-time students must satisfactorily complete a minimum of nine credit hours (12 credit hours if on an assistantship) each fall or spring semester; three credit hours must be completed during the summer semester if in residence (as describe under Academic Load, page 57).
    2. Part-time students typically register for eight or fewer credits each semester; distance education students must register according to the course plan on file with the Center of Graduate Studies.
    3. Each semester, all graduate students may audit at most one course (unless they have completed all course requirements for their degree) with the requirement of "SA" for satisfactory progress.
7. Successfully pass the preliminary and/or qualifying exams, candidacy exam, and oral defense based on the requirements of their graduate program.
8. Satisfy the time limit for graduation.

Probation, Contract Termination and Suspension

If a student fails to make satisfactory progress during a semester, they will be placed on academic probation and receive a warning letter from the Office of Graduate Studies. If the student fails to make satisfactory academic progress in a second, consecutive semester, they will be placed on academic suspension and be dropped from their graduate degree program.

If the student's probation or suspension was prompted by not registering for sufficient credits while on a contract, they will not be eligible for a contract in their next full-time semester. See the section on "Changing Student Classification," for more information on alternatives.

Assistantships or fellowships are subject to immediate termination if satisfactory academic progress is not achieved. Any student who is struggling with academic performance is encouraged to discuss the situation with their instructor(s), advisor(s), and the Dean of Graduate Studies. Any student who fails to maintain satisfactory progress for two consecutive semesters will be dropped from regular graduate student status. Such students (citizens and permanent residents) may apply for readmission to the same department after one semester has passed from the term of suspension. During that time the student may apply for pre-degree status.

Warning Letters

Students earning a GPA of less than 3.0 or a grade less than a "B" in any given semester will receive a warning letter that they are at risk of not meeting the requirement of Satisfactory Academic Progress.

Graduate Program Policies & Procedures

Thesis, Independent Study, and Dissertation

The thesis or dissertation is to be written with the intention of publication. The thesis or dissertation must include a preliminary, roman-numbered section containing the title page, acknowledgments, abstract, table of contents, list of figures, and list of tables. The acceptance sheet, signed by the members of the committee, is included at the end of the preliminary section of the thesis or dissertation. Arabic page numbering should begin with page 2 of the body of the thesis. Appendices may be included. The last appendix, entitled Permissions, must contain permissions for any substantial copyrighted material used in the publication (figures, tables, etc.). The bibliography should include only references cited in the text. Templates and detailed instructions for completion of the thesis manuscript are available online at: http://www.nmt.edu/gradstudies/grad-survival-guide.php

Master's theses and Ph.D. dissertations must be publicly presented and defended. After a successful defense and completion of all changes required by the student's committee, a thesis or dissertation must be submitted to the Center for Graduate Studies for publication online, in the Joseph R. Skeen Library, and be submitted for publication elsewhere. The thesis or dissertation submitted to the Center for Graduate Studies must be the version approved by the graduate committee. No changes can be made to theses or dissertations after submission to the graduate school for degree completion. As a result, no changes can be made to any thesis or dissertation that has been delivered for public dissemination. Note that students have not officially met all requirements until designated as complete by the Center for Graduate Studies (including iThenticate check and final formatting approval of the submission to ProQuest).

As is the case throughout the United States, New Mexico Tech is increasingly involved in contract research for corporations and governmental entities, and many times portions of these research projects cannot be published because of commercial or national security concerns. While a research assistant may complete conditions of employment by working on such projects, there must be a prior understanding between the student, advisory committee and funding source regarding precisely what will be available for the student's thesis or dissertation, and what will not be available. Documentation of such understanding is to be signed by all parties (student, supervisor, and funding agency/agent) and filed with the Center for Graduate Studies prior to the beginning of graduate student involvement in the research project. Students who fail to file such documentation, may be required to restart research on a different topic if there is a disagreement with the corporation or agency.

Thesis and Dissertation Completion

Manuscript Preparation

Complete guidelines and templates for manuscript preparation are available online at https://www.nmt.edu/gradstudies/completion_info.php. Students are strongly encouraged to use the provided LaTeX template and may use Overleaf as a free online resource.

Completion

Completed digital and printed theses or dissertations and digital copies of independent study abstracts must be submitted to and approved by the Center for Graduate Studies no later than two weeks prior to the end of the semester in which the requirements for the degree are to be completed. Although students may complete their degree at any time, students must allow two weeks processing time before a letter of completion can be guaranteed. Further, degree conferral takes approximately two months from the date of final submission of all Materials to the Center for Graduate Studies. During the winter holiday, degree conferral typically takes three months. Academic dishonesty in a thesis or dissertation has severe consequences. See the Academic Honesty and Research Integrity Policy in the Graduate Student Handbook for full details.

Digital Thesis and Dissertations

Students writing theses or dissertations must deposit complete digital copies of their manuscripts with the Institute's online digital thesis and dissertation database. Theses and manuscripts or portions thereof that are published must be uploaded and circulated locally, pending receipt of approval from the publisher for global circulation. If the publisher denies permission, only those portions affected will be limited to local circulation. Please visit the Graduate Studies web pages or the Center for Graduate Studies for information on submission of digital manuscripts.

Digital manuscripts must be submitted and approved by the Center for Graduate Studies two weeks prior to the end of the semester in which the requirements for the degree are to be completed. A copyright form must be completed and signed at time of submission of the digital manuscript.

Independent Study

Formats for the preparation of Independent Study papers should conform to the requirements of the advisor, advisory committee and department where the student is enrolled, but may follow the guidelines for theses and dissertations (above). A digital version of the independent study abstract must be submitted to the Center for Graduate Studies no later than two weeks before the end of the semester. If for any reason, an Independent Study report is published through the New Mexico Tech Library, it must also be checked using iThenticate and submitted to the New Mexico Tech online digital thesis and dissertation database.

Graduate Program Policies & Procedures

Transfer Credits

New Mexico Tech credits that have not been used to satisfy a previous degree may be transferred to the graduate transcript with the approval of the academic advisor and the Dean of Graduate Studies. Only courses 3000-level or above with a letter grade of C or higher and research or seminar credits with a satisfactory grade may be transferred. Approved credits will be transferred with their respective grade and will be used in the GPA calculation of the graduate degree. Application of these transfer credits to the graduate degree are subject to the approval of the student's advisory committee.

A maximum of 12 credit hours of course work with grade B or better earned at another accredited institution may be approved by the student's advisory committee and major department for transfer credit into the Master's program. The student's advisory committee considers transfer credit in doctoral programs on an individual basis. To be approved, such credits must not have been used to satisfy the requirements for a previous degree.

For details of the transfer credit policy applicable to the Master of Science for Teachers program, please see the MST program.

Graduate Program Policies & Procedures

Tuition & Fees

Please refer to Tuition & Fees page for information on the costs of tuition, housing, medical insurance, and other fees affecting graduate students. Those on a one-quarter or one-half time contract (TA or RA) issued by New Mexico Tech will be charged tuition at in-state rates provided that their contract starts before the census date and continues throughout the entire semester. This means students that sign contracts written for less than 10 hours per week or that start after close of registration or end before the end of final exams will be charged tuition based on their legal residence (their home state/country).

Graduate Program Policies & Procedures

Appeals

For the most up to date Appeal policy information please visit University Policies and see **NMT Student-Specific Policies.**

- Appeals Requirements for graduate degrees may be appealed to the Dean of Graduate Studies or to the Graduate Council through the appropriate department.

Graduate Program Policies & Procedures

Work Authorizations

Full-time graduate students may obtain hourly employment from various campus entities. Such employment is accommodated under a Student Work Authorization (SWA). During the fall and spring semesters, students holding a SWA must satisfactorily complete at least 9 credits of approved (upper division or graduate) coursework. To work during the summer, students must be taking at least three credit hours in the summer session or be pre-registered for the fall courses. The only exception is made one time, in a student's final semester, with a reduced registration approval from the Center for Graduate Studies., For information on accommodation for reduced registration for full- time students, see the section on Course Loads. When classes are in session, students on SWA may work no more than 20 hours per week on all on-campus employment. As one example, if a student has a ¼-time RA position and a SWA, they may work for only 10 hours on the SWA, since they are obligated for 10 hours to their RA. Working more than this maximum may be cause for dismissal from their job.

During the summer, students may have on-campus jobs unrelated to their degrees and avoid the necessity of registration if the benefits of employment are financial and not directly related to their degree progress or research project. A student who is: 1) not in residence for the summer, but is 2) pre-registered as a full time student for the fall semester, may qualify for a Student Work Authorization (on-campus employment up to 40 hours per week). The student's academic advisor must indicate that, to the best of their knowledge, the on- campus employment is unrelated to degree progress and that the student will not be using the facilities or staff of the Institute during the summer semester.

Taxes

All students receiving assistantships or otherwise employed on-campus, even students from other countries, are required to pay taxes on their employment. Taxes are automatically deducted from their pay. Domestic students and international students who are resident aliens for tax purposes may qualify for an education tax credit. This tax credit is claimed on the student's federal tax return. This IRS tax credit is not guaranteed to continue in the future and is subject to change in the tax regulation.

Graduate Program Policies & Procedures

Postdoctoral & Visiting Scholars

Postdoctoral fellows, research associates, and visiting scholars are accommodated as appropriate in research programs within departments. The faculty host and department negotiate arrangements, with an official appointment made by the NMT administration. International guests may visit classes on an informal basis by arrangement with the instructor. If credit or audit privileges are desired, application must be made through the Center for Graduate Studies.

Graduate Program Policies & Procedures

Research Integrity Policy

To find Policy information, please see University Policies page.

The Policy to Assure the Integrity of Research is found on the NMT Research and Economic Development webpage. This policy establishes the process for dealing with misconduct in research and creative activities associated with external funding. This policy applies to every researcher who is funded on any grant or contract; if the student is funded externally, the student is responsible for knowing and following the policy.

Graduate Degree Requirements

HERE YOU WILL FIND INFORMATION REGARDING THE FOLLOWING GRADUATE DEGREES.		
• **Graduate Minors** • **Changing Certificates** • **Master of Science Degrees** • **Professional Master Degree**	• **Master of Engineering Management** • **Master of Science for Teachers** • **Accelerated Master Option** • **Second Master of Science Degree**	• **Doctor of Philosophy Degree** • **Completion of Degree Requirements** • **Final Semester** • **Ethics & Plagiarism**

Graduate Degree Requirements

Graduate Minors

A graduate minor at the master's level requires at least 12 hours in the minor area with at least 6 of them at the 5000 level. Courses used for a bachelor degree or bachelor minor may not be used for a graduate minor. Specific requirements for a graduate minor must be approved by the Graduate Council and faculty senate.

Graduate Degree Requirements

Graduate Certificates

The following are the general requirements for a graduate certificate. Additional requirements for specific curricula are listed under the appropriate department.

1. A minimum of 12 credits with at least 9 credits, excluding research credits, at the 5000 level.
2. More than half of the credits must be at the 5000-level excluding research credits.

Graduate Degree Requirements

Master of Science Degrees

General requirements common to all Masters of Science degree curricula in the sciences and engineering fields are listed below. Additional requirements for specific curricula are listed under the appropriate department.

General Requirements

It is required that a student preparing to complete the M.S. degree:

1. have a minimum of six credit hours of approved out of program upper-division or graduate course work,
2. declare a major with at least 12 credit hours of coursework at the 5000-level, exclusive of research credits,
3. complete a research project culminating in a thesis or independent study paper, and
4. Thesis must be checked with iThenticate by the academic advisor before they will be accepted.

Note: Students pursuing a Master's degree in a different discipline than their Bachelor's degree may request a waiver for the out of program requirement. Waivers must be approved by the student's advisor, committee, department chair, and the Dean of Graduate Studies.

These general requirements do not apply to students in the Master of Science for Teachers (MST) program.

Approvals

1. The appropriate department grants admission to its graduate program.
2. The appropriate department and the Dean of Graduate Studies must approve the composition of each graduate student's advisory committee.
3. The graduate student's advisory committee must approve the student's thesis or independent study research project. The MS degree will not be awarded until the thesis or independent study paper has been approved by the advisory committee.
4. Coursework to be applied toward the degree must meet the associated degree requirements and be approved by the graduate student's advisory committee and the Dean of Graduate Studies.

Research Options

There are two research options, M.S. with Independent Study and M.S. with Thesis. Each option requires a minimum of 30 credit hours. Some departments do not recognize the Independent Study option.

M.S. with Independent Study Requirements:

1. Completion of at least 27 credit hours of approved course work, with at least 15 credit hours of 5000-level courses, exclusive of research credits;
2. Completion of at least three credit hours of independent study;
3. Submission of a formal paper describing the results of the research to the candidate's advisor and advisory committee; and
4. Submission of a digital abstract of the independent study to the Center for Graduate Studies.

M.S. with Thesis Requirements:

1. Completion of at least 24 credit hours of approved course work, with at least 12 credit hours of 5000-level courses, exclusive of research credits;
2. Completion of at least six credit hours of thesis work;
3. Satisfactory oral defense of the thesis research; and
4. Submission of the digital thesis to the Center for Graduate Studies via ProQuest.

Graduate Degree Requirements

Professional Masters Degree

General requirements are common to all Professional Master's degree curricula in the science and engineering fields. Specific requirements are listed under appropriate departments. Professional Master's degrees include Professional Master of Hydrology, Professional Master of Transdisciplinary Cybersecurity, Master of Engineering in Chemical Engineering and Master of Engineering in Mechanical Engineering.

General Requirements

It is required that a student preparing to complete a professional Master's degree:

1. Have a minimum of six credit hours of approved out of program upper-division or graduate course work.
2. Declare a major with at least 18 credit hours of coursework at the 500-level.

Approvals

1. The appropriate department grants admission to its graduate program.
2. Coursework to be applied toward the degree must meet the associated degree requirements and be approved by the graduate student's advisor, chair, and the Dean of Graduate Studies.

Graduate Degree Requirements

Master of Engineering Management

New Mexico Tech's Master of Engineering Management graduate program is a Master's degree program designed for students interested in developing their management and leadership skills as practitioners in their respective fields. The MEM is a course-based degree program. The curriculum is designed to be innovative and can be delivered both on campus and via distance education. Specific requirements related to the Master of Engineering Management degree curricula are listed in the program information.

General Requirements

- 30 credit hours of 5000-level Engineering Management courses and approved outside-of-program upper division electives.

Approvals

1. The Management Department grants admission to its graduate program.
2. Coursework must be approved by the graduate student's advisor, chair, and the Dean of Graduate Studies.

Graduate Degree Requirements

Master of Science for Teachers

The graduate program in science for teachers provides graduate-level classroom and laboratory instruction for secondary school teachers of science and mathematics and leads to the Master of Science for Teachers (MST) degree. Courses for science teachers are offered on the campus during the summer session and through distance education during the academic year.

All MST research products (independent study or thesis) must be checked with iThenticate before being accepted.

General Requirements

- 30 credits following the requirements listed in the Master of Science for Teachers section.

Approvals

1. The Master of Science for Teachers program grants admission to its graduate program.
2. If pursuing research option, the Master of Science for Teachers program and the Dean of Graduate Studies must approve the composition of each graduate student's advisory committee.
3. If pursuing research option the graduate student's advisory committee must approve the student's thesis or independent study research project. The MST degree will not be awarded until the thesis or independent study paper has been approved by the advisory committee.
4. Coursework to be applied toward the degree must be approved by the graduate student's advisory committee.

Research Options

There are two research options, MST with Independent Study and MST with Thesis. Each option requires a minimum of 30 credit hours.

M.S. with Independent Study Requirements:

1. Completion of at least 27 credit hours of approved course work, with at least 15 credit hours of 500level courses;
2. Completion of at least three credit hours of independent study; and
3. Submission of a formal paper describing the results of the research to the candidate's advisor and advisory committee.
4. Independent study must be checked with iThenticate.
5. Submission of a digital abstract of the independent study to the Center for Graduate Studies.

M.S. with Thesis Requirements:

1. Completion of at least 24 credit hours of approved course work, with at least 12 credit hours of 500level courses;
2. Completion of at least six credit hours of thesis work;
3. Satisfactory oral defense of the thesis research; and
4. Thesis must be checked with iThenticate.
5. Submission of digital thesis to the Center for Graduate Studies via ProQuest.

Graduate Degree Requirements

Accelerated Master Option

Well prepared advanced students with a GPA of 3.0 or higher, or with a recommendation from the department chair, may apply for an accelerated Masters degree. The Accelerated Master's option allows accepted students to fulfill the requirements for both Bachelor's and Master's degrees, potentially within 5 years. Students who are enrolled in the Accelerated Masters program may count at most 12 credits of 5000-level courses total towards both their undergraduate and graduate degrees (individual departments may impose lower limits); no undergraduate courses may be counted toward both degrees. In partial fulfillment of the Master's degree, students must have an approved course plan by the student's graduate committee; therefore, qualified students are highly encouraged to apply when they reach junior standing within their major to ensure all requirements are being timely met. If admitted, graduate status will be granted upon fulfillment of the requirements for the Bachelor's degree. Please refer to participating departments' corresponding section for additional requirements and restrictions.

Graduate Degree Requirements

Second Master of Science Degree

Students who wish to earn a second Master degree at NMT must fulfill the requirements for both degrees. Twelve credits may be applied to both degrees. Independent study, directed study or thesis credits may not be counted twice. Second degrees may not be available from some departments.

Graduate Degree Requirements

Doctor of Philosophy Degree

The degree of Doctor of Philosophy requires a high level of competence in a recognized field of learning, and only those students showing unusual promise are accepted. A dissertation that contributes to the general field of knowledge must be written and defended before a committee of the faculty. No doctoral degree will be awarded without full committee approval of the doctoral dissertation and its defense.

The doctoral student can expect to spend at least five or more years of study and research beyond the bachelor's degree in order to complete the program. In addition to dissertation credits, course requirements for each specialty are listed under the programs and courses of instruction for each department.

Doctoral degree programs are available in chemistry, computer science, the earth science fields, electrical engineering, Materials, mathematics, mechanical engineering, petroleum engineering, and physics. Faculty, courses, research fields, and specific requirements for these programs are given under the appropriate department listing.

Preliminary Examination

Each department may require a preliminary or qualifying examination for the students admitted to its doctoral degree program. Students contemplating doctoral studies at the university should contact the respective department regarding the administration of these examinations.

Candidacy Examination

The purpose of the candidacy examination is to evaluate the student's ability to complete dissertation research. The exam is taken before enrollment in or accumulation of dissertation credits, typically after completion of the majority of graduate course work. The candidacy exam is the responsibility of the individual department; the graduate student should consult their department about candidacy exams. Passing the candidacy exam is one of several steps that must be completed prior to Admission to Candidacy. Graduate committees can and should require additional coursework and/or other remediation for deficiencies discovered during the candidacy exam. Any such remediation is to be added to the students graduate file in the Center for Graduate Studies.

Admission to Candidacy

A doctoral student may apply for candidacy upon completion of a minimum of one year of graduate study at NMT. A student qualifies for admission to candidacy by:

1. averaging B or better in coursework taken;
2. passing the preliminary or qualifying examination at an approved level;
3. passing the candidacy examination; and
4. showing preliminary work under way on a dissertation subject; typically this is done through the defense of a dissertation proposal.

Once admitted the student becomes a PhD Candidate. Candidacy must be achieved at least one year prior to the time the degree is conferred.

Dissertation

The doctoral dissertation demonstrates the candidate's capacity for independent research. The student may register for dissertation hours only after successfully advancing to candidacy. A minimum of 24 credit hours of dissertation distributed over one or more years must be devoted to the dissertation after candidacy has been achieved. No dissertation credits taken before approval of candidacy will count toward a doctoral degree. The student is encouraged to explore the various current research projects in his or her field of interest before choosing a dissertation subject. The dissertation must be defended before the NMT faculty under the supervision of the student's advisory committee. An external examiner will be included on the defense committee. The candidate must be registered during the semester in which the completed dissertation is defended and submitted to the Center for Graduate Studies. Students may pay a fee to defend between semesters, but they must have been registered the semester before and they must have permission of their full committee. Between semester defense and all requirements including final formatting and inclusion of required permissions must be completed two weeks before the first day of class for the subsequent semester or the student must enroll and pay for registration. Doctoral candidates are required to present at least one departmental or general seminar on the dissertation during their tenure as a graduate student. Before the degree is approved and granted, at least one paper on the subject matter of the dissertation must be submitted to a recognized journal acceptable to the doctoral committee of the student. Generally, significantly more research publication is expected.

Departmental Certification

The appropriate department must certify to the Center for Graduate Studies that the general requirements are being satisfied and that the candidate is making required progress. The method of evaluation varies with the department. Certification is transmitted to the Center for Graduate Studies on forms provided by the Center for Graduate Studies.

These forms are:

1. The Advisory Committee Form, and
2. The Report of the Advisory Committee, which records the actions of the student's advisory committee.

Graduate Degree Requirements

Completion of Degree Requirements

- During the final semester of residence, the student must have on file a Declaration of Intent to Graduate with the Registrar's Office. Deadlines are July 1 for those completing their degrees in December and December 1 for those completing their degrees in May and August. The Declaration communicates the candidate's intent to fulfill the degree requirements. When completing this form, the student is recommended to verify with their advisor and the Center for Graduate Studies that they will have met all degree requirements prior to completion of their next semester.
- Generally, at least eight weeks prior to the end of the candidate's planned defense, preliminary copies of the candidate's thesis, independent study, or dissertation must be in the hands of the advisor.
- Two weeks prior to the defense, the complete defense draft (with all sections, figures, bibliography, and appendices) must be in the hands of the committee.
- The student must be registered for the semester during which the thesis or dissertation is defended, or the independent study is approved. Students may pay a fee to defend/present between semesters, but they must have been registered the semester before and they must have permission of their full committee. The student must also be registered in the semester that they complete all corrections, including formatting. Between semester defense and all requirements must be completed two weeks before the first day of class for the subsequent semester or the student must enroll and pay for registration. Post defense, with the permission of the advisor, the student may register for just one credit as a full time student after their successful defense to complete corrections that do not require significant experiments.
- The chair of each graduate advisory committee will submit a written report to the student with copies to the chair of the department and Dean of Graduate Studies within five days of the defense of a thesis or dissertation. In this report, the chair shall state that the thesis or dissertation is accepted as submitted and defended or explain at a high level what needs to be done in order for the thesis or dissertation to be accepted. The report will be initiated by the members of the advisory committee or they must be cc'ed if the report is submitted via email (email to graduate@nmt.edu).
- Two weeks prior to the end of the semester the completed report of the advisory committee, iThenticate report from academic advisor, and ProQuest submission of the final thesis/dissertation must be submitted to the Center for Graduate Studies or one final copy of an accepted independent study paper must be submitted to the student's advisor and advisory committee. Student degrees are not complete until final Materials have been approved by the Center for Graduate Studies and the student receives final acceptance via email from the ProQuest system.

Graduate Degree Requirements

Final Semester

Three Credit Option

If a student is an unsupported full-time graduate student in good standing who has completed two or more years in residence in their graduate program, finished their coursework, and filed an Intent to Graduate, they may register for as few as three credit hours of independent study, thesis or dissertation during their final semester at Tech. This level of registration will provide the student with access to their committee for advising and degree approval, office space, laboratories, library services, computers and the like. If the student fails to complete their degree during this semester, they will be required to register as a full-time student without reduced registration during all subsequent terms. Graduate students are highly encouraged to make every effort to complete all of the requirements for their degree before they depart campus.

One Credit Option

Students who miss the completion deadline for the end of the semester, but who have successfully defended their independent study, thesis, or dissertation before the first day of the subsequent semester, may be allowed to register for one (1) credit for one (1) semester only one time to complete corrections to the independent study, thesis, or dissertation. For this to apply, the research advisor must submit the defense report to the Center for Graduate Studies before the first day of the semester. If a student does not complete their corrections during that semester, they must return to full-time registration.

Defense Fee Option

If a student met the eight-week deadline (see Completing the Graduate Degree and Thesis and Dissertation sections) for getting a preliminary copy of their thesis, or dissertation to their committee, but cannot schedule a defense before the end of the semester because one or more members of their committee are unavailable, the student may qualify for the "defense fee option." If the student is able to defend their work before the first day of the following semester, they may pay a $50.00 defense fee to defend before the next semester at which point they will need to register for one (1) credit to complete their corrections to their independent study, thesis, or dissertation. (Note no completions are processed during the first two weeks of classes or immediately prior to the semester; that time is reserved for new admissions, registration, and processing graduate contracts.)

To qualify for the defense fee option, the student's committee must first certify that they have judged the student's thesis to be defensible before the first day of the semester. For this to apply, the student's advisor must send this certification to the Center for Graduate Studies before the end of the semester. If the student fails to satisfactorily complete all of the remaining requirements for their degree before the close of registration, the student will be required to register full-time for the semester and to pay all full-time tuition and fees. Students considering these options should keep in mind that members of their advisory committee are not obliged to provide them with feedback on their research when school is not in session and when the student is not registered. If the student is not registered in a semester, they cannot complete their degree.

Completion Record

A record of all steps completed in a particular student's program is kept in the Center for Graduate Studies. When all the requirements are completed, the record of the program is sent to the Registrar for the student's permanent file. If the graduation and other fees have been paid and a Declaration of Intent has been filed and approved by the Registrar, the candidate's name will be presented to the Faculty Senate for recommendation of conferral of degree to the Regents.

Graduate Degree Requirements

Ethics & Plagiarism

Ethics are a code which guides conduct. A breach of ethics causes harm to someone. Ethics are involved when people cheat on tests, fail to attribute information used in term papers and theses or falsify research results. Graduate students are expected to act ethically. This includes not cheating, falsifying information, or plagiarizing – actions which may cause their instructor or department to report ethics violations. Other non-ethical acts may also be cause for disciplinary action as outlined within this Student Handbook.

Graduate Degree Requirements

The Graduate Student Association (GSA)

The Graduate Student Association (GSA) is comprised of all enrolled graduate students who have paid the Student Activity Fee. GSA represents graduate students on policy-making committees, including Graduate Council, Faculty Senate, and the Student Association. The association works with the administration to address issues relating to graduate student life at Tech. They award travel grants for graduate students to present research at professional meetings and provide for extracurricular activities for graduate students and their families. The governing body for the GSA consists of officers and representatives from each department.

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Degrees Offered

UNDERGRADUATE DEGREES OFFERED AT TECH

Associate Degrees

- Associate in General Studies
- AS in BUS

Undergraduate Certificates

- UC-BUS
- UC-AFMG

Bachelor Degrees

- Bachelor of General Studies

Bachelor of Science

- BS-BIOLOGY
- BS-Biomedical Sciences
- BS-Chemical Engineering
- BS-Chemistry
- BS-Civil Engineering
- BS-Computer Science
- BS-Earth Science
- BS-Electrical Engineering
- BS-Engineering Management
- Environmental Engineering
- BS-Environmental Science
- BS-IT
- BS-Interdisciplinary Sciences
- BS in MGTT
- BS-Materials Engineering
- BS-Mathematics
- BS-Mechanical Engineering
- BS-Mineral Engineering
- BS-Petroleum & NatGas Engr
- BS-PHYSICS
- BS-PSY
- BS-Technical Communication

Bachelor of Arts

- BA-BIOLOGY
- BA in BUSM
- BA- Chemistry
- BA- Earth Science
- BA-Interdisciplinary Sciences
- BA- Psychology

Undergraduate Minors

- Minor in Aerospace Engineering
- Biology
- Minor in Biomedical Eng.
- Minor in Chemistry
- Minor in Chemical Engineering
- Minor in Civil Engineering
- Minor in Computer Engineering
- Minor in Computer Science
- Minor in Cybersecurity
- Data Science
- Earth Science
- Minor in Economics
- Minor in E.E
- Minor Environmental Eng.
- Minor in Explosives Eng.
- Geobiology
- Geophysics
- Hispanic Studies
- History
- Hydrology
- Literature
- Minor Materials Engineering
- Minor in Mathematics
- Minor-MENG
- Minor in Mineral Engineering
- Mineral Resources
- Music
- Optical Science & Engineering
- Minor in Petroleum Engineering
- Petroleum Geology
- Philosophy
- Physics
- Minor in Polymer Science
- Psychology
- Minor in RNBL
- STS
- Secondary Education
- Technical Communication

GRADUATE DEGREES OFFERED AT TECH

Graduate Certificates

- Grad Cert Electrical Engineeri
- GC Elem Alternative Licensure
- GC- Secondary Alt. Licensure
- Grad Cert Explosive Engineeri
- Grad Cert in Geothermal
- GC-Hydrology
- Scientific & Professional Comm
- GC-TL

Master's Degrees

Accelerated Master's

- Accelerated M.S. in Biology
- Accelerated M.S. in Chemistry
- A.M in Computer Science
- ACCEL Masters in Chemical Engr
- Accelerated Masters Elect /Eng
- Accelerated M.S. in EMGT
- Accelerated M.S. in CEE
- Accelerated M.S. in Mtls Eng.
- A.M in Mathematics
- Accelerated M.S. in Physics

Master of Engineering

- ME in CH E
- MEM
- ME-Materials Engineering
- ME-Mechanical Engineering

Professional Master's

- PM-Hydrology
- PM-Trans Cybersecurity

Master of Science

- MS-Biology
- MS-Chemistry
- MS-Computer Science
- MS-Civil & Environmental Engr
- MS in CH E
- MS-Electrical Engineering
- MS -EMGT
- MS-Geochemistry
- MS-Geology
- M.S. in Geophysics
- M.S. in Hydrology
- M.S. in Materials Engineering
- MS-Mathematics
- MS-Mechanical Engineering
- MS-Mineral Engineering
- MS-Petroleum Engineering
- MS-PHYSICS
- MS-PCOM
- Master of Science for Teachers
- MS-Trans Cybersecurity

Doctor of Philosophy Degrees

- PhD-Biotechnology
- Ph.D.-Chemistry
- Ph.D.-CH E
- Ph.D.-Computer Science

- PHD-Earth&Environmental Sci
  Earth Dissertation options in:
  - Geobiology
  - Geochemistry
  - Geology
  - Geophysics
  - Hydrology

- PHD-Electrical Engineering
- PhD-Materials Engineering

- PHD-Mathematics
  Dissertation in:
  - Applied & Industrial Math

- PhD-Mechanical Engineering

- PHD-Mineral Engineering
- PHD-Petroleum Engineering
- Ph.D.-Physics
  Physics Dissertation options in:
  - Astrophysics
  - Atmospheric Physics
  - Instrumentation
  - Mathematical Physics

- PHD- Trans Cybersecurity

Graduate Minors

- Graduate Minor in Analysis
- G.M in Applied & Ind. Math
- G.M in Operat Research & Stats
- Graduate Minor in Physics

New Mexico General Education Requirements for Undergraduate Students

The following 31 credits are required to fulfill the New Mexico General Education Curriculum as described on the New Mexico Higher Education Department Website: https://hed.nm.gov/resources-for-schools/public_schools/general-education. Students transferring to New Mexico Tech having completed courses in the New Mexico General Education Curriculum at other New Mexico universities schools will receive credit for completing these General Education requirements. However, students will still be required to complete New Mexico Tech Institute Requirements (next section) if they did not complete these courses as part of fulfilling their general education requirement.

- Area 1– Communications (6 credit hours)
- Area 2 - Mathematics (3 credit hours)
- Area 3 - Basic Laboratory Sciences (4 credit hours)
- Area 4 - Social Sciences (3 credit hours)
- Area 5 - Humanities (3 credit hours)
- Area 6 – Creative and Fine Arts (3 credit hours)
- Area 7 (Flexible 9) - Additional Social Sciences or Humanities (9 credit hours). To include at least 3 credit hours from each of Area 4 and Area 5, and three additional hours from either Area 4, 5, or 6

Transfer students are expected to meet these general requirements in principle but are not required to present the exact duplicate of these courses. Their transcripts will be evaluated by the Office of the Registrar. Students readmitted will meet with and be reviewed by the Office of the Registrar and faculty advisor to determine requirements to complete their General Education requirements.

Students transferring to New Mexico Tech having completed courses in the New Mexico General Education Curriculum at other New Mexico universities schools will receive credit for completing these General Education requirements. However, students completing a Bachelor of Science or Bachelor of Arts will still be required to complete New Mexico Tech's Institute Requirements or may need to complete other prerequisites courses for their major.

New Mexico Tech views its general education core curriculum requirements as the foundation for a broad and meaningful educational experience for all its undergraduates. The New Mexico Tech general education core curriculum requirements prepare students to communicate and reason well, evaluate and apply information, understand human societies and cultures, deepen their sense of values and ethics, and enrich their personal lives. Additionally, the general education core curriculum requirements equip students with the analytical, language, science, and mathematics skills necessary for the specific degree requirements of their majors. The courses and their sequence in the general education core curriculum requirements are designed specifically to achieve these objectives and to prepare students for success in subsequent courses.

NM General Education Requirements for UG

New Mexico Tech Institute Requirements

In addition to the required New Mexico General Education Curriculum, New Mexico Tech students completing a Bachelor's degree at New Mexico Tech (Bachelor of Science, Bachelor of Arts, and Bachelor of General Studies) will have Institute Requirements to fulfill. Institute Requirements may be either specific classes NMT students must take to receive a degree (e.g., students completing a BS degree must take MATH 1510 and 1520) or additional credits required in certain content areas.

For students originating at New Mexico Tech, these Institute Requirements should be taken to satisfy the New Mexico General Education Curriculum. Students transferring to NMT who satisfied their New Mexico General Education requirement using other classes will receive credit for completing the General Education but will still need to complete the Institute Requirements for their degree.

Courses marked with a "g" in the course title have been articulated as General Education with the state of New Mexico for the area number (1 - 6) indicated and will transfer to other New Mexico institutions for that area. For example, **ENGL 1110: g1 Composition 1** will transfer within the state as General Education Area 1 Communication. Courses marked with an "i" in the course title will satisfy an Institute Requirement at NMT for the area indicated. For example, **ENGL 3041: i1 Technical Writing** satisfies Area 1 Communications at NMT. Students will need to consult with the receiving institution on whether the course will transfer.

The following table shows the courses needed to complete the General Education and Institute Requirements for each bachelor's degree. Changes in the educational program are made from time to time by action of the Faculty Senate. Students in continuous residence area assured that care will be taken to avoid unnecessary hardship caused by such changes.

Bachelor of Science Bachelor of Arts Bachelor of General Studies

	NM GEN ED + NMT INSTITUTE REQUIREMENTS FOR NMT BACHELOR'S DEGREE PROGRAMS	

	Bachelor of Science Degrees	Bachelor of Arts Degrees	Bachelor of General Studies	Associate of General Studies
Area 1: Communications	**9 credits** ENGL1110 g1: Composition I (3) ENGL1120 g1: Composition II (3) ENGL3041 i1:Technical Writing/MENG3041 Mech Eng Technical Writing (3)	**9 credits** ENGL1110 g1: Composition I (3) ENGL1120 g1: Composition II (3) ENGL3041 i1:Technical Writing/MENG3041 Mech Eng Technical Writing /TCOM4011 Persuasive Com & Grant Wrtng (3)	**9 credits** ENGL1110 g1: Composition I (3) ENGL1120 g1: Composition II (3) COMM1130 g5:Public Speaking or ENGL3041 i1:Technical Writing (3)	**6 credits** ENGL1110 g1: Composition I (3) ENGL1120 g1: Composition II (3)
Area 2: Mathematics and Quantitative Reasoning	**8 credits** MATH 1510 (4) MATH 1520 (4)	**A minimum of 6 credits (2 classes) total taken from:** CSCI 1220 (4) MATH 1430 (3) MATH 2350 (3) MATH 1510 (4) MATH 1520 (4) (At least 3 credits must be MATH)	**3 credits from** any MATH	**3 credits from** any MATH
Area 3: Science	**18 credits** PHYS 1310 & 1310L (5) PHYS 1320 & 1320L (5) CHEM 1215 & 1215L (4) CHEM 1225 & 1225L (4)	**A minimum of 12 credits** A course and associated lab (of at least 3 total credit hours) from each discipline listed below: Biology Chemistry Earth Sciences Physics	**8 credits from** any Science or Engineering (with associated labs)	**4 credits from** any Science or Engineering (with associated labs)
Area 4: Social and Behavioral Science	**6 credits taken from** ECON, POLS, PSYC, ANTH, SOSC, GNDR	**9 credits** Area 4a: Policy and Technology (3) At least one of “policy and technology” classes (POLS; SOSC) Area 4b: Other Social Sciences (6) ECON, POLS, PSYC, ANTH, SOSC, GNDR	**6 credits taken from** ECON, POLS, PSYC, ANTH, SOSC, GNDR	**6 credits taken from** ECON, POLS, PSYC, ANTH, SOSC, GNDR
Area 5: Humanities	**6 credits taken from** ENGL (except 103, 1110, 1120, 3041), COMM, HIST, PHIL, HUMA, TCOM (except 3021, 4020, 4022), foreign languages	**9 credits** Area 5a: Ethics and Technology (3 cr) At least one of “ethics and technology” classes (PHIL, or other specified classes) Area 5b: Other Humanities (6 cr) ENGL (except 103, 1110, 1120, 3041), COMM, HIST, PHIL, HUMA, TCOM (except 3021, 4020, 4022), foreign languages	**6 credits taken from** ENGL (except 103, 1110, 1120, 3041), COMM, HIST, PHIL, HUMA, TCOM (except 3021, 4020, 4022), foreign languages	**6 credits taken from** ENGL (except 103, 1110, 1120, 3041), COMM, HIST, PHIL, HUMA, TCOM (except 321, 4020, 4022), foreign languages
Area 6: Creative and Fine Arts	**3 credits taken from** ARTH, MUSC (except ensembles), THEA, FDMA, ARTS	**3 credits taken from** ARTH, MUSC (except ensembles), THEA, FDMA, ARTS	**3 credits taken from** ARTH, MUSC (except ensembles), THEA, FDMA, ARTS	**3 credits taken** from ARTH, MUSC (except ensembles), THEA, FDMA, ARTS
Area 7: Additional Courses	**3 credits taken from** Areas 4, 5, or 6	**3 credits taken from** Areas 4, 5, or 6	**3 credits taken from** Areas 4, 5, or 6	**3 credits taken from** Areas 4, 5, or 6
Total credits	**53**	**A minimum of 51**	**38**	**31**

NOTE: Specific Bachelor of Arts (BA) degree programs may require specific classes to complete certain content areas. Please refer to your degree program description and talk to your advisor about program-specific requirements.

Degree Requirements

Undergraduate Degree Requirements

In order to graduate, every student enrolled in a Bachelor degree program must complete NM Tech’s General Education Core Curriculum Requirements. This core set of requirements contains courses in Humanities, Mathematics, and Basic Science or Engineering. In addition, each program has its own set of course requirements as well as the minimum number of credit hours needed to graduate.

Graduate Degree Requirements

Graduate students must also complete a set of general requirements. In addition, each program has its own set of courses you must complete to earn the degree, as well as the minimum number of credit hours needed to graduate. In order to graduate, every student must complete the General Degree Requirements.

Sample Curricula

Most programs provide sample curricula to help you set your schedule. While you will graduate at the end of four years if you follow the sample curriculum faithfully, these curricula are meant to be guides only. Talk with your advisor to chart your individual curriculum and select electives to round out your degree program.

Academic Policies

[Contact: Office of the Registrar, New Mexico Tech, 801 Leroy Place, Socorro, NM 87801; 575.835.5133; fax: 575.835.6511; registrar@nmt.edu],

Grading System

A grade is reported for each course in which a student has enrolled to indicate the quality of performance in that course. The grading system used at NM Tech is as follows:

Grade Point Per Semester Hours	Grade	Definitions
4.00	A	
3.67	A-	
3.33	B+	
3.00	B	
2.67	B-	
2.33	C+	
2.00	C	
1.67	C-	
1.33	D+	
1.00	D	
0	F	
n/a	S	Satisfactory (C– or better)
n/a	U	Unsatisfactory (D+ or worse)
n/a	SA	Satisfactory Audit
n/a	UA	Unsatisfactory Audit
n/a	W	Withdrawal
n/a	WO	Withdrawal without Prejudice
n/a	PR	Progress
n/a	NR	Not Reported
n/a	NG	Not Graded

Grade Point Average (GPA)

The total institutional semester hours in which grades of A, A-, B+, B, B-, C+, C, C-, D+, D, and F have been received are divided into the corresponding total grade points earned to determine the student's cumulative grade-point average (GPA). Likewise, the student's GPA for any time period is found by dividing the credit hours in which grades other than S, U, SA, or UA were received into the total grade points earned during that period. The student's GPA indicates scholastic standing. Results of challenge examinations shall not be included in the student's class load for the semester in which the exam is taken. Transfer credit is not included in the GPA.

Grade Options

Auditing a Class

Students may attend classes as auditors; that is, they may enroll in a course for a grade option as an audit with the permission of the instructor of the course. Auditors pay tuition and fees on the same basis as those who enroll for credit. No student will be allowed to change registration from credit to audit or from audit to credit after the tenth week of a regular semester or the fifth week of the summer session. Students may not change from credit to audit or audit to credit more than once in a class. Auditors receive grades of SA (satisfactory audit) or UA (unsatisfactory audit) as determined by the instructor. The grade of Audit does not affect a students GPA, however course credit load may be affected, please see financial aid for additional information.

Graduate Auditing a Class

Graduate students may attend at most one three credit class as an auditor per semester.

Satisfactory/Unsatisfactory (S/U)

Courses may not be taken S/U without consent of the student's academic advisor, the student's major department, and the department in which the course is taken. Approval for the S/U grade basis must be obtained within the first ten weeks of classes. Decisions made at that time for either letter grade or S/U grade evaluation may not be subsequently changed. Students who receive a grade of S will receive credit for the course but that credit will not be applied to any graduate program requirements. The student is not eligible to repeat the course unless the course description specifically says they may. Students who receive a grade of U will not receive credit for the course. Some programs may not allow S/U to be applied towards courses in their programs (e.g., MENG department requires graded courses) or use S/U for graduations, before changing a grade option to S/U, check with your major department chair for any course grade restrictions to avoid any unwanted Graduation issues.

Undergraduate S/U

Students may take up to a total of 18 credit hours on an S/U basis in courses not normally graded S/U, with a limit of 7 credits in any one semester. Some degree programs do not allow courses taken S/U to count for degree requirements.

Graduate S/U

Courses that are normally graded may not be taken on an S/U basis and applied to any graduate program. Graduate students in good standing may take up to a total of 3 credit hours on an S/U basis in courses not normally graded S/U in a given semester. However, such courses cannot be applied to any graduate program requirements.

PR (Progress)

A grade of "PR" for independent study, thesis, or dissertation is given when satisfactory progress on research has occurred during the semester. If research progress has not been satisfactory, a grade of "U" (unsatisfactory) is issued. Students who earn unsatisfactory grades are not making satisfactory academic progress.

Withdrawing from a Course

Withdraw (W)

A student may not **withdraw (W)** from a class after the tenth week of a fall or spring semester, or the fifth week of a summer session. A W can only be assigned after consulting with the instructor and completing and submitting the appropriate form to the Office of the Registrar. Under no circumstances can an instructor assign a W in a course. A withdrawal does not have any negative impact on a student's GPA, the student is also relieved from attending any further classes for the course they have withdrawn from. Students withdrawing from a course or all courses are still financially responsible for the courses they withdrew from, no refunds are given for withdrawals.

Graduate Withdrawing from a Course

(see also withdrawal without Prejudice)

Graduate students must ensure that they successfully complete sufficient credits each semester; check with the Center for Graduate Studies if you have questions before withdrawing from a class.

Repeating a Class

A computable grade is a grade with a numerical equivalent: A, A-, B+, B, B-, C+, C, C-, D+, D, or F. A non-computable grade is a grade with no numerical equivalent: SA, UA, S, or U. **Students may not repeat courses at other institutions**.

Undergraduate Repeating a Class

If you received; Then

A, A-, B+, B, B−, C+, C, or S;	You may **not** repeat the class for a grade or credit unless the course description specifically states that it is repeatable.
C-, D+, D, or F;	You may repeat the class for a new letter grade and credit. (You may not repeat on an S/U basis.) The original grade will remain on your permanent record. The new grade will replace the old grade in calculation of your GPA, even if the new grade is lower. If you receive an F, you will receive 0 credit hours for the course, **even if you previously received credit.** ***You may not repeat the class at an institution other than New Mexico Tech.***
SA, UA, or U;	You may repeat the course for a grade and credit. If you repeat a course in which you received a U, you **must** take it for a computable grade.

Graduate Repeating a Class

If you received; Then

A, A-, B+, B, B−, C+, C, or S;	You may not repeat the class for a grade or credit unless the course description specifically says you may. If a student's overall graduate GPA is below a 3.0, permission to repeat specific courses (with grades of B-, C+ or C) may be requested from the Graduate Dean to meet graduation requirements.
C-, D+, D, or F;	You *must* repeat the class for a new letter grade and credit. (You may not repeat on an S/U basis.) The original grade will remain on your permanent record. The new grade will replace the old grade in calculation of your GPA, even if the new grade is lower. If you receive an F, you will receive 0 credit hours for the course, **even if you previously received credit.** ***You may not repeat the class at an institution other than New Mexico Tech.***
SA, UA, or U;	You may repeat the course for a grade and credit. If you repeat a course in which you received a U, you **must** take it for a computable grade.

Accessing Final Grades

Final grades are viewable in the secure area of Banweb (https://banweb7.nmt.edu) at the end of every semester. Grades are viewable shortly after the instructor submits them, however the students' GPA and academic standing are not official until the Friday following the last day of the semester.

Change of Grade

The instructor of a course has the responsibility for any grade reported. Once a grade has been reported to the Office of the Registrar, it may be changed only in the case of clerical error or in the case of documented extenuating circumstances. The instructor who issued the original grade must submit in writing the reasons for the change. The change of grade must also be approved by the department chair. Changes in grade must be made within five weeks after the start of the next semester. After this date grade changes can only be done with the approval from the Vice President of Academic Affairs.

Grade Appeal Procedure

A grade must be appealed no later than the end of the semester following the semester in which the student took the class. All questions can be referred to the Office of the Registrar.

Undergraduate Grade Appeal Procedure

Undergraduate students seeking grade changes must speak first with the instructor, next with the department chair, and finally with the Dean of the department.

Graduate Grade Appeal Procedure

Graduate students seeking grade changes must speak first with the instructor, next with the department chair, and finally with the Dean of the department.

Withdrawal without Prejudice (WO)

(See also Withdrawing from a Course, above)

Under extremely unusual circumstances (for example, serious illness or death in the student's immediate family), a student may petition for a withdrawal without prejudice. Students may not withdraw without prejudice from a course they are failing due to plagiarism, cheating, or other disciplinary issues. Charges for tuition and fees are not altered by such a withdrawal.

Undergraduate Withdrawal without Prejudice

A petition for an undergraduate withdrawal without prejudice should be submitted to the Dean of Students for review and consideration. The petition must include the completed Withdrawal Without Prejudice Request Form, a written letter explaining the circumstances, and supporting documents (a statement from a physician, obituary, etc.). The deadline for submission of the petition is the Friday before the start of final exams. In rare cases the Dean of Students may consider requests after the deadline.

Graduate Withdrawal without Prejudice

A petition for a graduate withdrawal without prejudice should be submitted to the Graduate Dean for review and consideration. The petition must include the completed Withdrawal Without Prejudice request form, a written letter explaining the circumstances, and supporting documents (a statement from a physician, obituary, etc.). The deadline for submission of the petition is the Friday before the start of final exams. In rare cases the Graduate Dean may consider requests after the deadline.

Transfer Credits

New Mexico Tech accepts academic credits from regionally accredited institutions of higher education. All credits will be evaluated and transferred on a course-by-course basis. Credit earned at any institution while a student is on academic suspension will be accepted following our standard transfer policy after a student serves the suspension, is readmitted to New Mexico Tech, and returns to good standing. Credit for courses previously attempted at New Mexico Tech will not be accepted.

Undergraduate Transfer Credits

A letter grade of "C" or higher is required for all transfer credit,.

Graduate Transfer Credits

For graduate degrees, NMT accepts at most 12 academic credits from regionally accredited institutions of higher education. All credits will be evaluated and transferred on a course-by-course basis. Only courses at the 3000 level and above with a grade of "B" or higher are eligible for transfer credit for graduate degrees

Academic Probation and Suspension

Note: Disciplinary probation and suspension are different than academic probation and suspension. Please see the Responsible Conduct section of the Guide to Conduct and Citizenship for Students at https://www.nmt.edu/studenthandbook/policies.php for information about disciplinary probation and suspension.

Academic Regulations

The academic regulations have a two-fold purpose:

1. to prevent the dissipation of the resources and time of students who fail to make reasonable progress in their academic programs at New Mexico Tech, and
2. to facilitate the maintenance of high academic standards at New Mexico Tech.

Academic Probation

Undergraduate Academic Probation

A student whose semester GPA falls below the minimum requirements needed for good standing will be placed on academic probation for the next regular semester of enrollment. Students are continued on probation if they withdraw from New Mexico Tech while on probation. See page on Good Academic Standing (Undergraduate) for minimum requirements.

Graduate Academic Probation

A graduate student who fails to achieve satisfactory academic progress will be placed on academic probation for the next regular semester of enrollment. Students are continued on probation if they withdraw from New Mexico Tech while on probation. See the Graduate Program for information.

Academic Suspension

Undergraduate Academic Suspension

Students who fail to achieve the minimum semester GPA for a second consecutive semester will be placed on academic suspension unless their cumulative GPA is 2.0 or better. A student on academic suspension is denied the privilege of enrolling at New Mexico Tech for the specified period of time.

Graduate Academic Suspension

Graduate students who fail to achieve satisfactory academic progress for a second consecutive semester will be placed on academic suspension. A graduate student on academic suspension is denied the privilege of enrolling at New Mexico Tech for the specified period of time.

Notification of Academic Suspension

Notification to the student of academic suspension will be made in writing to the address on file in the Registrar's Office. Academic probation and suspension will appear on the student's official transcript at the end of each grading period.

Duration of Academic Suspension

The first academic suspension from New Mexico Tech will be for one regular (fall or spring) semester. Second and subsequent academic suspensions will be for one calendar year. A student academically suspended after the fall semester is suspended for the following spring and summer semesters. A student academically suspended after the spring semester is suspended for the following summer and fall semesters. A student academically suspended after the summer semester is suspended for the following fall semester. Credit earned at any institution while a student is on academic suspension will be accepted following our standard transfer policy after a student serves the suspension, is readmitted to New Mexico Tech, and returns to good standing. Credit for courses previously attempted at New Mexico Tech will not be accepted.

Academic Policies

Withdrawing from the University

Students leaving New Mexico Tech, including those who are graduating or transferring to another institution, must withdraw from the university.

Before withdrawing from the university, you must

1. check in all NM Tech property (laboratory keys, gymnasium equipment, etc.);
2. settle or make arrangements for all financial obligations to the university;
3. complete a withdrawal form along with the withdrawal survey (the form and survey are available from the office of the Registrar);
4. complete an exit interview with the Financial Aid Office;
5. notify the Office of the Registrar if you have preregistered for classes offered the next semester. If you withdraw during the semester, you must complete the above steps and:
6. withdraw from all classes.

If you do not complete these steps, your transcript and/or diploma may be withheld.

A student may petition for Withdrawal without Prejudice under extremely unusual circumstances, such as serious illness or a death in the student's immediate family.

Academic Policies

Academic Issues & Appeal Policy and Procedure

New Mexico Tech (NMT) takes student concerns seriously and has policies and procedures in place to ensure that student grievances are considered and addressed if warranted. Occasionally, students may have reason to disagree with an academic decision, or feel that they have a legitimate concern about an instructor or staff member at Tech. Students should be aware that the Associate Vice President of Academic Affairs (for undergraduate students) and the Dean of Graduate Studies (for graduate students) are available to discuss and advise on any matter of academic concern and frequently help to expedite resolution of such matters. The following procedures should be followed for either appealing a course grade or all other types of academic appeals:

Procedures for Course Grade Appeals

1. A student must submit a grade appeal no later than the end of the regular semester (Fall or Spring) following when the student took the class. All questions can be referred to the Office of the Registrar.
2. The student should first discuss the issue, verbally or in writing, with the instructor.

3. If the student is not satisfied, is not comfortable following step two, or if the faculty member is unable to meet with the student, the student should then consult with the instructor's department chairperson (and program director, if appropriate). Every effort should be made to resolve the issue at this level, ideally within 7 academic days. An academic day is a regular business day of the Institute when classes are in session (e.g., M-F when classes are held). If the issue or concern is with the department chairperson/program director, then the student should skip this step and go to step 4.
4. If no satisfactory resolution has been reached, the student may present the issue or concern to the appropriate academic dean, either the Dean of Arts and Sciences or the Dean of Engineering. The dean should give their response to the issue within 10 academic days. The decision of the dean shall be final and not subject to further consideration.

Procedures for All Other Academic Appeals

1. The student should first discuss the issue, verbally or in writing, with the instructor or staff member.
2. If the student is not satisfied, is not comfortable following step one, or if the faculty member is unable to meet with the student, they should then consult with the instructor's department chairperson or the staff member's supervisor. Every effort should be made to
resolve the issues at this level, ideally within 7 academic days. An academic day is a regular business day of the Institute when classes are in session (e.g., M-F when classes are held). If the issue or concern is with the department chairperson or supervisor, then the student should skip this step and go to step 3.
3. If no satisfactory resolution has been reached, they may present the issue or concern to an academic dean, either the Dean of Arts and Sciences or the Dean of Engineering, depending on the course or individual with whom the student has a concern. If the Dean of Arts and Sciences or the Dean of Engineering is the subject of the complaint, then the student should skip this step and proceed to step 4.
   a. The student should submit the issue to the Dean (Arts and Sciences or Engineering) in writing, followed by a meeting to discuss the concern.
   b. The Dean (Arts and Sciences or Engineering) will investigate the issue and report back to the student in a timely manner, ideally within 10 academic days.
4. If no satisfactory resolution has yet been reached, or if the staff member does not report to an academic dean, they may present the issue or concern to the Associate Vice President of Academic Affairs (AVPAA) or the Dean of Graduate Studies (DGS). If the AVPAA or DGS is the subject of the complaint, then the student should skip this step and proceed to step 5.
   a. The student should submit the issue to the AVPAA or DGA in writing, followed by a meeting to discuss the concern.
   b. The AVPAA or DGS will investigate the issue and report back to the student in a timely manner, ideally within 15 academic days.
5. If no satisfactory resolution has yet been reached, the student may then present the issue or concern to the Vice President for Academic Affairs (VPAA) or their designated representative if there is a conflict of interest.
   a. The student should submit the issue to the VPAA in writing, followed by a meeting to discuss the concern.
   b. The VPAA will investigate the issue and report back to the student in a timely manner, ideally within 20 academic days. The VPAA will inform the President prior to rendering a decision.
   c. The VPAA's decision is final and not subject to further consideration.

The following conditions apply to all appeals:

- Students utilizing this appeal procedure will be protected from any form of retaliation. Any faculty or staff member engaging in retaliation will be subject to disciplinary action following the policies detailed in Institute documents (e.g., NMT Employee Handbook, Regulations Governing Academic Freedom and Tenure, Disciplinary Policy for Complaints Directed at Instructional Staff).
- Grade appeals handled at the dean level are formally tracked. Other academic appeals handled at the Associate Vice President of Academic Affairs, Dean of Graduate Studies, or a higher level are formally tracked.
- This appeal procedure does not apply to cases already subject to review and appeal by by other NMT policies (e.g. Title IX policy, academic honesty policy).
- For appeals that arise near the end of an academic semester, the participating individuals should work together to resolve the issue in a timely fashion.
- No changes will be made to a student's course schedule until after the grade appeal is finalized.
- Grades assigned as a result of an Academic Honesty Violation cannot be appealed through the Grade Appeal Process.
- Non-academic issues must be brought to the Dean of Students (for undergraduate students) and the Dean of Graduate Studies (for graduate students).
- Sexual harassment issues must be brought to the Title IX Coordinator.

Academic Honesty

New Mexico Tech has an outstanding academic reputation and excels as a teaching and research university specializing in areas of science, engineering, and related fields. This reputation is contingent on an environment of academic honesty and integrity. Violations of academic honesty and research integrity are therefore unacceptable and will not be tolerated at New Mexico Tech.

New Mexico Tech's procedures for handling Academic Honesty violations may be found on the website https://www.nmt.edu/academicaffairs/avpaa/academic_honesty.php It includes important information about cheating and plagiarism, consequences of violating the Academic Honesty Policy, and the judicial process if charges are brought. All New Mexico Tech students are strongly encouraged to be familiar with this document.

Additional Policies

Students who enroll at New Mexico Tech should do so with the realization that they are presumed to be serious in purpose, and they are expected to conduct themselves as good citizens of the college community. An effective guardianship of the health, general safety, and welfare of all students must be maintained.

The final responsibility for the accomplishment of these purposes must rest upon the administration and faculty of the institution, who may, therefore, prescribe certain rules and enforcement procedures for guidance toward these ends. Information concerning such rules and additional procedures can be found on the website.

New Mexico Tech is committed to the full support of the constitutional rights of its students, including due process in student disciplinary matters. Detailed procedures designed to safeguard students' rights and to guarantee fair and impartial treatment of any disciplinary cases are outlined on the website https://www.nmt.edu/studenthandbook/policies.php. Methods developed to provide due process in student disciplinary matters are based on the 1967 joint recommendations of the American Association of University Professors, the National Association of Students, and the National Association of Student Personnel Administrators, conforming to Title IX—Educational Amendments of 1972.

Continued enrollment in New Mexico Tech is dependent upon the maintenance of satisfactory grades and conformity to the rules of NM Tech.

Check the **Guide to Conduct and Citizenship for Students** for General Campus Rules and Policies on:

	Discipline	Privacy Rights
	Drugs and Alcohol	Quiet
	Grievance	Vehicle

Academic Policies

FERPA

STUDENT RECORD REGULATIONS

“Student Record” means all material concerning an individual student maintained in any form by New Mexico Tech or its employees, or Board of Regents, or contracted Third Party, except personal notes maintained by academic or other school personnel solely for their own individual use and not communicated to any other person. If these personal notes are transmitted to any dean, department, chairperson, academic program director, advisor, or administrator, they become student records to be treated in accordance with these rules and regulations. “Student” means any individual currently or previously enrolled in any academic offering of New Mexico Tech.

Transcripts and other documents in a student’s file from other institutions, organizations or individuals submitted to New Mexico Tech for admission, credit transfer or under control of the Registrar’s Office become the property of New Mexico Tech, and cannot be returned to the student or forwarded to other institutions. Under Federal policy, the student has the right to view the documents in their file; New Mexico Tech does not provide copies of these documents.

RETENTION AND SECURITY OF RECORDS

Records managers shall have the overall responsibility for maintaining and preserving the confidentiality and security of student records. The records managers may, however, designate another professional employee of the school to perform the duties of records manager.

- The Director of Human Resources shall be the records manager for records maintained regarding on-campus employment
- The Registrar shall be the records manager for academic records maintained by the central administration of the school
- The Director of Alumni Relations shall be the records manager for the records maintained by the Alumni Office
- The Controller shall be the records manager for records maintained by the Accounting Office
- The Director of Financial Aid shall be the records manager for the records maintained by the Financial Aid Office
- The Academic Program Chairs shall be records managers for the records maintained by their programs
- The Director of International Students & Scholars Office shall be the records manager for the records maintained by the International Students & Scholars Office.

STUDENT RECORD CONFIDENTIALITY

Notification of Rights Under FERPA

The Family Educational Rights and Privacy Act of 1974 (FERPA) affords eligible students certain rights with respect to their education records. An “eligible student” under FERPA is a student who is 18 years of age or older or who attends a postsecondary institution. These rights include:

1. **The right to inspect and review the student's education records within 45 days of the date that New Mexico Institute of Mining and Technology (New Mexico Tech) receives a request for access**.

· Current and former students who wish to make a FERPA-related request to view records should submit an online or written request to the Office of the New Mexico Tech Registrar that identifies the record(s) the student wishes to inspect.

· Applicants do not have FERPA rights unless and until they are admitted and are in attendance at the New Mexico Tech.

· Students are advised to provide complete information in order to assist the New Mexico Tech in following up on the request. Federal law requires that the New Mexico Tech provide access to requested extant records within 45 days.

· A Registrar's Office official will make arrangements for access and notify the student of the time and place where the records may be inspected. If the records requested are not under the control of the Registrar's Office, the Registrar's Office will make arrangements for the relevant office to provide the records within the time frame established under the law.

2. The right to request the amendment of the student's education records that the student believes are inaccurate, mislead ing, or otherwise in violation of the student's privacy rights under FERPA.

· A student may ask the New Mexico Tech to amend the record that he or she believes is inaccurate or misleading. The student should write the New Mexico Tech official responsible for the record (with a copy to the New Mexico Tech Registrar), clearly identify the part of the records he or she wants changed, and specify why it should be changed.

· If the New Mexico Tech decides not to amend the record as requested by the student, the New Mexico Tech will notify the student in writing of the decision and advise the student of his or her right to a hearing regarding the request for amendment.

· Additional information regarding the hearing procedures is provided to the student when notified of the right to a hearing.

3. The right to consent to disclosures of personally identifiable information contained in the student's education records, except to the extent that FERPA authorizes disclosure without consent.

1. FERPA contains various exceptions to the general rule that the New Mexico Tech should not disclose education records without seeking the prior written consent of the student. The following circumstances are representative of those in which education records (and information drawn from education records) may be disclosed without the student's prior written consent:

2. Upon request, the New Mexico Tech may release Directory Information (see the "FERPA Directory Information" section below).

3. School officials who have a legitimate educational interest in a student's education record may be permitted to review it. A school official has a legitimate educational interest if the official needs to review an education record in order to fulfill his or her responsibility to NMT or to the student.

- a school official is: a person employed by the New Mexico Tech in an administrative, supervisory, academic or research, or support staff position (including law enforcement unit personnel and health staff);
- a person or company with whom the New Mexico Tech has contracted (such as an attorney, auditor, or collection agent);
- a person serving on the Board of Trustees/Board of Regents; or a student or volunteer serving on an official committee (or representing a recognized student group), such as a disciplinary or grievance committee, or assisting another school official in performing his or her tasks.

4. FERPA permits disclosure of personally identifiable information (PII) from students' educational records, without consent of the student, if the disclosure meets certain conditions found in FERPA regulations. Some examples are:

· New Mexico Tech must provide records in response to lawfully issued subpoenas, or as otherwise compelled by legal process.

· New Mexico Tech discloses education records without consent to officials of another school, in which a student seeks or intends to enroll, upon request of officials at that other school.

- The New Mexico Tech may choose to disclose education records (and information drawn from education records) to either supporting parent(s) or guardian(s) where the student is claimed as a dependent under the Internal Revenue Code.
- The New Mexico Tech may inform persons including either parent(s) or guardian(s) when disclosure of the information is necessary to protect the health or safety of the student or other persons.
- For students under the age of 21, the New Mexico Tech may notify either parent(s) or guardian(s) of a violation of any law or policy relating to the use of alcohol or controlled substances.

5. The right to file a complaint with the U.S. Department of Education concerning alleged failures by New Mexico Tech to comply with the requirements of FERPA.

The name and address of the office that administers FERPA is:

Student Privacy Policy Office

U.S. Department of Education,

400 Maryland Avenue, SW,

Washington, DC 20202-4605.

FERPA Directory Information

- Student's name
- Address (local and campus box number)
- Telephone listing
- Electronic mail address
- Photographs, videos and other similar information
- Major field of study
- Dates of attendance
- Class (freshman, sophomore, junior, senior)
- Degrees, honors, and awards received
- The most recent educational agency or institution attended

- Student ID number, user ID, or other unique personal identifier used to communicate in electronic systems but only if the identifier cannot be used to gain access to education records except when used in conjunction with one or more factors that authenticate the user's identity, such as a PIN, password, or other factor known or possessed only by the authorized user
- A student ID number or other unique personal identifier that is displayed on a student ID badge, but only if the identifier cannot be used to gain access to education records except when used in conjunction with one or more factors that authenticate the user's identity, such as a PIN, password, or other factor known or possessed only by the authorized user.

The student is entitled to request that this information not be made publicly available by a request, in writing, to the Registrar at least one week prior to the beginning of Fall, Spring, or Summer. Requests received after the beginning of the term will be effective for the next term.

NOTE: It is still permissible for the school to release information to lenders, guarantee agencies, or the Department of Education concerning the enrollment status or address of any student or previous student who has obtained a loan under the Federal Perkins Loan, Federal Stafford Student Loan, Federal Graduated PLUS Loan and/or Private Education/Alternative Loan Programs.

Students Opting for no Release in the Classroom Setting:

Students cannot choose to be anonymous in the classroom setting. If a student has chosen "no release" for their directory information, that does not mean that an instructor cannot call on the student by name in class or that the student's email address cannot be displayed on an electronic classroom support tool such as a discussion board, blog, or chat feature. In addition, courses or sections offered through distance learning require a student photograph as identification similar to a student wearing an ID in an in-person class and is not subject to "no release" in a "classroom setting."

Consent to Use of Photographic Images:

Registration as a student and attendance at or participation in classes and other campus and New Mexico Tech activities constitutes an agreement by the student to the New Mexico Tech's use and distribution (both now and in the future) of the student's image or voice in photographs, video or audio capture, or electronic reproductions of such classes and other campus and New Mexico Tech activities.

If any student in a class where such photographing or recording is to take place does not wish to have his or her image or voice so used, the student should raise the matter in advance with the instructor.

Lecture Capture Videos: FERPA does not prohibit instructors from making a recording of virtual lectures or class sessions available to students controlled in the course. However, sharing the recordings beyond students enrolled in the course would generally require prior written consent.

Social Security Numbers in Student Records

As required by law, social security numbers are collected from prospective and current students who plan to seek employment on campus or wish to receive financial aid. In addition, the university is mandated by federal tax regulations to provide tuition and fee payment information to the student and the Internal Revenue Service, so that applicable educational tax credits may be computed. The social security number will be necessary to submit this tax reporting. The social security number is a confidential record and is maintained as such by the university in accordance with the Family Educational Rights and Privacy Act.

Sharing Information with Parents

Students are encouraged to maintain an ongoing, open dialogue with parents throughout their careers at NMT about academic progress and personal development. Most student difficulties are resolved at NMT without involving parents. Students may sign a release for Parents to discuss specific information with one of NMT student offices. The consent form can be found on the Registrar's Home page under FERPA. The New Mexico Tech does recognize, however, that there are some exceptional situations where parental involvement may be appropriate to assist a student through a difficult circumstance. Under those circumstances, NMT may (but is not required to) choose to disclose information to parents if permitted by law.

Under the Family Educational Rights and Privacy Act (FERPA), NMT is permitted to disclose information drawn from education records to parents if one or more parent claims the student as a dependent for federal tax purposes. Some laws, especially those relating to medical and mental health care, prohibit the disclosure of information without the student's consent, even where the student is a tax dependent.

PROCEDURE FOR INSPECTION OF RECORDS

Step 1. Students may request, in writing, the opportunity to inspect personal records. The request should be made to the records manager or designee in the department in which the records are on file.

Step 2 Such requests must specify records to be inspected. A request to inspect the pertinent records will be granted within a reasonable period of time, but such time is not to exceed forty-five days after the request has been made. Records will be inspected by the student or other authorized individual in the presence of the records manager or designee. Students may take notes but not remove, photo copy or photograph actual documents.

Step 3 A notation will be placed in the file each time it is inspected by anyone other than authorized school personnel

PROCEDURES FOR CHALLENGE OF RECORDS

Step 1: In the event that a student objects to any decision of a records manager regarding the retention of any student data, in whole or in part, such student shall make the objection known in writing to the records manager of those records.

Step 2: If the objection is not satisfied by discussion with the records manager, the student shall have the right to appeal to the Vice President of Academic Affairs. The student may challenge the retention of any data in the student record on the basis that it is inaccurate, misleading, or otherwise a violation of the privacy or other rights of the student. Request for appeal shall be in writing and must identify the specific portion(s) of the record to be challenged and state the reason for the challenge. Grades may be challenged under this procedure only on the basis of the accuracy of their transcription.

Step 3: The Vice President of Academic Affairs (VPAA), or designee, shall create a review panel composed of one Dean and two faculty members. Additional staff members may be involved, but will not be voting members of the committee. The review panel shall decide, upon appeal of the student, whether the challenged student data should be destroyed or amended.

Step 4: The review panel shall, within four weeks after being notified of such appeal, or longer should the appellant request delay, conduct a fair hearing to decide the issues presented by the appellant.

The records manager shall have the burden of proof with regard to the issues presented by the appellant

The appellant and the records manager shall have the right to be represented by an advocate of his or her choosing, cross-examine witnesses, present evidence, make a tape recording of the proceedings, and request a written decision supported by reasons

Potential Outcomes

- · If the student appeals according to the provisions set forth above and obtains a favorable ruling, the contested data shall be expunged from the student's record or corrected.
- If the student receives an unfavorable ruling upon appeal, then the objection must be noted in the student's record and the student be given the opportunity to insert a written rebuttal into the record.

The Department of Education has designated the following office to investigate, process and review violations and complaints. Any student who feels, after a hearing, that the school has not acted in accordance with the law may contact this office:

Student Privacy Policy Office

U.S. Department of Education

400 Maryland Avenue, SW

Washington, D.C. 20202-4605

PROCEDURE FOR INSPECTION OF FINANCIAL AID RECORDS

· The general procedure for inspection of records also applies to financial aid records and follows the same procedure for inspection

· The records and conversations between any aid applicant, his/her family, and the staff of the Financial Aid Office are confidential

· As a rule, all currently enrolled and former students have the right to review their financial aid records to determine their content and accuracy with the exception of those records including parental information and confidential references or recommendations for scholarships received from prior institutions attended, other individuals or from faculty and staff of New Mexico Tech

· A student who wishes to obtain access to his/her financial aid records is able to do so in the presence of a Financial Aid Office full-time employee

· Information may be disclosed to other institutional employees, if deemed appropriate, and representatives of Federal and state agencies, auditors and accrediting organizations

Students, faculty, and others with questions regarding student records should contact the Office of the New Mexico Tech Registrar.

Other Academic Policies

Cross-Enrollment:

The purpose of Cross Enrollment Agreement(s) are to allow qualified and approved students to concurrently enroll in a limited number of undergraduate or graduate courses/credit hours at another College/University within the State of New Mexico while reducing admissions processes and fees should a student apply to both institutions separately. While the primary concept was to allow graduate students to enroll in courses at another institution to enhance their learning experience and leverage access to expertise, some agreements have been made that select specific undergraduate courses. To inquire about Graduate Cross enrollments please speak with the Dean of Graduate Studies. To inquire about undergraduate cross-enrollment, please speak with the Office of the Registrar.

Academic Load

Veterans Academic Load

The Veterans Administration requires students on the GI Bill to carry a minimum of 12 credit hours (6 credit hours in summer) to qualify for full benefits. Community Education Physical Recreation (CEPR), Fine Arts (CEFA), and Community Outreach noncredit (CONC) courses do not count toward the minimum credit hours for veterans. Complete information can be obtained from the Veteran's Administrator.

Undergraduate Academic Load

A full-time undergraduate should carry an academic load of approximately 15 credit hours per semester for the fall and spring semesters. During the summer session, 6 credit hours is a full-time academic load; 3 credit hours is half-time. Students wishing to take more than 19 credits in a semester must obtain permission from their college dean using the appropriate registrar form.

Graduate Academic Load

Full-time graduate students must carry a load of at least 9 credits each fall and spring semester. Graduate students on assistantships must carry at least 12 credits in the fall and spring. Graduate students who are in residence during the summer must register for 6 credits. Physical Recreation (PHED), Studio Arts (ARTS), Lifestyle Activities (LIFE), and Community Education (CED) courses (designated by the letter "C" in the course number) do not count toward the minimum credit hours for graduate students. Graduate loads normally only count courses numbered 300 and above.

Part-time graduate students must register each fall and spring semester for 1-8 credits. If in residence during the summer, part-time graduate students must register for 1-6 credits.

Directed Study Course

Undergraduate Directed Study Course

To be included as part of student declaration of courses fulfilling degree requirement, directed study courses (courses numbered 491 and 581) require the approval of the department chair in the major department, the chair of the department offering thecourse, and the student's advisor. Approval must be obtained before the student takes the course.

Graduate Directed Study Courses

Directed study courses (courses numbered 491 and 581) are not typically accepted to meet graduate requirements. To be included as part of a student's declaration of courses fulfilling degree requirements, directed study courses require the approval of the student's graduate committee, the department chair in the major department, and the Graduate Dean unless the use of directed study is explicitly listed as applicable in the graduate student's degree program requirements. Approval must be obtained before the student takes the course and recorded in the student's graduate file in the Center for Graduate Studies.

Attendance

A student is responsible for all material covered in class; however, it is the decision of the individual instructor whether attendance is mandatory or optional. It is the student's responsibility to ascertain this.

Undergraduate Attendance

Illness or other circumstances that necessitate extended absence from class work should be reported as promptly as possible to the Dean of Students or designated representative who will notify the student's instructors on valid and confirmed situations. Students called to Military Active Duty must notify the Dean of Students or designated representative and provide appropriate documentation.

Graduate Attendance

Illness or other circumstances that necessitate extended absence from class work should be reported as promptly as possible to the Graduate Dean or designated representative who will notify the student's instructors. Students on Military Active Duty must notify the Graduate Dean or designated representative and provide appropriate documentation.

Student Use of New Mexico Tech Facilities

Many Tech facilities are available for student use. In order to be eligible, a club or organization must be officially recognized by the Dean of Students, or designated representative and by the Student Association. Facilities may only be used for legal and otherwise legitimate purposes, and that use must not in any way hinder the academic mission of NM Tech. Further details regarding use of classrooms and other facilities may be found in the New Mexico Tech Student Handbook.

Credit Hour

The institutionally established equivalencies to the Federal definition of the credit hour at New Mexico Tech are below. These standards apply to all undergraduate and graduate degree programs and courses bearing academic credit.

For each semester hour of credit, classes that meet in a person-to-person format are nominally one 50-minute period with the instructor and two hours of outside of class work per week for the length of the semester. Similarly, one hour of credit may be awarded for a laboratory period that meets for 150 minutes per week for the length of the semester. Other variations, including a combination of the above examples, are possible.

Classes that do not have the required person-to-person contact time (for example, hybrid or online courses) meet the credit hour standard if they meet one of the following criteria: (a) the course covers the same material in the same depth as a person-to-person version of the same course or (b) the course has been evaluated by the department for content, level and depth of coverage, and the department has approved the course credit to be awarded; this approval must be documented by the department.

This credit-hour policy will also be used to guide the offering of independent/directed study, internships, coops, teaching practicum courses, clinical placements, field courses, studio and lab courses, research study, thesis/dissertation work, and other kinds of for-credit experiential learning, recognizing these experiences may be more difficult to quantify than a traditional in-person course with a structured meeting schedule.

Any course offered during an abbreviated term must be equivalent in both contact and outside work total hours as a semester length course. If outside work is not assigned, lost hours must be made up through additional contact time.

Departments continue to be responsible for the consistent application of the credit hour, credit-hour policy, and for ensuring that a stated credit-hour standard is maintained as courses and instructors and mode of instruction or course formats change.

All courses are required to have stated student learning outcomes. Learning outcomes serve as a basis to determine if the amount of learning is consistent across different formats, instructors, and modes of instruction.

During each program review, all courses offered by the program will be reviewed by its program faculty for compliance with NMT's and the U.S. Department of Education's credit hour definition. The results will be shared with the Registrar and the Office of Academic Affairs to ensure ongoing compliance of assignment of credit hours to courses.

Student Identity Verification Policy

This policy aims to ensure that New Mexico Institute of Mining and Technology operates in compliance with the United States Federal Higher Education Opportunity Act (HEOA) provisions concerning the verification of student identity in distance education as well as any requirements set forth by accrediting bodies (e.g., Higher Learning Commission).

All credit-bearing courses and programs offered through distance education methods must verify that the student who registers for a distance education course or program is the same student who participates in and completes the course or program and receives academic credit. According to the HEOA, one or more of the following methods must be used:

- An individual secure login and password (e.g., Canvas),
- Proctored examinations, and/or
- Other technologies or practices that are effective in verifying student identification.

Any student work, assignments, or activities that are graded or contribute to a student's grade must be submitted via a system that verifies the student's identity as noted above.

The institution complies fully with the provisions of the Family Education Rights and Privacy Act (FERPA). All methods of verifying student identity in distance education must protect the privacy of student information. Additional information on FERPA and student record access can be found on the Institution's website.

If any fees associated with the verification of student identity will be charged to students, they will be indicated in the academic catalog, as part of the term's course offerings, or on the "Cost of Attendance" website.

All users are responsible for maintaining the security of usernames, passwords, and other access credentials as required. An account is given to an individual for the exclusive use by that individual. Attempting to discover another user's password or attempts to gain unauthorized access to another person's files is prohibited. Users are not permitted to give someone their password or allow others to use their account. Users are responsible for all activity on their accounts.

Failure to comply with this policy will be addressed using the appropriate personnel and conduct policies and procedures of the institution (e.g., Student Code of Conduct, Academic Honesty Policy, Employee Handbook). Failure to comply may also be a violation of civil/criminal law and may cause the violator to be subject to applicable penalties.

Waivers

Waivers do not constitute a reduction in the minimum hours required in a New Mexico Tech degree or certificate program. Waived courses must be replaced with an equal number of elective credits or an approved core course from another approved New Mexico Tech program that does not duplicate a course already completed.

The New Mexico Tech waiver policy applies to all credit-bearing programs (degrees, certificates, etc.). A waiver is official recognition that a graduation requirement has been satisfied through previous course work (waiver by documentation) or testing (ACT/SAT/AP/IB/Challenge exams). All documentation for a waiver must be submitted and approved the week before classes begin.

College Level Examination Program

The College Level Examination Program (CLEP) is a national program of credit by examination that offers the opportunity for college level achievement wherever or however the student learned. NMT does not accept CLEP exams and No credit is given for CLEP exams. However, challenge exams may be available in select courses at the discretion of the department for lower-level courses. Contact the Office of the Registrar for more information; registrar@nmt.edu.

Course Waivers

Placement

ACT/SAT English Waiver and Placement

Students who score 27 or higher on the ACT English test or 610 or higher on the SAT Critical Reading or 650 or higher on the Redesigned SAT Writing/Critical Reading test will have English 1110 waived as a requirement. While students will not need to take English 1110, they may still need 3 credits to reach the minimum credit requirements for their degree program. These credits can be in any subject area. Students transferring out of NMT will need to follow placement policies at the receiving institution, even if ENGL 1110 was waived at NMT. Similarly, if a student placed out of English at their originating university and are transferring to NMT, they should contact the Dean of the College of Arts and Sciences to arrange a placement exam.

Adult learners age 23 or older are not required to, but may submit an SAT/ACT score, and will be placed into entry level courses unless the student can provide adequate evidence that they can succeed in higher level courses, such as placement exams, transfer coursework, or challenge exams.

Math Placement

Mathematics is the backbone of all coursework at New Mexico Tech, and the selection of your initial math course is critical to your success at Tech. Placement is determined by your ACT/SAT math score or the optional math placement test, described below.

ACT MATH SCORE	SAT REDESIGN MATH SCORE	INITIAL MATH COURSE	TEST OUT EXAM & SCORE
24 or lower	580 or below	MATH 1220	MPAA 20
25 to 29	590 to 690	MATH 1240	MPCR 20
25 to 29	590 to 690	MATH 1230	MPTR 24
30 or above	700 or above	MATH 1510	

You may also enroll in MATH 1510 (Calculus I) if:

1. You are transferring college credit in precalculus and trigonometry.
2. You have earned a 4 or 5 on the Advanced Placement (AP) Precalculus exam. Earning a 4 or 5 on the AP exam will fulfill prerequistes and place the student into MATH 1510 (calculus).
3. You have earned a 3 on the Advanced Placement (AP) Calculus AB exam . Earning a 3 on the AP exam will fulfill prerequisites and place the student into MATH 1510 (calculus).

Placement based on AP Math Score:

Students with a 3, 4 or 5 on PreCalculus exam: Students scoring a 3 will receive credit for MATH 1240, Pre-Calculus. Students will have pre-reqs fulfilled, placement into Math 1230, trigonometry. Students scoring a 4 or 5 will receive credit for MATH 1240, Precalculus, and MATH 1230, trigonometry. Students will have pre-reqs fulfilled, placement into MATH 1510, Calculus I.

Students with a 3, 4 or 5 on Calculus AB exam: Students scoring a 3 will receive credit for Math 1240, Pre-Calculus. Students will have pre-reqs fulfilled, placement into MATH 1510, Calculus I. Students scoring a 4 or 5 will receive credit for MATH 1510, Calculus I , and place into MATH 1520 (Calculus II).

Students with a 3, 4, or 5 on the Calculus BC exam: Students scoring a 3 will receive credit for Math 1510, Calculus I and place into MATH 1520 Calculus II. Students scoring a 4 or 5 will receive credit for MATH 1510, Calculus I, and MATH 1520, Calculus II.

Math Placement Testing:

Optional math placement test(s), covering college algebra (MPAA), pre-calculus (MPCR), and trigonometry (MPTR), are available to students who score below 30 on the ACT math test or received below 670 on the SAT mathematics test or below 700 on the SAT redesigned mathematics test. **Waivers into 1000 level math classes are not granted. You must take the math placement exam if you want to enroll in any math class other than those listed above for your ACT or SAT math score.** Please contact mathplacement@nmt.edu for information about the math placement test. A score of 80% or higher is required to pass each placement test.

Course Waivers

Transfer Credit

Undergraduate Transfer Credits

New Mexico Tech accepts academic credits from regionally accredited institutions of higher education. All credits will be evaluated and transferred on a course-by-course basis.

Courses to be considered for transfer credit must have been taken for a letter grade.

Courses must be passed with a grade of “C” or higher to be considered for transfer credit at the undergraduate level.

Grades earned at other universities are not transferred to New Mexico Tech.

Credit earned at any institution while a student is on academic or disciplinary suspension will not be accepted at New Mexico Tech.

A list of courses offered at other New Mexico colleges and universities and their Tech equivalents is online at https://ccns.nmhed.us/

Coursework completed at universities/colleges outside of the United States, will require transcripts to be submitted through WES: https://www.wes.org/ for a Comprehensive Course by Course Report.

Graduate Transfer Credits

For graduate degrees, NMT accepts at most 12 academic credits from regionally accredited institutions of higher education. All credits will be evaluated and transferred on a course-by-course basis. Only courses at the 300 level and above with a grade of “B” or higher are eligible for transfer credit for graduate degrees.

Terminal Transfer Credits

Terminal transfer credits, credits earned at another college or university in order to complete the last degree requirements at NMT, are not allowed except when specified by a particular degree program, or when unusual circumstances appear to justify it. In no case will more than 12 credit hours of terminal transfer credits be allowed. A student who anticipates the need for requesting terminal transfer credit should do so as soon as practical and in no event later than the time of filing the Intent to Graduate for a degree. The request should be addressed to the Vice President of Academic Affairs. It should contain a statement of the circumstances which, in the student’s judgment, justify the request and a specific statement of the program proposed for obtaining the terminal credits. Approval, if granted, will be of a specific program.

Transfer Credits among New Mexico Higher Education Institutions

During the 2005 New Mexico legislative session (Senate Bill 161), and continuing with the passing of SB 103 in 2017 legislative session, courses successfully completed with a grade of C or higher at any regionally accredited public institution of higher education in New Mexico and recognized through a state approval process as general education at that institution are guaranteed to transfer to any other New Mexico two- or four-year public institution as general education coursework. Effective in fall 2019, New Mexico requires a minimum of 31 hours of general education coursework for students to be designated as "General Education Complete" at any NM institution for all Associates or Bachelor's degrees, taken from the approved General Education areas listed on the New Mexico Higher Education Department (HED) website (https://hed.state.nm.us/). Students who have decided on a major and/or an institution at which to complete their studies should consult with an academic advisor at that particular institution to determine the most appropriate course selections. Students enrolling for the first-year of study at a New Mexico college or university and considering possible transfer into a certificate and/or degree program at another institution are encouraged to take the courses approved for transfer during their first and sophomore year of study. Students transferring to NMT should also be aware that while they may have completed their New Mexico General Education requirements at the originating school, they may still be required to complete Institute Requirements for New Mexico Tech degree programs.

Student Responsibility

New Mexico's colleges and universities have collaborated to produce guides to assist students who plan to transfer before completing a program of study. Course modules are designed to help students select courses carefully so that they may transfer with little or no loss of credit. However, planning for effective transfer with maximum efficiency is ultimately the student's responsibility. Responsible transfer planning includes early and regular consultation with the intended degree-granting institution to assure that all pre-transfer coursework will meet the requirements of the desired degree.

Transferable Lower-Division General Education Common Core

Students enrolling for first-year study who have not yet selected either an academic focus or the institution where they wish to graduate are advised to take courses during their first year outlined in the Lower Division General Education Common Core. For students enrolled at any public institution in New Mexico, the following courses are guaranteed to transfer to any other New Mexico public college or university, and apply toward Associate and Baccalaureate degree program requirements if the student passes the classes with a grade of C or higher. Students should consult advisors at their current institutions regarding which specific courses fit these categories. Students preparing for careers in Engineering, Health Sciences, or other profession-related fields are advised that some of this coursework may not transfer toward general education requirements but in most cases will apply toward elective requirements.

The core matrix of approved courses guaranteed to transfer and meet general education requirements at any New Mexico college or university can be found on the New Mexico Higher Education Department website. Courses are listed by institution, whether university or community college, for each general education area. Students may also be able to access this list by going directly to https://hed.nm.gov/resources-for-schools/public_schools/general-education

Lower-Division 64-hour Transfer Module

Students who have selected a field of study but have not yet selected the college or university where they wish to earn their baccalaureate degree are advised to take courses during their first and sophomore years outlined in the General Education modules found at https://hed.nm.gov/resources-for-schools/public_schools/general-education.. For students enrolled at any public institution in New Mexico, these courses are guaranteed to transfer to any New Mexico university and apply toward Bachelor's degree program requirements. Students should consult advisors at their current institutions regarding which specific classes fit these categories. Lower-division transfer modules currently exist for:

- Biological Sciences
- Business
- Early Childhood Education
- Engineering
- Physical Sciences
- Social and Behavioral Studies

New Mexico Common Course Numbering System (NMCCNS)

A common course numbering system has been devised by New Mexico colleges and universities in compliance with the New Mexico Post-Secondary Education Articulation Act. The purpose of the system is to assist New Mexico students who are transferring between institutions within the state. The system provides a neutral state wide course identifier for those courses that are similar in nature and considered to be equal in transfer. To view the common courses between the University's in New Mexico please visit New Mexico Higher Education's common course crosswalk at https://ccns.nmhed.us/.

Inter-institutional Transfer Guides and Catalogs

Students who have selected a field of study and/or the institution where they wish to graduate from are advised to consult the transfer guide or catalog for that institution for current and detailed advice to guide their course selection.

Complaint Procedure for Transfer Students

All New Mexico public post-secondary institutions are required to establish policies and practices for receiving and resolving complaints from students or from other complainants regarding the transfer of course work from other public institutions in the state. Complaints can be filed with:

New Mexico Higher Education Department

2044 Galisteo Street,

Santa Fe, NM 87505-2100

505.476.6500

http://hed.state.nm.us/

Course Waivers

Challenge Examinations

Challenge exams are available to students who are able to demonstrate proficiency in the course learning outcomes. Students may request an opportunity to receive credit for a course by passing a comprehensive test of the course material (challenge examination). Each department determines what courses are eligible for a challenge exam. This information is updated annually and provided to the registrar's office. There is a challenge examination fee charged.

The following regulations will apply to all challenge examinations:

- The individual is a NMT student in good standing.
- Students who have attempted and received a grade in a class including “W” and “Audit” offered at NMT, have transferred in credit for a course, or have unsuccessfully challenged a course, may not take a challenge exam in that course.
- The form of the examination (written, oral, practical, combination, etc.) will be determined and scheduled by the department chairperson or program director.
- Information as to the nature of the challenge examination will be made available to a student upon request. The responsibility for preparatory study for these examinations rests entirely with the student; faculty members are under no obligation to assist with such preparation.
- Credit hours earned in this way are exactly equivalent to those credits transferred into the institution.
- Exams must be taken, graded, and processed before the last day to add a course for the Fall and Spring terms.
- Results of challenge examinations shall not be included in the student ‘s class load.

Course Waivers

Advanced Placement

Advanced Placement

Students who have completed college-level courses in secondary schools and have taken the Advanced Placement Examinations of the College Examination Board with resulting composite scores of 3, 4, or 5 may receive college level credit. The amount of credit and the equivalent university courses for which credit will be granted is listed in the table below. Such credit will be treated as transfer credit without a grade, will count toward graduation, and may be used in fulfilling specific curriculum requirements.

ADVANCED PLACEMENT PROGRAM

New Mexico Tech participates in the Advanced Placement Program of the College Entrance Examination Board. Credit and/or advanced placement are granted according to the departmental policies listed below. Advanced Placement credit is not awarded for **scores** of 1 or 2.

Subject	*AP Score*	*Credits Earned*
ART		
Art History	3	(3) ART REQ or HUMA REQ
	4 and 5	(3) ART REQ & (3) HUMA REQ
Studio Art: 2-D Design Portfolio	3	(3) GEN ELECT
	4 and 5	(6) GEN ELECT
Studio Art: 3-D Design Portfolio	3	(3) GEN ELECT
	4 and 5	(6) GEN ELECT
Studio Art: Drawing Portfolio	3	(3) GEN ELECT
	4 and 5	(6) GEN ELECT
BIOLOGY		
Biology	3	(3) LSCI ELECT or GEN ELECT
	4 and 5	(3) BIOL 2110 **Lecture only***
* Lab **waiver** only if AP course had a lab. If no lab, student must take an appropriate lab at NMT. It is the student's responsibility to consult with the Biology Department Chair to determine lab waiver eligibility.		
CALCULUS		
Calculus AB	3	(3) MATH 1240 and placement into MATH 1510
	4 and 5	(4) MATH 1510
Calculus BC	3	(4) MATH 1510
	4 and 5	(4) MATH 1510 and (4) MATH 1520
CHEMISTRY		
Chemistry	3	(3) LSCI ELECT or GEN ELECT
	4	(3) CHEM 1215 **Lecture only***
	5	(3) CHEM 1215 and (3) CHEM 1225 **Lectures only***
* Lab **waiver** only if AP course had a lab. If no lab, student must take an appropriate lab at NMT. It is the student's responsibility to consult with the Chemistry Department Chair to determine lab waiver eligibility.		
COMPUTER SCIENCE		
Computer Science A	3	(4) CSCI 1220
	4 and 5	(3) CSCI 2210
Computer Science Principles	3, 4 and 5	(2) CSCI 1001
ECONOMICS		
Macroeconomics	3, 4 and 5	(3) ECON 2110
Microeconomics	3, 4 and 5	(3) ECON 2120
ENGLISH		
English Lang	3, 4 and 5	(3) ENGL 1110
English Lit	3, 4 and 5	(3) HUMA REQ

ENVIRONMENTAL SCIENCE		
Environmental Science	3, 4 and 5	(3) LSCI ELECT or GEN ELECT
FOREIGN LANGUAGES		
Foreign Languages	3	(3) LANG ELECT or HUMA REQ
	4	(6) LANG ELECT or HUMA REQ
	5	(6) LANG ELECT or HUMA REQ and (3) GEN ELECT
GEOGRAPHY		
Human Geography	3, 4 and 5	(3) SS REQ
HISTORY		
European History	3	(3) HIST 1150
	4 and 5	(3) HIST 1150 and (3) HIST 1160
US History	3	(3) HIST 1110
	4 and 5	(3) HIST 1110 and (3) HIST 1120
World History	3	(3) HIST 1130
	4 and 5	(3) HIST 1130 and (3) HIST 1140
MUSIC THEORY		
Music Theory	3, 4 and 5	(3) MUSC 2420
PHYSICS		
Physics 1	3, 4 and 5	(3) LSCI ELECT or GEN ELECT
Physics 2	3, 4 and 5	(3) LSCI ELECT or GEN ELECT
Physics C: Mechanics	3, 4 and 5	(4) PHYS 1310 **Lecture only***
Physics C: Elctrcty & Mgntsm	3, 4 and 5	(4) PHYS 1320 **Lecture only***
* Lab **waiver** only if AP course had a lab. If no lab, student must take an appropriate lab at NMT. It is the student's responsibility to consult with the Physics Department Chair to determine lab waiver eligibility.		
POLITICAL SCIENCE		
Comp Gvrnmnt & Pltcs	3, 4 and 5	(3) SS REQ
US Gvrnmnt & Pltcs	3, 4 and 5	(3) SS REQ
PSYCHOLOGY		
Psychology	3, 4 and 5	(3) PSYC 1110
STATISTICS		
Statistics	3, 4 and 5	(3) MATH 2350

Course Waivers

International Baccalaureate

International Baccalaureate

Students who have completed college-level courses in secondary schools and have taken the International Baccalaureate **(IB)** Examinations may receive college level credit. The amount of credit and the equivalent university courses for which credit will be granted is listed in the table below. Such credit will be treated as transfer credit without a grade, will count toward graduation, and may be used in fulfilling specific curriculum requirements.

NMT Policies for International Baccalaureate (IB) Program New Mexico Tech accepts IB (International Baccalaureate) credit according to the departmental policies below.					
HL (high level) Examination only					
Examination	**Score required**	**Course Subject Prefix**	**Course Equivalency**	**Credit Given**	**Course Title**
Biology HL	5 or higher	BIOL	2110	3	General Biology I
Biology Lab		BIOL	2110L*	1	
Chemistry HL	5 or higher	CHEM	1215	3	General Chemistry I
Chemistry Lab		CHEM	1215L*	1	
Computer Science HL	5 or higher	CSCI	1220	4	Intro to CS
English A: Literature HL	5 or higher	ENGL	1110	3	English
Economics HL	5 or higher	ECON	2110 & 2120	6	Macro/Micro
History HL	5 or higher	HUMA	HUMA REQ	3	
MATH HL Topics 5 & 7	5 or higher	MATH	2530	3	Statistics
MATH HL Topics 6	5 or higher	MATH	1510	4	Calculus I
MATH HL Topics 9	5 or higher	MATH	1520	4	Calculus II
Physics HL	5 or higher	PHYS	1310	4	General Physics I
Physics Lab		PHYS	1310L*	1	
Psychology HL	5 or higher	PSYC	1110	3	Intro to Psychology
Languages HL	5 or higher	LANG/ HUMA	LANG/HUMA REQ	3	
* Lab credit will be considered upon submittal of lab course work documentation to the appropriate department.					

Course Waivers

Military Training

Military Training

NMT is dedicated to ensuring the success of our active duty and veteran students. If you attended a military service school, received training, or served in an occupation specialty you may be able to earn credit towards your program at NMT.

1. Check Your Eligibility In order to request credit or an evaluation of your military experiences, you must:
    - Be accepted as a student at NMT
    - Have a declared program of study to which the credit awarded will apply
    - Request your official Joint Service Transcript (JST) and have it submitted directly to the NMT Articulation and Transfer Office if you are or were a member of the U.S. Armed Forces.

Call to Active Duty Service

Call to Service is appreciated and respected at NMT. If you are called to Active Duty during your enrollment at NMT please contact the Veterans Education Benefits Office and the Registrar's office located in Fidel Center, Suite 289.

Veterans Education Benefits

NMT is dedicated to the success of our Armed Service Members and Dependents using Veterans Education Benefits.

Steps to receive and utilize these benefits are as follows:

- Apply for VA Education Benefits through https://www.va.gov/education/how-to-apply/
- Apply to and be accepted to NMT
- Register for Classes
- Supply a copy of your Certificate of Eligibility to the Veterans Education Benefits, School Certifying Official upon receipt.
- Comply with School Certifying Official's requests, i.e., semester by semester requests to continue to utilize benefits, any changes in credit hours, withdrawal from classes, etc.

Email and Telephone contacts can be found at https://www.nmt.edu/veterans/

Attendance

A student is responsible for all material covered in class; however, it is the decision of the individual instructor whether attendance is mandatory or optional. It is the student's responsibility to ascertain this.

Undergraduate Attendance

Illness or other circumstances that necessitate extended absence from class work should be reported as promptly as possible to the Dean of Students or designated representative who will notify the student's instructors on valid and confirmed situations. Students called to Military Active Duty must notify the Dean of Students and Registrar's Office and provide appropriate documentation.

Graduate Attendance

Illness or other circumstances that necessitate extended absence from class work should be reported as promptly as possible to the Graduate Dean or designated representative who will notify the student's instructors on valid and confirmed situations. Students on Military Active Duty must notify the Graduate Dean and Registrar's Office and provide appropriate documentation.

Student Health Center

Student Health Center

The Student Health Center is a convenient and confidential way to meet the health needs of Tech students. The medical staff provides primary medical care, which includes history taking, physical examination, and lab testing as needed for both acute and chronic health problems. The nurse practitioner can diagnose, prescribe and provide treatment. Medical care outside the center's scope of practice will be referred to a physician, nurse practitioner or registered nurse.

Children's Center

Children's Center

The New Mexico Tech Children's Center is 5 star accredited and offers full-time and part-time quality and developmentally appropriate education and care for children of New Mexico Tech students and employees, as well as community members. Our staff has an uncompromising commitment to excellence. The Children's Center equally places a high priority on responsiveness and close working relationships with each child and family. We offer a relaxed and casual setting for children ages 2 through 6 in our two preschool classrooms. The program in these rooms focuses on active learning and social engagement to build appropriate skills and knowledge in young children. We also have after-school care for children attending the public schools in grades kindergarten through fourth grades. We also have an infant care program for babies starting 6 weeks old. Our center is open year-round, from 7:45 a.m. to 5:15 p.m., Monday through Friday, with the exception of New Mexico Tech holidays/closures. Please contact the Children's Center at 575-835-5240 or autumn.haworth@nmt.edu, or visit the center located on Olive Lane next to Macey Conference Center for more information.

Student Leadership & Engagement

Center for Student Leadership and Engagement

Student Leadership and Engagement (SLE) fosters an environment for student success, engaging in personal development, and enhancing leadership and innovative skills. Student Leadership and Engagement includes the offices of Career Services, Student Activities, and oversees the NMT Food Pantry (located in Fidel 326). Professional staff provide students with services including career coaching, resume writing, interviewing skills, and leadership training. Career Services connects students with employment opportunities including two Career and Graduate School Fairs each year. NMT students can participate in leadership programs specifically designed for STEM students. Student Leadership and Engagement also hosts student programming to engage students with the campus community as well as the Socorro area. Come visit Student Leadership and Engagement in the Joseph A. Fidel Student Services Center, Suite 262, Monday through Friday from 8 a.m. to 5 p.m.

Student Leadership & Engagement

Career Service

Career Services

The Office for Career Services provides career counseling; resume, cover letter, and interviewing skills assistance; and listings of permanent, temporary, on-campus, internship, fellowship, and research positions. The Office for Career Services is responsible for Career Fairs, the Cooperative Education program, maintaining placement records, sponsoring workshops on aspects of graduate school and job search processes, and providing assistance to employers, including scheduling information sessions and on campus interviews. Information is available at https://www.nmt.edu/studentaffairs/careerservices/index.php.

Student Leadership & Engagement

Cooperative Education Program

Cooperative Education Program

The Cooperative Education/ Internship Program is a three-way partnership among the employer, the student, and NMT. The program is designed to provide experienced based learning to New Mexico Tech students through employment in practical, curriculum-related work assignments structured to meet students' interests, abilities, and aptitudes while meeting employers' staffing needs. Information is available at https://www.nmt.edu/studentaffairs/careerservices/index.php

Student Leadership & Engagement

Counseling Services

Counseling Services

The Office of Counseling and Disabilities (OCDS) is located in the Joseph A. Fidel Student Services Center and is open weekdays from 8 a.m. to 5 p.m. OCDS provides students with individual and couples counseling, outreach programs, consultation and crisis intervention. We adhere to the Code of Ethics of the New Mexico Board of Clinical Mental Health Counselors. All services are strictly confidential and are free to students enrolled at NMT.

To schedule an appointment, email counseling@nmt.edu or call (575) 835-6619. Please fill out the Counseling Intake form before your appointment; it can be found on our website at www.nmt.edu/cds/counseling.php.

For after hours emergencies, please contact Campus Police at 575-835-5434.

Student Leadership & Engagement

Student Access Services

Student Access Services

Student Access Services arranges academic accommodations for students who have documented disabilities that affect their ability to participate on an equal basis with students who do not have disabilities. Students with sensory, mobility, learning, psychological, or other recognized disabilities are encouraged to contact this office to assist with accommodations. The office is located in the Joseph A. Fidel Student Services Center and is open from 8 a.m. to 5 p.m. weekdays. Students are encouraged to request services well in advance of the start of the semester to allow adequate time to make needed arrangements. Students must provide current documentation to be eligible for accommodations. New Mexico Tech is committed to ensuring that the campus is accessible to all individuals.

Student Leadership & Engagement

Multicultural Programs

Multicultural Programs

The Office for Multicultural Programs supports student chapters of the American Indian Science and Engineering Society (AISES) and the Society of Hispanic Professional Engineers (SHPE), as well as administering the Louis M. Stokes Alliance for Minority Participation. The Office for Multicultural Programs works to provide academic and financial support as well as providing information about opportunities within and outside NMT. The Office for Multicultural Programs is housed in the Center for Student Leadership and Engagement on the second floor of the Joseph A. Fidel Student Services Center, Suite 262. https://www.nmt.edu/studentaffairs/multicultural/index.php

Student Leadership & Engagement

International & Exchange Programs

International and Exchange Programs

The Office of Admissions oversees International Student Services. The office provides advice and compliance to international students, especially with regard to visa-related matters. It also coordinates activities, both on and off campus, designed to help students from other countries make the transition to living in the United States and Socorro. These activities include orientations, international receptions, and Global Village Day.

In addition, the office maintains information about study abroad opportunities in other countries, coordinates Tech's student exchange program with a number of foreign universities, and participates in the New Mexico International Education Consortium. The Office for International Student Services is located in the Joseph A. Fidel Student Services Center, room 303. www.nmt.edu/studentaffairs/intlprograms/index.php

Residential Life

Housing and Residential Life

https://nmt.edu/reslife/

Housing and Residential Life is centrally located on the second floor of Joseph A. Fidel Student Services Center. During normal University business days, Residential Life is open between 8 a.m. and 5 p.m., Monday through Friday. You can contact us at 575-835-5900 or by email at residential_life@nmt.edu. After hours, an on-call housing professional can be reached for urgent matters by contacting the Campus Police Dispatcher at 575-835-5434.

New Mexico Tech housing consists of six traditional residence halls and one student pod complex. All are within walking distance to classrooms, labs, the computer center, child care, research facilities, food service, and the bookstore. If you are a regular, full-time student, you are eligible to live on campus. Four halls – Driscoll, Presidents, West, and South – sit on Tech's tree-lined Campus Drive, close to the gym, Joseph A. Fidel Student Services Center, the athletic field, Student Activity Center, swimming pool, and sport courts. Torres Hall, Baca Hall, and Altamirano Apartments fall on the south side of campus.

Auxiliary Services manages 2 apartment communities for graduate students, families, and upper-class students. Mountain Springs Apartments are located on the southwest corner of Bullock Blvd. and El Camino Real St. and offer campus living closer to the community. Desert Willow Apartments are located in the southwest corner of campus on Romero Dr. off of Neel Dr. More information can be found at https://www.nmt.edu/studentlife/apartments.php.

If you live on campus, you are expected to abide by Residential Life rules and procedures, which are found in the Room and Board Agreement, and the Community Standards for Residence Halls webpage: https://nmt.edu/reslife/docs/COMMUNITY-STANDARDS.pdf

Housing & Meal Plans

Dining and Meal Plans https://nmt.edu/reslife/dining.php

Dining Possibilities at New Mexico Tech

Dining at New Mexico Tech is a great aspect to living on campus. NMT Dining, our food service provider, continually strives to improve the dining services to students at New Mexico Tech. We have several meal plan options available to our residents and student population. Every student who lives in a residence hall must purchase a meal plan and there are many options available sure to fit your needs.

The New Mexico Tech food service operations are located on the ground floor of the Joseph A. Fidel Student Services Center, and include the main dining room and Fire and Ice coffee shop. Both are operated by Chartwells, a division of the Compass Group. The main dining room features a variety of stations with food options ranging from international cuisines to burgers and fries to home-style cooking. Special events and theme meals are offered on a regular basis. For more information about dining and specific meal times, please visit the NMT Dining websitehttp://www.dineoncampus.com/nmt/.
It is mandatory for all undergraduate residents to purchase a meal plan. The size of the meal plan required depends on the student's living arrangements. The number of meals in a meal plan are for an entire semester. Meals remaining at the end of the semester cannot be carried over to the next semester. No refunds will be given for meals not eaten. Dollars work like cash and are accepted at the Fire and Ice coffee bar, which is just outside the dining room on the ground floor of Fidel. For more information about meal plan choices, please visit our webpage: https://nmt.edu/reslife/dining.php.

Housing & Meal Plans

Room Cancellations

Room (Apartment or Residence Hall) Cancellation Policy Entering Students

Tuition and Applicable Fees, Summer Semester		
• Prior to 5 p.m. on the second Tuesday after summer classes begin	The student who drops any or all summer classes at New Mexico Tech prior to 5 p.m. on the second Tuesday after classes begin will receive a 100% refund.	
• After the second Tuesday after classes begin	No refunds are made to students who drop or withdraw from any or all summer classes after the second Tuesday after classes begin.	
• Financial Aid Implications	Student receiving financial aid who withdraw from all classes are subject to a Return of Title IV Funds policy, which returns funds to the financial aid programs. For further information, see Return of Title IV Funds.	

Students entering University housing for the proceeding semester may cancel their Room & Board Application and License Agreement without financial penalty by June 1 (for the proceeding fall term), December 1 (for the proceeding spring term) and May 1 (for the proceeding summer term).

Between above dates and Opening Day for those respective terms, the student will be charged a $400 fee for breaking the Agreement/ not checking in by the first day of classes.

Room cancellations made after the first day of classes are not eligible for refund of room or board. Fall semester residents who request cancellation of their room & board for the following Spring semester will still be charged for room & board if they remain enrolled at the University.

Term dates are available on the current Residential Life Rates Sheet.

Cancellations must be in writing. No cancellations will be accepted over the phone. Students with extenuating circumstances for canceling the Agreement may request a waiver of the cancellation fee and/or room & board charges by submitting a written waiver request to Residential Life. The request will be reviewed by a committee.

Returning Students

- Returning students may cancel their agreement for the upcoming academic year prior to June 1st without penalty.
- Agreements canceled after June 1st will incur a $400 penalty.
- Room cancellations made after the beginning of the Apartment/Residence Hall term will receive no refund on their room rent.
- Fall semester residents who cancel their room for the following Spring semester will still pay the cost of the room.
- Term dates are available on the Residential Life web site. https://www.nmt.edu/reslife/

Cancellations must be in writing. No cancellations will be accepted over the phone. Students with extenuating circumstances for canceling their residence hall agreement must request a waiver of the penalty fee in writing to the Residential Life Office. The request will be reviewed by a committee.

Boarding Plans

You may not cancel or make any changes to your meal plan after the first week of classes each semester. Students with extenuating circumstances who wish to cancel their meal plan must send a request, in writing, to the Office of Housing & Residential Life (HRL). For more information on HRL's cancellation policy, please follow the associated link: https://www.nmt.edu/reslife/policies/cancellation-policy.php

Student Support Services

- Dean of Students
- NMT Office of the Registrar
- NMT Financial Aid Services
- NMT Veteran Affairs
- NMT Academic Support Services

Dean of Students

Dean of Students

The Dean of Students Office (DOSO), serves as a resource network for faculty, staff, students and their families, and is committed to helping all students at NMT reach their fullest potential. The office provides a variety of student support services along with opportunities for leadership experience, diverse student work environments, engaging programming and specialized resources.

The Office of the Dean of Students includes four specialized areas:

- Center for Student Leadership and Engagement
- Performing Arts Series
- Housing and Residential Life
- Student Accountability

The DOSO handles issues that can range from unresolved roommate conflicts, complaints, concerns or grievances, and University policy violations. The goal is to treat students with dignity, and provide educational interventions as appropriate to assist students in accomplishing their aspirations, and successfully persist to graduation. Whatever the issue, the DOSO is an excellent place to begin seeking out advice, information and services on the following areas:

- Absentee Notification
- Student Funding Request
- Withdrawal Without Prejudice
- NMT Student Handbook
- NMT Student Code of Conduct

- Student Support Resources

Dr. Aly El Osery, the Dean of Graduate Studies, specializes in our graduate student needs.

Dean of Students email: deanofstudents@nmt.edu

Registrar Office

Welcome to Office of the Registrar!

To visit our website homepage where you can find information for registration, document requests, and registration forms, click the following link Registrar Office.

Registrar Office

Readmission

Readmission for regular degree-seeking undergraduate students who left on good standing

A student who has not been continuously enrolled for an Academic year (Fall and Spring excluding summer session) must submit an application for readmission to the Office of the Registrar. A student who left on good academic standing must submit the following:

- A completed readmission application, the application can be downloaded here.
- If you attended another institution while away from NMT, an official transcript will be required with the submission of your readmission application. A student will not be considered for readmission unless all transcripts have been received.
- Readmission applications are processed beginning in November for the Spring semester, beginning in July for Fall semester, and beginning in May for the Summer semester. Readmission applications must be completed and submitted the Friday before classes begin for each semester.

Readmission for regular degree-seeking undergraduate students who left on academic probation or suspension

A student who has not been continuously enrolled for an Academic year (Fall and Spring excluding summer session) must submit an application for readmission to the Office of the Registrar. A student who left while on academic probation or academic suspension must submit the following documents:

- Readmission Application which can be downloaded from here.
- A one-page Appeal Letter that persuasively makes a case for Readmission. Please include the following:
    - An explanation of why you did poorly.
    - An explanation of what you plan to do differently to be successful.
    - Any other information that shows the committee you are ready to be a successful student at NMT.
- A Supporting Letter from the Student's Advisor. If you are changing majors, this letter can be from your old advisor, new advisor, or both.
- An Academic Warning Packet, which can be downloaded from here. If you are changing majors, the packet must be completed with/approved by your new advisor.
- Any documents the student thinks are relevant, such as medical documents or letters of support from faculty, counselors, or the Dean of Students.
- Official transcripts for any colleges/universities attended since leaving New Mexico Tech.

You can mail, fax, or email this into our office. registrar@nmt.edu fax # 575.835.6511, and address is 801 Leroy Place, Socorro, NM, 87801. When readmitted from suspension status the student will be on probation and subject to all the rules and regulations of a student on probation. Failure to meet the minimum grade point average for academic good standing will result in a second suspension from the Institute for a period of a Full Academic year (Spring, Summer, Fall). Credits earned at another institution during duration of suspension will not be accepted for transfer.

A student in good standing will be readmitted by the Registrar. Application and material submitted by a student who left while on academic probation or academic suspension will be reviewed by the Academic Standards and Admission Committee and written notice of the decision will be given to the petitioner.

Students will not be readmitted after their third suspension except in very unusual circumstances on a case-by-case basis.

Conditions of Readmission

A readmitted student must choose degree requirements to be satisfied from the catalog in effect when the student was readmitted or any subsequent catalog, provided the student is continuously enrolled after readmission. A student readmitted by the Academic Standards and Admission Committee must follow the guidelines set by the committee. If accepted for readmission, a student on academic probation will be automatically placed on academic probation for 1 semester excluding the summer semester. A student accepted for readmission from suspension will be automatically placed on academic probation for 3 semesters excluding summer semesters and subject to all the rules and regulations of a student on probation.

Appeal Deadlines

Deadlines for appealing admission decisions are on the 10th of every calendar month. Students may appeal one time per semester, fall, spring, and summer. Appeal applications submitted after the 10th will be reviewed the following month. The Academic Standards and Admissions Committee will meet within 5 business days of each appeal application deadline to evaluate the cases and make a determination. The Associate Vice President for Academic Affairs will be an active participant in the monthly meetings and will make recommendations on the student's situation to the committee. All decisions will be final.

Deadlines for appealing admission decisions are on the 10th of every calendar month. Students may apply.

Readmission After Ten Years

If a student is readmitted to the university after not being continuously enrolled for more than ten years (from the last enrolled term), then the student will be treated as a transfer student. A transfer evaluation will be performed in consultation with the academic department.

- For courses related to the major: the department would evaluate course content and major requirements to identify whether completed courses satisfy the learning outcomes and requirements associated with the major that are currently in effect.

- For courses related to the General Education program: the academic dean of the appropriate college, in consultation with academic departments, would evaluate course content and general education requirements to identify whether completed courses satisfy the learning outcomes and requirements associated with the program that are currently in effect.
- All credits remain on the student's transcript and may count toward a degree's credit requirement (e.g., elective credit).

Registrar Office

Registration of Courses

[Contact: Office of the Registrar, New Mexico Tech, 801 Leroy Place, Socorro, NM 87801; 575.835.5133; fax: 575.835.6511; registrar@nmt.edu]

Registering for Courses

Regular students can register online at http://banweb.nmt.edu. You must obtain your Alternate PIN (APIN) from your advisor before registering. Instructions for registering online can be found at the registrar's web page, www.nmt.edu/registrars-office.

Specific days are set aside for registration (see Academic Calendar). You may register online or in person through the second Tuesday of instruction which is the last day to add any classes to a students schedule.

The last day to drop any courses without financial responsibility is the third Friday of the semester. After this date no schedule changes will be allowed and will only be considered under extreme or unusual circumstances and on a case by case basis, after consultation and approval from the Vice President of Academic Affairs.

Schedules of course offerings, with time and place of meeting and the name of the instructor in charge, are available at http://banweb.nmt.edu before the registration period of each semester or summer session.

A course may be cancelled if demand or resources are insufficient. Students are encouraged to discuss with their advisors their interest in courses not currently offered. You must be enrolled in a class to attend that class. Students may not "sit in" on a class for which they are not registered at New Mexico Tech.

Course Prerequisites and Corequisites

Some courses have prerequisites, courses you must successfully complete before enrolling in that course. Exceptions can be made for extenuating circumstances with the approval of your advisor and instructor, however please be mindful that an override is not guaranteed. If you enroll in a course in which you do not have the prerequisites without permission from your advisor and instructor, you will be disenrolled from the course with notification.

Corequisites are courses that should be taken during the same semester.

Prerequisites and corequisites are not determined by the student's individual catalog, but rather by the catalog in effect at the time that the course is taken.

Course Grade options

If a student would like to change the option change the option of the grade from their course they may be do so with the appropriate documentation completed, fro more information regarding grade option please see academic policies on page

Cross-Enrollment between NMT and Other Universities

NMT offers cross-enrollment with select institutions who participate in the program with NMT. For further information please see cross-enrollment on page

Changes in Registration

A student may change their registered courses by filing a Change-of-Registration form with the Registrar. No classes may be added after the second Tuesday following the beginning of classes. During the first three weeks of a fall or spring semester, and through the second Tuesday of the summer session, a student may drop a class and the course will not appear on the permanent record. After the third week of classes in a fall or spring semester or the second Tuesday of a summer session, the student must file a Withdrawal Authorization Form and pay the withdrawal fee. The grade "W" will appear on the student's permanent record. A student may not withdraw (W) from a class after the tenth week of a fall or spring semester, or the fifth week of a summer session. You may change to audit or S/U up to the end of the tenth week of the semester or the fifth week of the summer session.

Registration Fees

Late Registration Fee

Students who fail to register for at least one course by the first 3 days of class during the designated registration period are charged a late fee per day. This stipulation applies to all regular undergraduate and graduate students who have not registered for any courses by the first Wednesday of the semester, changing registration is excluded. Non-degree seeking students are not charged this fee.

Validation

Undergraduate Validation -You must settle your financial status (validate) with the NM Tech Business Office before your registration will be considered complete. Students who have not validated by the Wednesday (fall and spring semesters) and on Friday (summer semester) before the close of registration are subject to disenrollment from classes.

Graduate Validation - If you have a teaching or research assistantship contract, you may validate through the Graduate Deferment Payment plan with Student Accounts.

Financial Aid for Undergraduate Students

[Contact: Financial Aid Office, New Mexico Tech, 801 Leroy Place, Socorro, N.M. 87801; 575.835.5333; email: financial_aid@nmt.edu]

New Mexico Tech makes every effort to make our undergraduate education affordable for everyone: new students, returning students, and transfer students. Assistance comes in the form of institutional scholarships, state scholarships, financial aid, and student employment.

1. **Institutional scholarships** are based solely on your grades (high school GPA, standardized test scores, and college GPA if you are a transfer student). Institutional scholarships include

First-Time Students (Presidential, Gold, Silver, Copper)

Transfer Students (Phi Theta Kappa, Regents, Transfer Excel, Tech Transfer)

Tuition Reduction Programs for Non-Residents (Competitive, Colorado Reciprocity, Western Undergraduate Exchange, Tuition Reduction Program)

You do not need to demonstrate financial need for an institutional scholarship—only your own academic merit.

2. **State scholarships** are awarded to New Mexico residents and include the Legislative Lottery Scholarship and the New Mexico Opportunity Scholarship.

3. In addition to scholarships, we offer **financial aid**, which includes
4. Federal grants (e.g., Pell Grant and Supplemental Educational Opportunity Grant)
5. Federal loans (e.g. Direct Stafford Loan, PLUS Loan)
6. Federal work study
7. New Mexico grants (State Student Incentive Grant, College Affordability Grant)
8. New Mexico work-study

Details on this year's institutional scholarships and financial aid programs, including dollar amounts, are available at http://www.nmt.edu/finaid/index.php or in a brochure available from the Office of Admission.

Institutional Scholarships

When you are admitted to New Mexico Tech, your application is automatically reviewed for an institutional scholarship. ***(Tech gives only one institutional scholarship per person. If, by accident or oversight, you are offered two institutional scholarships, you may keep only one.)***

The deadline for consideration of scholarships for the fall semester for first-time students is March 1.

For consideration for a scholarship for the spring semester, the deadline is November 1. The deadline for scholarships for transfer students is April 1 for the following fall semester and November 1 for the spring semester. If you did not qualify for an institutional scholarship when you entered Tech and you complete two semesters at Tech, earning a minimum of 24 credit hours with at least a 3.0 GPA, you may be eligible for an Endowed Scholarship. Inquire at the Financial Aid Office.

Generally for scholarship consideration, a student must:

- Be a U.S. citizen or an eligible non-citizen; or be an international student in legal F1 or J1 student status. (International students are eligible only for transfer scholarships and certain tuition reduction programs.)
- Be pursuing a first bachelor's degree;
- Be enrolled in a regular degree program at New Mexico Tech; and
- Carry at least 12 credit hours per semester. Students receiving the Legislative Lottery Scholarship must carry at least 15 credit hours per semester.
- Have a High School Diploma or a recognized equivalent.

Institutional Scholarship Renewal

Each year, your institutional scholarship is automatically renewed. You must maintain the GPA specified by your specific scholarship to keep the scholarship and have earned a minimum of 24 credit hours in the regular academic year. The requirements for your institutional scholarship are listed below under the Scholarship Conditions and Requirements. Please note that you may not qualify for a scholarship higher than the one you were awarded when you entered New Mexico Tech.

Scholarship Conditions and Requirements:

Students must earn 24 credit hours in the academic year (fall & spring), in addition to the GPA Requirements listed below, to meet retention criteria. Credit hours completed during the summer semester may count as completed credit hours for purposes of Institutional scholarship reinstatement. It is your responsibility to request reinstatement at the end of the summer semester.

CUMULATIVE GRADE POINT AVERAGE REQUIRED FOR RETENTION OF SCHOLARSHIP				
	CATEGORY OF SCHOLARSHIP			
	Presidential	Endowed	Silver	Copper
	Gold	NM Scholars	Transfer Excel	Tech Transfer
	PTK	International	Competitive	CORE
	Regents	Competitive*	(U.S. Citizens)	WUE
				NM Lottery**
GPA Requirement	3.25	3.00	3.00	2.50

RETENTION OF AWARD :

1. Scholarship recipients must maintain a minimum of twelve (12) credit hours of course work for each Fall and Spring semester. *Lottery Students and International Competitive recipients must maintain fifteen (15) credit hours per semester. Grades of *U, F, W,* and audits do not count as completed credits for scholarship retention purposes.
2. Scholarship eligibility is reviewed yearly at the end of the spring semester. (If a student attends summer school, eligibility will be reviewed again at the end of the summer semester to ensure GPA requirements are maintained.)
3. Inability to meet minimum requirements by the end of the spring semester will result in scholarship loss for the following academic year.
4. Students who lose scholarship eligibility may submit a written appeal (by the posted deadline) of extenuating circumstances with appropriate documentation.

5. If a scholarship is cancelled for academic ineligibility and the student later regains eligibility, it is the student's responsibility to request reinstatement of the scholarship. Renewal of a scholarship is made only if the originally specified consecutive time period has not expired. Reinstatement requests are only accepted after the spring and summer semesters.

Competitive Scholarships, CORE, WUE, and Tuition Reduction Program participants will lose their respective awards if the established retention criteria are not met; no scholarship replacement will be offered. The student's tuition rate will then revert to non-resident status.

Note: Students awarded the Competitive Scholarship or who are participating in the CORE, WUE, or Tuition Reduction Program are not eligible to establish New Mexico residency while on the program or use any time in New Mexico while on the program toward meeting the requirement for New Mexico residency.

Time Limits

Institutional scholarships are offered for a maximum of four years for first-time students and a maximum of three years for transfer students. The length of your scholarship is listed on your scholarship offer. Work closely with your advisor and check with the Registrar's Office to make sure you are on track to finish your program in the time specified. If you need additional funding to finish your bachelor's degree, you should consider applying for financial aid.

If your scholarship is cancelled due to academic ineligibility, and you then re-establish eligibility, you may apply for reinstatement of the scholarship. This request should be made as soon as possible after the spring or summer semester, whichever is applicable. The originally specified time period of the scholarship is not extended.

State Scholarships

Legislative Lottery Scholarship

The Legislative Lottery Scholarship pays a portion of tuition at NM Tech for students who meet the following requirements: Must be a New Mexico resident; must have graduated from a New Mexico public high school, an accredited New Mexico private high school, or have obtained a New Mexico GED; must be enrolled in and earn 15 or more credit hours at an eligible New Mexico public college or university in the first regular semester immediately following their high school graduation; must obtain a 2.5 GPA during their first college semester. Eligible students do not begin receiving the award until their second semester of full-time enrollment, provided that all eligibility requirements have been met. A student may be eligible for up to seven consecutive semesters of support or until the student graduates with a bachelor's degree from an eligible institution, whichever is sooner.

Renewal - The Legislative Lottery Scholarship is renewable for up to seven (7) semesters with the following conditions/requirements:

1. Successfully complete the first semester (eligibility semester) with 15 credit hours and a GPA of 2.5 or higher. Grades of U, F, W, I and audits do not count as completed credits for scholarship retention purposes.
2. Completion of 15 credit hours with a cumulative GPA of 2.5 or higher each semester thereafter. Scholarship eligibility is reviewed at the end of each semester.
3. Students who do not meet these requirements can appeal and provide documentation of exceptional mitigating circumstances beyond the student's control.
4. Approved appeals for first semester requirements will result in deferring the qualifying semester to the semester immediately following the semester in which the student did not meet the eligibility requirements.
5. All appeals will be held to state regulations.
6. All students attending summer school will be evaluated to ensure GPA has been maintained.

Extenuating Circumstances

Students who have exceptional mitigating circumstances as determined by the Director of Financial Aid may have their scholarship reinstated with conditions under the following circumstances:

1. student shall submit an appeal certifying the nature of their exceptional mitigating circumstances to the Financial Aid Office.
2. Director of Financial Aid shall exercise professional judgment to determine whether the exceptional mitigating circumstance was beyond the student's control and precluded the student from meeting the requirements of the scholarship.

Financial Aid

To apply for financial aid you must complete the **Free Application for Federal Student Aid (FAFSA)**.

You may apply online at ***www.fafsa.gov***. New Mexico Tech's Title IV code for the FAFSA is 002654.

For maximum consideration, please submit your FAFSA for processing before March 1, if you plan to enter the following fall.

Approximately 30 percent of all applications are selected for review in a process called verification. If your file is selected for verification, additional documents will be needed. The financial aid office will notify you if additional paperwork is needed and inform you what that paperwork is. Verification must be completed before a financial aid package will be calculated for the student.

The FAFSA results from the federal processor contain your Expected Family Contribution (EFC) number.

This number is used to determine your eligibility for the various financial aid programs.

We will offer you a package to try to meet your needs at New Mexico Tech. Our offer to you may include grants, loans, work-study, and/or an institutional scholarship. To accept our offer, please log into your New Mexico Tech BanWeb account.

To qualify for financial aid at Tech, you must:

1. Be a U.S. citizen or an eligible non-citizen
2. Show satisfactory academic progress
3. Be enrolled in a regular degree program at Tech
4. Not be in default on a federal student loan or owe a repayment on a federal grant
5. Have a High School Diploma or a recognized equivalent

Continuing Your Financial Aid at Tech

Each year, you must fill out the FAFSA. This form should be filed as soon as possible after October 1.

For maximum consideration you should fill out the FAFSA before our priority deadline of March 1.

Satisfactory Academic Progress for Financial Aid

Financial Aid Offices are required to have a policy regarding Satisfactory Academic Progress. The purpose of this policy is to measure a student's academic progress in both a qualitative and quantitative way. This is done by measuring both cumulative grade point average and credit hours earned. To continue receiving Federal and/or State Financial Aid, students must meet the minimum requirements set in New Mexico Tech's Satisfactory Academic Progress Policy. Be aware that these standards are not the same as New Mexico Tech's standards for academic probation and suspension.

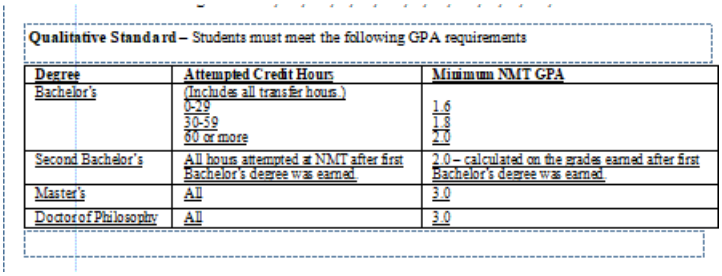
At New Mexico Tech, satisfactory academic progress is reviewed at the end of each payment period (semester). The Satisfactory Academic Progress Policy applies to both undergraduate and graduate level students who participate in the following programs: Federal Pell Grant, Supplemental Grant, New Mexico State Student Incentive Grant, College Affordability Grant, Federal Work Study, New Mexico Work Study, New Mexico

Non-need Work Study, Perkins Loan, Federal Direct Stafford Loan, Federal Direct Grad PLUS Loan, and Direct PLUS loan.

Satisfactory Academic Progress Status

Result of SAP measurement	Status	Description	Eligibility
Never received Title IV aid before	X	Not reviewed	Eligible
Meeting SAP policy standards	OK	Satisfactory	Eligible
1st Failure to meet SAP policy standards	WARN	Warning	Eligible for 1 payment period
Failure to meet SAP policy standards at end of warning period	SUSP	Suspension	Not eligible

Qualitative Standard– Students must meet the following GPA requirements



Qualitative Standard – Students must meet the following GPA requirements

Degree	Attempted Credit Hours	Minimum NMT GPA
Bachelor's	(Includes all transfer hours.) 0-29 30-59 60 or more	 1.6 1.8 2.0
Second Bachelor's	All hours attempted at NMT after first Bachelor's degree was earned.	2.0 – calculated on the grades earned after first Bachelor's degree was earned.
Master's	All	3.0
Doctor of Philosophy	All	3.0

Quantitative Standard

Students must earn (successfully complete) at least 67% of the total credit hours they attempt. This is calculated

Cumulative hours successfully completed Cumulative hours attempted

Total hours attempted includes grades of A, A-, B+, B, B-, C+, C, C-, D+, D, F, S, U, W, WO, IN, SA, UA, PR, NG and all transfer credits.

Total hours earned includes grades of A, A-, B+, B, B-, C+, C, C-, D+, D, S, PR, and all transfer credits.

Repeat courses - count as attempted hours, but the hours can only be earned once. For example, if a student takes a 3 credit hour course one semester and earns a D, the hours are counted as attempted and earned. If the student later repeats the course, the 3 hours are added to the attempted, but hours earned will not increase because of the repeat; however, because a grade of F does not count as earned hours, a student repeating a grade of F at a later time and earning a D will have the hours count as attempted and earned when the course is repeated.

NR, NG grades - It is the student's responsibility to notify the Financial Aid Office when a grade of NR, NG is changed to a grade by the instructor so Satisfactory Academic Progress can be re-evaluated.

Maximum Time Frame

- Students seeking their first bachelor's degree may be eligible for Title IV aid up to a maximum of 195 attempted credit hours.
- Students pursuing a second bachelor's degree have a maximum timeframe of 150% of the number of hours needed to complete the degree. This is determined through a credit evaluation done by the Registrar's Office.
- For instance, if the student has 140 credit hours and needs 60 hours to earn a second degree, the student will have financial aid eligibility for a maximum of 90 attempted credit hours.
- Students pursuing a master's degree may be eligible up to a maximum of 45 attempted credit hours. This includes all hours attempted as a graduate Master student regardless of the course level.
- Students pursuing a doctor of philosophy degree may be eligible up to a maximum of 75 attempted credit hours. This includes all hours attempted as a graduate PhD student regardless of the course level.
- When you fall below the SAP policy requirements, you will automatically be placed on financial aid warning for your next semester of enrollment. During this semester you will be eligible to receive aid.
- If you are still below the policy standards after the financial aid warning semester, you are no longer eligible for Title IV aid.

- Once a student is on financial aid suspension, he/she is not eligible for any Federal or State Financial Aid until the standards of the Satisfactory Academic Progress Policy have been met or an appeal is approved.

Appeals for Exception to Standards of Satisfactory Academic Progress Policy

Students have the opportunity to appeal the determination that they are not making satisfactory academic progress. To appeal, the student will need to complete an Appeal Form. On that form, the student will need to explain why he/she failed to meet our Satisfactory Academic Progress standards and what has changed that will allow him/her to meet the standards by the end of the next semester.

If an appeal is approved the student's SAP status will change to either Probation or Probation with a plan.

A student can remain eligible for aid once they have had an appeal approved with conditions (probation with a plan) as long as the student continues to meet the individual "plan" that was set forth for them in the appeal response. Satisfactory Academic Progress is measured at the end of each semester. Summer is considered a separate semester. If a student's earned hours or cumulative GPA falls below the minimum standard indicated in the policy, they will be notified in writing. The student will also be notified if they have met the maximum time frame.

Financial Aid Policies

Return of Title IV Funds Policy

This policy applies to all students that participate in the following Title IV financial aid programs.

- Federal Pell Grant
- Supplemental Grant
- Federal Direct Stafford Loan
- Federal Direct GradPLUS Loan
- PLUS Loan

Federal regulations require that if a recipient of Title IV financial aid funds (those programs listed above) withdraws from New Mexico Tech after beginning attendance for the semester, the amount of Title IV assistance earned by the student must be determined. This is done through a calculation developed by the United States Department of Education. If the amount disbursed to the student is greater than the amount the student earned, unearned funds must be returned. If the amount disbursed to the student is less than the amount the student earned, and for which the student is otherwise eligible, they are eligible to receive a

post-withdrawal disbursement of the earned aid that was not received.

The amount of assistance the student has earned is based upon the percentage of the semester in which the student was enrolled.

Enrolled days / total number of days in the semester = % of aid earned. Once the student has completed more than 60% of the semester, they are considered to have earned all of the funds awarded and is not subject to the calculation.

There are two types of withdrawals for Title IV financial aid purposes:

- **Official Withdrawals—**If the student officially notifies New Mexico Tech of their intentions to withdraw, this date is considered to be your last date of attendance and will be the official withdrawal date for calculating the amount of Title IV financial aid funds earned. This applies to both withdrawal (W) and withdrawal without prejudice (WO).

- **Unofficial Withdrawals**—If a student receives grades of all F, U, or UA for a semester, the student is considered to have unofficially withdrawn from New Mexico Tech. The midpoint of the semester is used as the student's unofficial withdrawal date unless documentation is submitted to show a different last date of attendance at an academically related activity.

Entrance Loan Counseling Policy

According to federal law, if you intend to borrow money on the Perkins Loan or Federal Direct Loan programs, you must complete entrance loan counseling. Go to ***www.studentloans.gov*** and sign in to complete Entrance Loan Counseling. Complete the entrance loan counseling for the type(s) of student loans you intend to borrow or have been offered.

Exit Loan Counseling Policy

If you receive an education loan and you graduate, withdraw, drop below six credit hours, or do not re-enroll; you must complete exit loan counseling. Go to ***www.studentlloans.gov*** and click Student Loan Counseling interview on the left side. Complete the exit loan counseling for the type(s) of student loans you borrowed.

Student Employment Policy

All student employment is limited to a maximum of 20 hours per week during the fall and spring semesters. Maximum hours per week during the summer semester depend on the number of credit hours the student is taking. Any student employed under the work-study program must demonstrate satisfactory academic progress for financial aid. Students employed on a part-time basis must be enrolled as regular, full-time students. Students attending less than full-time are subject to IRS regulations regarding FICA/Medicare deductions.

A Student Employee Handbook is available online at http://www.nmt.edu/finaid/index.php and at the Financial Aid Office.

(A cooperative education program is available, in which students alternate periods of off-campus, full-time employment with on-campus, full-time study. See the Director of the Center for Student Leadership and Engagement for more information.)

Veteran Affairs

NMT is dedicated to ensuring the success of our active duty and veteran students. If you attended a military service school, received training, or served in an occupation specialty you may be able to earn credit towards your program at NMT.

1. 1. Check Your Eligibility In order to request credit or an evaluation of your military experiences, you must:

- Be accepted as a student at NMT
- Have a declared program of study to which the credit awarded will apply
- Request your official Joint Service Transcript (JST) and have it submitted directly to the NMT Articulation and Transfer Office if you are or were a member of the Army, Coast Guard, Navy, Marine Corps, or Reserve.

Call to Active Duty Service

Call to Service is appreciated and respected at NMT. If you are called to Active Duty during your enrollment at NMT please contact the Veterans Education Benefits Office and the Registrar's office located in Fidel Center, Suite 289.

Veteran Affairs

Military Benefits

Veterans Education Benefits

NMT is dedicated to the success of our Armed Service Members and Dependents using Veterans Education Benefits.

Steps to receive and utilize these benefits are as follows:

- Apply for VA Education Benefits through https://www.va.gov/education/how-to-apply/
- Apply to and be accepted to NMT
- Register for Classes
- Supply a copy of your Certificate of Eligibility to the Veterans Education Benefits, School Certifying Official upon receipt.
- Comply with School Certifying Officials requests. I.E Semester by semester request to continue to utilize benefits, any changes in credit hours, withdrawal from classes, etc.

Email and Telephone contacts can be found at https://www.nmt.edu/veterans/

Attendance

A student is responsible for all material covered in class; however, it is the decision of the individual instructor whether attendance is mandatory or optional. It is the student's responsibility to ascertain this.

Undergraduate Attendance

Illness or other circumstances that necessitate extended absence from class work should be reported as promptly as possible to the Dean of Students or designated representative who will notify the student's instructors on valid and confirmed situations. Students called to Military Active Duty must notify the Dean of Students and Registrar's Office and provide appropriate documentation.

Graduate Attendance

Illness or other circumstances that necessitate extended absence from class work should be reported as promptly as possible to the Graduate Dean or designated representative who will notify the student's instructors. Students on Military Active Duty must notify the Graduate Dean and Registrar's Office and provide appropriate documentation.ntent

Academic Support Services

The areas of Academic Support Services you can find here on campus are:

- The NMT Skeen Library
- The Information Technology Center (ITC)
- The Academic Center of Technology (ACT)
- The Office for Student Learning (OSL)
- The Writing & Communication Lab (WCL)
- Academic Advising
- Academic Counseling

Skeen Library

Joseph R. Skeen Library

The Joseph R. Skeen Library's collection and services support the educational, research, public service, and economic development mission of New Mexico Tech. The library maintains a collection of over 1.1 million eBooks and printed books, maps, government documents, and periodicals. A majority of the items in the library's collection are digital and accessible 24/7 through the library's website. Skeen Library also works to protect its users' right to privacy, supports intellectual freedom, and upholds intellectual property rights.

Housed in an attractive, three-story building with a prominent clock tower, the Skeen Library actively works to provide a safe, welcoming, and friendly environment. Food, drink, and talking are all allowed in the library. Skeen Library provides a free coffee bar; seven reservation available study rooms and other study rooms; a presentation seminar room; a variety of flexible technology-equipped group study areas; a computer lab; a popular DVD collection; and a popular reading collection. The library provides the general public with free access to Internet connected computers and WiFi Internet connections, as well as having 40 computers dedicated only for student use. Also available are a Virtual/Augmented Reality system, connected with the Drone Lab in cooperation with the Mechanical Engineering Department.

The library provides inter-library loan services to students and faculty members allowing access to the collections of over 75,000 libraries worldwide. and faculty who wish to visit other libraries may also request Passports to attain borrowing privileges at other university libraries in New Mexico.

The library is the custodian of archival materials relating to the history of the institution; an extensive map collection; a historical microform collection of Socorro newspapers; an comprehensive collection of historical geologic and mining materials; the President Workman Papers; and the personal library of the late U.S. Representative Joseph R. Skeen.

To learn more about the library and its staff and services, please visit our website at www.nmt.edu/library/

Information Technology and Communications Center (ITC)

www.nmt.edu/itc/

The ITC is open to students, faculty, and staff while classes are in session. Students in all disciplines are encouraged to use the facility as a normal part of their course work. The center provides computer access to any regularly New Mexico Tech matriculated student who requests it, subject to ITC regulations and the New Mexico Tech Computer Usage Policy. Each user is given an e-mail address and access to the Internet, as well as an initial storage space. The ITC has a wide range of scientific software available.

ITC operates a network of Linux, Macintosh, and Windows workstations. At the time of publication, there are more than 300 workstations, all equipped with color screens, on the academic network. In addition, there are PC labs connected to a Samba server on the campus network. There are also several computer classrooms with computers and integrated projection systems. Several labs have scanners, and all are connected to the network printing system.

The campus network is connected to the National Science Foundation Internet II nationwide computer network. The network connection gives Tech access to other New Mexico colleges, Sandia and Los Alamos national laboratories, and thousands of other sites worldwide.

In addition to the facilities found in the ITC there are many other computer systems on campus used in conjunction with departmental programs and funded research.

The ITC is an integral part of major research projects at Tech. Students and faculty who desire to use of the facilities are encouraged to contact the director of the center at 575.835.5735 or via email at ***help@nmt.edu***.

ITC also offers free classes each semester to acquaint students with how to use the TCC and the World Wide Web.

Academic Center for Technology

www.nmt.edu/act/

New Mexico Tech provides students access to synchronous and asynchronous online courses as well as courses offered in a hybrid modality that permit remote students to engage in courses offered on campus in one of Tech's many multimedia-enabled classrooms. Students may enroll in select courses or programs (at the graduate level) that are offered online.

The Academic Center for Technology, which assists departments in managing their distance education courses, operates a growing number of technologically enhanced classrooms around campus that can be used for distance education, videoconferencing and remote speakers. Distance education students must be admitted to the university to take distance education courses. Admission and registration can be handled online.

For more information on distance education courses and programs, call the Academic Center for Technology at 575-835-6700 or email at ***act@nmt.edu***.

Office for Student Learning (OSL)

www.nmt.edu/osl

The Office for Student Learning, located in the Joseph R. Skeen Library, is a nexus for student academic support initiatives and includes the following services:

One on One Tutoring, Homework Help, Group Work and Moral Support

The OSL offers drop-in peer tutoring and homework help for most undergraduate classes. Additionally, the OSL works with several of the academic departments to provide ways for students to rework test problems for better comprehension. Students looking for extra help with an assignment, seeking deeper understanding of a challenging subject, or wanting to join a study group are encouraged to contact the OSL team. Learning Coaches work together to provide a welcoming environment with resources for academic success. Services are free.

Academic and Professional Development Workshops

The OSL hosts workshops that complement academic coursework, with the goal of providing students with additional skills for academic success and for future professional careers in science and engineering. Workshop topics have included MATLAB, LATEX, Excel, Reading and Retention, Building a Competitive Resumé, Applying for Internships and REU Programs, and more.

The Writing and Communication Lab (WCL)

Located in Skeen Library,WLC assistsbothgraduateandundergraduatestudentswithmanyformsofwriting, including, technical papers, resumes and everything in between. The WCLassists with oral presentations and research posters. The WCL offers both in-person tutoring and online tutoring during the fall and spring semesters, with hours and further information online at www.nmt.edu/academics/class/center.php. Services are free.

Academic Advising

Academic Advising

Academic advising is one of the most important keys to a student's success. Academic advising provides the student with the necessary information about courses and degree requirements, but more importantly, the academic advisor serves as a mentor as the student explores the discipline and develops his or her professional identity.

The advising system is designed so that:

- Each student is assigned a faculty advisor from the major department.
- Each student works with their academic advisor each semester to plan the next semester's courses. The advisor must approve the selected coursework and sign the registration form or provide the student with an Alternate PIN (APIN) to register in Banweb.
- Students seeking to minor in a subject must obtain a faculty advisor for the minor.

Undergraduate Advising

The advising system is designed so that:

- Undecided students work with the Associate Dean of Student Success to determine the best placement until the major is declared.
- Advisor/Major changes are also initiated in the Office of the Registrar.
- It is the responsibility of the student, in cooperation with the appointed academic advisor, to arrange programs so as to satisfy the common requirements for all bachelor's degrees and the specific requirements of the major department.

Graduate Advising

The advising system is designed so that:

- Each student is assigned a faculty advisor from the major department. Your academic advisor must be a regular (full-time or emeritus) faculty in your home department. Your academic advisor may or may not be the same as your research advisor. The default advisor assigned by the department upon graduate admission may be changed when you designate your committee in Banweb.
- Each student works with their academic advisor each semester to plan the next semester's courses. The advisor must approve the selected coursework and sign the registration form or provide the student with the Alternate PIN (APIN) to register in Banweb.
- Students seeking to minor in a subject must obtain a faculty advisor for the minor.
- It is the responsibility of the student, in cooperation with the appointed academic advisor, to arrange programs so as to satisfy the common requirements for all graduate degrees and the specific requirements of the graduate program.

Advisor/Student Responsibilities

Academic Advisors and students are expected to develop a professional and confidential partnership to foster a collaborative advising process leading to success at New Mexico Tech. The following is a list of responsibilities both for the Advisor and student to be mindful of to effectively facilitate this partnership.

Advisor Responsibilities

- Assist students with developing a realistic educational plan that is consistent with their career path.
- Monitor and document student progress toward program completion.
- Maintain student advising files.
- Review a student's eligibility to engage in a registered Internship/Module Abroad/Exchange Program.
- Inform and/or refer students to resources, services, and opportunities to enhance their learning experience.
- Treat students with courtesy, dignity, and respect.
- Uphold the integrity of New Mexico Tech by enforcing all school and department policies and procedures.

Student Responsibilities

- Read the Catalog and become knowledgeable about and adhere to institutional policies, procedures, and requirements.
- Clarify personal values, abilities, career interests, and goals.
- Make an appointment with an Advisor when required or when in need of professional advising.
- Notify an Advisor when you cannot make your appointment.
- Prepare for your advising session and bring appropriate materials.
- Follow through on actions identified during your advising session.
- Accept final responsibility for all decisions.
- Attend and participate in courses, workshops, advising seminars, etc.
- Meet with an Advisor to determine eligibility for an Internship/Module Abroad/Exchange Program.
- Obtain the necessary visa documents to travel to other countries.

Academic Counseling

Office of the Dean for Student Success Initiatives

Contact: Elaine DeBrine Howell, MA, LPCC

Dean for Student Success Initiatives

Email: Elaine.debrinehowell@nmt.edu, 575.835.5208, Joseph A. Fidel Student Services Center, Room 237

The Office of the Dean for Student Success Initiatives provides many services to assist students in achieving their academic goals at New Mexico Tech, including:

Academic Success Planning: Academic counseling with a focus on identification of academic strengths, learning style preference, and navigating university policies and procedures.

Degree planning: assistance with degree audits, understanding degree requirements and departmental policies, academic advising.

Grade Extension Agreements: At the instructor's discretion and in the case of extenuating circumstances, additional time may be given to a student to complete additional work and/or exams in a course after the final grade is submitted. The grade extension agreements are monitored by the Dean for Student Success Initiatives for undergraduates and the Dean of Graduate Studies for graduate students. Grade extensions must be filed within one week of posting final grades. The date for completion is set by the instructor but cannot exceed an academic year.

Early Intervention: An Academic Referral Program designed to identify students who are experiencing academic difficulty with the aim to assist them with those emerging problems before they become insurmountable. The teaching faculty is asked to refer students to the Dean for Student Success Initiatives at the beginning of the 3rd week of the semester, if not earlier. Interventions continue throughout the semester.

Typical issues of concern:

Absences/lateness

Missed homework, quizzes or tests

Poor performance on homework, quizzes or tests

Inappropriate classroom behavior

Change in behavior

Any other concerns

Academic Warning Program: the program allows all undergraduate students whose cumulative or semester GPA falls below 2.0 the opportunity to identify and rectify obstacles to their academic success. Students on warning work with their academic advisor to complete an Academic Success plan that is reviewed and approved by the Academic Standards and Admissions Committee. A registration hold remains on the students' account for the duration of the warning semester to help ensure that the student is following through on their academic plan. Academic Warning is not an official Academic Standing and does not appear on the transcript.

Additional Support:

Academic Advising for Dual Credit and Non-degree Undergraduate students

New Faculty Advisor Training

TA training

Macey Scholars Program Advisor

Fulbright Scholar Program Advisor

Orientation

Orientation

Undergraduate Orientation

Undergraduate orientation is held over the summer months for incoming students and begins the transition from high school or other colleges to New Mexico Tech. An abbreviated version of orientation will be offered to students starting in the spring semester. Students will have a chance to meet with other students, learn about the campus, the requirements and support offices for students in their undergraduate studies. Students will be able to meet with the different major department representatives and/or advisors, can pay their tuition and register for classes.

Graduate Orientation

Graduate orientation for incoming students begins the transition to New Mexico Tech graduate school. You'll have a chance to meet other graduate students, learn about requirements and support for graduate studies, and meet staff who will assist you during your studies. Orientation is held at the beginning of fall semester. If you begin during the summer or spring semester, contact the Center for Graduate Studies to watch the orientation video.

Teaching assistantship (TA) orientation is required for all teaching assistants before they begin teaching and is held at the beginning of fall semester. If you begin during the summer or spring semester, contact the Center for Graduate Studies to watch the TA orientation video.

Transfer Students

Students in good academic standing at other colleges and universities (2.0 minimum GPA) are eligible for transfer admission to New Mexico Tech. Credits taken at another institution will be evaluated and transferred on a course-by-course basis. See transfer section for information on how to apply for admission and transfer of credit.

You will be considered a transfer student if you have a minimum of 30 credit hours transfer from an accredited college or university you have attended after graduating high school or completing your GED. (If you have fewer than 30 credit hours of transfer credit, or if you completed college credit as dual credit, follow the regular Freshman/first-year Admission section above.)

Admission Requirements

The minimum admission requirements for a student who is classified as a transfer student are as follows:

- The student transferring from another college or university must have completed the same high school coursework requirements as freshman/first -year student admission (either from high school or from equivalent courses taken since high school).
- The applicant must present official college transcripts showing a cumulative GPA of 2.0 or better.
- The applicant must place in Math 1240 (Pre-Calculus) or higher.
- The student must be in good academic standing at the last institution attended.
- The student must be eligible to re-enroll at the institutions from which they wish to transfer. An applicant who cannot re-enroll at that institution is not eligible to enter New Mexico Tech.

Procedure

To be considered for admission, a Transfer student applicant must:

1. complete an Application for Undergraduate Admission and Scholarship.

2. May be asked to provide an official high school transcript at the discretion of the Office of Admission (although a high school transcript may not be needed for the admission process, an official High School transcript showing date of graduation will need to be provided to the Office of the Registrar; required of all students)
3. provide official transcripts from all colleges attended, (official awarding of transfer credit cannot be completed until the university has received the official college transcripts)
    - Coursework completed at universities/colleges outside of the United States, will require transcripts to be submitted through WES: https://www.wes.org/ for a Comprehensive Course by Course Report.In addition course information in English may be requested
4. May be asked to provide an official ACT or SAT student Profile Report; and
5. If you are deemed academically qualified, then you will receive a letter of admission and the Acceptance of Admission form. You must complete this form and return it with the non refundable admission fee of $100 to the Office of Admission before you are allowed to register for classes.

The university may choose not to accept transfer courses completed more than ten years prior to enrollment at NMT for undergraduate courses or seven years for graduate courses if such courses are central to the current knowledge and/or skills base of a program of study. Acceptance may also be conditional, subject to a student successfully completing courses for which these transfer courses serve as prerequisites.

Transfer

Transfer Credit

Undergraduate Transfer Credits

New Mexico Tech accepts academic credits from regionally accredited institutions of higher education. All credits will be evaluated and transferred on a course-by-course basis.

- Courses to be considered for transfer credit must have been taken for a letter grade.
- Courses must be passed with a grade of "C" or higher to be considered for transfer credit at the undergraduate level.
- Grades earned at other universities are not transferred to New Mexico Tech.
- Credit earned at any institution while a student is on academic suspension will be accepted after a student serves the suspension, is re-admitted to New Mexico Tech, and returns to good standing. Credit for courses previously attempted at New Mexico Tech will not be accepted.
- A list of courses offered at other New Mexico colleges and universities and their Tech equivalents is online at https://ccns.nmhed.us/
- Coursework completed at universities/colleges outside of the United States, will require transcripts to be submitted through WES: https://www.wes.org/ for a Comprehensive Course by Course Report.

Graduate Transfer Credits

For graduate degrees, NMT accepts at most 12 academic credits from regionally accredited institutions of higher education. All credits will be evaluated and transferred on a course-by-course basis. Only courses at the 300 level and above with a grade of "B" or higher are eligible for transfer credit for graduate degrees.

Terminal Transfer Credits

Terminal transfer credits, credits earned at another college or university in order to complete the last degree requirements at NMT, are not allowed except when specified by a particular degree program, or when unusual circumstances appear to justify it. In no case will more than 12 credit hours of terminal transfer credits be allowed. A student who anticipates the need for requesting terminal transfer credit should do so as soon as practical and in no event later than the time of filing the Intent to Graduate for a degree. The request should be addressed to the Vice President for Academic Affairs. It should contain a statement of the circumstances which, in the student's judgment, justify the request and a specific statement of the program proposed for obtaining the terminal credits. Approval, if granted, will be of a specific program.

Transfer Credits among New Mexico Higher Education Institutions

During the 2005 New Mexico legislative session (Senate Bill 161), and continuing with the passing of SB 103 in 2017 legislative session, courses successfully completed with a grade of C or higher at any regionally accredited public institution of higher education in New Mexico and recognized through a state approval process as general education at that institution are guaranteed to transfer to any other New Mexico two- or four-year public institution as general education coursework. Effective in fall 2019, New Mexico requires a minimum of 30-31 hours of general education coursework for students to be designated as "General Education Complete" at any NM institution for all Associates or Bachelor's degrees, taken from the approved General Education areas listed on the New Mexico Higher Education Department (HED) website (https://hed.state.nm.us/). Students who have decided on a major and/or an institution at which to complete their studies should consult with an academic advisor at that particular institution to determine the most appropriate course selections. Students enrolling for the first-year of study at a New Mexico college or university and considering possible transfer into a certificate and/or degree program at another institution are encouraged to take the courses approved for transfer during their first and sophomore year of study. Students transferring to NMT should also be aware that while they may have completed their New Mexico General Education requirements at the originating school, they may still be required to complete Institute Requirements for New Mexico Tech degree programs.

Student Responsibility

New Mexico's colleges and universities have collaborated to produce guides to assist students who plan to transfer before completing a program of study. Course modules are designed to help students select courses carefully so that they may transfer with little or no loss of credit. However, planning for effective transfer with maximum efficiency is ultimately the **student's responsibility**. Responsible transfer planning includes early and regular consultation with the intended degree-granting institution to assure that all pre-transfer coursework will meet the requirements of the desired degree.

Transferable Lower-Division General Education Common Core

Students enrolling for first-year study who have not yet selected either an academic focus or the institution where they wish to graduate are advised to take courses during their first year outlined in the Lower Division General Education Common Core. For students enrolled at any public institution in New Mexico, the following courses are guaranteed to transfer to any other New Mexico public college or university, and apply toward associate and baccalaureate degree program requirements if the student passes the classes with a grade of C or higher. Students should consult advisors at their current institutions regarding which specific courses fit these categories. Students preparing for careers in engineering, health sciences, or other profession-related fields are advised that some of this coursework may not transfer toward general education requirements but in most cases will apply toward elective requirements.

The core matrix of approved courses guaranteed to transfer and meet general education requirements at any New Mexico college or university can be found on the New Mexico Higher Education Department website at http://hed.state.nm.us. Follow the "Colleges and Universities" link to the drop down menu and select "Transferring Credits", then select "Core Matrix". Courses are listed by institution, whether university or community college, under each of the five general education areas. Students may also be able to access this list by going directly to https://hed.nm.gov/resources-for-schools/public_schools/general-education

New Mexico Common Course Numbering System (NMCCNS)

A common course numbering system has been devised by New Mexico colleges and universities in compliance with the New Mexico Post-Secondary Education Articulation Act. The purpose of the system is to assist New Mexico students who are transferring between institutions within the state. The system provides a neutral state wide course identifier for those courses that are similar in nature and considered to be equal in transfer. To view the common courses between the University's in New Mexico please visit New Mexico Higher Education's common course crosswalk at https://ccns.nmhed.us/.

Inter-institutional Transfer Guides and Catalogs

Students who have selected a field of study and/or the institution where they wish to graduate are advised to consult the transfer guide or catalog for that institution for current and detailed advice to guide their course selection.

Complaint Procedure for Transfer Students

All New Mexico public post-secondary institutions are required to establish policies and practices for receiving and resolving complaints from students or from other complainants regarding the transfer of course work from other public institutions in the state. Complaints can be filed with:

New Mexico Higher Education Department

2044 Galisteo Street,

Santa Fe, NM 87505- 2100

505.476.6500

http://hed.state.nm.us/

Student Government Association (SGA)

Student Government Association

Students at New Mexico Tech assume important responsibilities for the regulation of their affairs. The Student Government Association provides opportunities for undergraduate students looking to improve their leadership skills as well as to be more involved with the New Mexico Tech campus. Student Government Association is made up of three branches; Executive, Legislative, and Judicial. The Executive Branch includes the President, Vice President, Chief Financial Officer, Student Activities Technical Director, Student Activities Director, and the Paydirt Editor and Chief. The Judicial Branch includes the Chief Justice and a minimum of two justices. The Legislative Branch is the governing body of the Student Government Association which is also the Student Senate, whose members are elected twice a year for one-year terms. The Student Senate regulates extracurricular activities, organizations, campus/community events, appropriating money, voicing student concerns, and improving student life on campus. The Student Senate carries out its functions through the creation of its own committees, and its deliberations are open to all students and other interested persons. Any enrolled student may serve in the Senate if properly elected and any undergraduate student may participate in the Student Government Association through volunteering. To view more information about SGA please visit https://www.nmt.edu/sga/.

Student Government Association (SGA)

Student Clubs

A host of student clubs, organizations, and activities flourish at Tech. These are as broad as student interests themselves.

To view club lists and information, please visit the Student Government Association's website at https://www.nmt.edu/sga/clubs.php.

Student Activities

A host of student clubs, organizations, and activities flourish at Tech. These are as broad as student interests themselves.

To view club lists and information, please visit the Student Government Association's website at https://www.nmt.edu/sga/clubs.php.

Student Accounts Office

Tuition

Undergraduate Students

Any undergraduate who registers for 12 to 18 credit hours pays full tuition. Additional tuition for all hours carried above 18 credit hours will be charged at the semester hourly rate for residents or nonresidents as applicable. Students registered for 11 credit hours or less pay tuition at the semester hourly rates.

Graduate Students

Any graduate student who registers for 9 to 13 credit hours pays full tuition. Additional tuition for all hours carried above 13 credit hours will be charged at the semester hourly rate for residents or nonresidents as applicable. Graduate students registering for fewer than nine credit hours pay tuition at the semester hourly rates.

Auditors, Non-Degree Students, and Senior Citizens

Students who audit courses (those who enroll in one or more courses for no credit) pay the same tuition and fees as credit students.

Non-degree-seeking students, as classified by the Office of Admission or Registrar, pay required tuition and fees per credit hour. Non-degree students may not register for more than six credit hours per semester. Non-resident tuition is waived for non-degree students enrolled for no more than six credit hours.

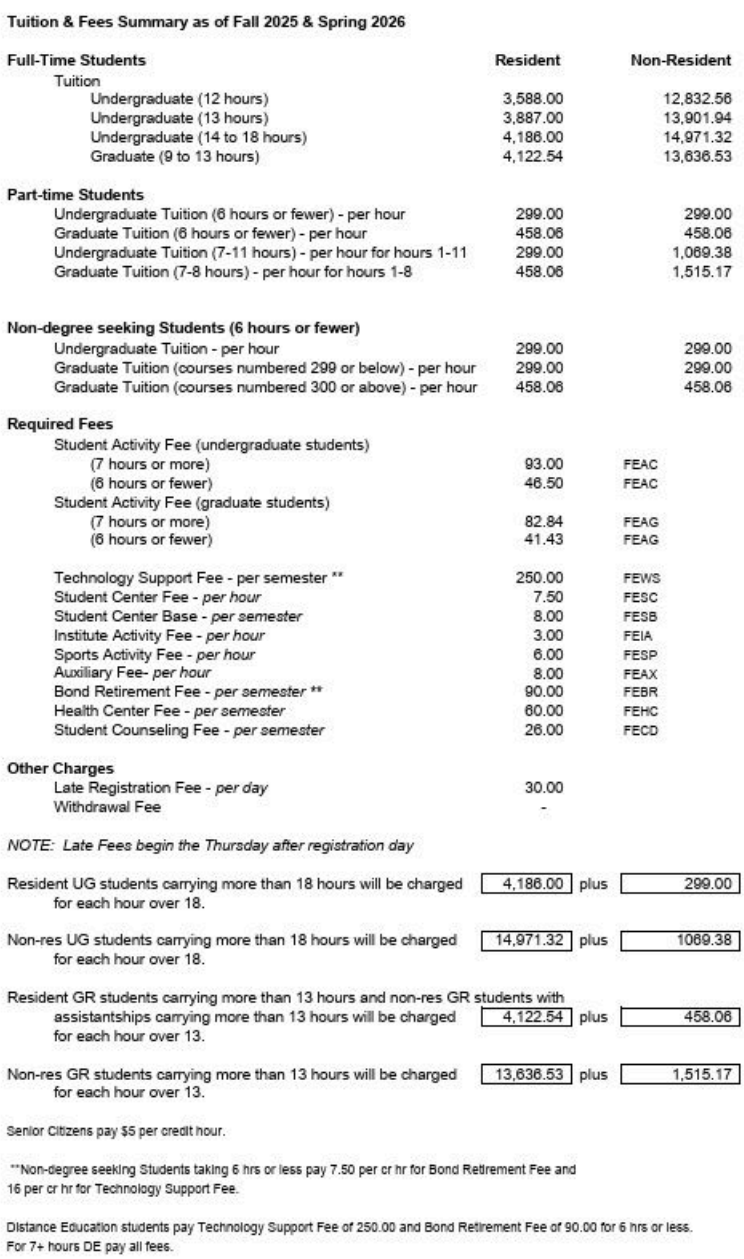
Non-degree-seeking student who has a bachelor's degree is regarded by New Mexico Tech as a Non-degree Graduate Student. Non-degree Graduate Students will be charged tuition at undergraduate rates for courses numbered less than 300 and graduate tuition for all courses numbered 300 and above. Tuition for students 65 or older is $5.00 per credit hour and must be requested at time of registration. Applicable fees must also be paid.

Student Accounts Office

Tuition & Fees

To view the most up to date cost of attendance as well as Tuition and Fees, visit the financial office at https://www.nmt.edu/finaid/

Tuition Fees Workbook 2025- 2026 pdf of the below image.



Tuition & Fees Summary as of Fall 2025 & Spring 2026

	Resident	Non-Resident	
Full-Time Students			
Tuition			
Undergraduate (12 hours)	3,588.00	12,832.56	
Undergraduate (13 hours)	3,887.00	13,901.94	
Undergraduate (14 to 18 hours)	4,186.00	14,971.32	
Graduate (9 to 13 hours)	4,122.54	13,636.53	
Part-time Students			
Undergraduate Tuition (6 hours or fewer) - per hour	299.00	299.00	
Graduate Tuition (6 hours or fewer) - per hour	458.06	458.06	
Undergraduate Tuition (7-11 hours) - per hour for hours 1-11	299.00	1,069.38	
Graduate Tuition (7-8 hours) - per hour for hours 1-8	458.06	1,515.17	
Non-degree seeking Students (6 hours or fewer)			
Undergraduate Tuition - per hour	299.00	299.00	
Graduate Tuition (courses numbered 299 or below) - per hour	299.00	299.00	
Graduate Tuition (courses numbered 300 or above) - per hour	458.06	458.06	
Required Fees			
Student Activity Fee (undergraduate students)			
(7 hours or more)	93.00		FEAC
(6 hours or fewer)	46.50		FEAC
Student Activity Fee (graduate students)			
(7 hours or more)	82.84		FEAG
(6 hours or fewer)	41.43		FEAG
Technology Support Fee - per semester **	250.00		FEWS
Student Center Fee - *per hour*	7.50		FESC
Student Center Base - *per semester*	8.00		FESB
Institute Activity Fee - *per hour*	3.00		FEIA
Sports Activity Fee - *per hour*	6.00		FESP
Auxiliary Fee- *per hour*	8.00		FEAX
Bond Retirement Fee - *per semester* **	90.00		FEBR
Health Center Fee - *per semester*	60.00		FEHC
Student Counseling Fee - *per semester*	26.00		FECD
Other Charges			
Late Registration Fee - *per day*	30.00		
Withdrawal Fee	-		

NOTE: Late Fees begin the Thursday after registration day

Resident UG students carrying more than 18 hours will be charged for each hour over 18. 4,186.00 plus 299.00

Non-res UG students carrying more than 18 hours will be charged for each hour over 18. 14,971.32 plus 1069.38

Resident GR students carrying more than 13 hours and non-res GR students with assistantships carrying more than 13 hours will be charged for each hour over 13. 4,122.54 plus 458.06

Non-res GR students carrying more than 13 hours will be charged for each hour over 13. 13,636.53 plus 1,515.17

Senior Citizens pay $5 per credit hour.

**Non-degree seeking Students taking 6 hrs or less pay 7.50 per cr hr for Bond Retirement Fee and 16 per cr hr for Technology Support Fee.

Distance Education students pay Technology Support Fee of 250.00 and Bond Retirement Fee of 90.00 for 6 hrs or less. For 7+ hours DE pay all fees.

Student Accounts Office

Residency

You are considered a resident of New Mexico if your parents or legal guardians are residents of New Mexico. If you are over 18 years of age, you may become a legal resident of New Mexico while attending New Mexico Tech. Non-resident aliens cannot obtain New Mexico residency.

With the exception of graduate students employed as teaching or research assistants, international students do not qualify for in-state tuition.

Student Accounts Office

Navajo Residency

Registered members of the Navajo Tribe who reside anywhere within the Navajo Nation are considered New Mexico residents for tuition purposes.

Student Accounts Office

Refunds

Tuition and Applicable Fees, Fall and Spring Semesters

The student who drops all fall and spring classes at New Mexico Tech prior to 5 p.m. on the third Friday after classes begin

will receive a refund according to the following schedule:

REFUND OF TUITION AND FEES		
First week (days 1 through 5)	100%	
Days 6 through 12	75%	
Days 13 through 19	70%	
Days 20 and beyond	0%	
After the third Friday after classes begin	No refunds are made after the third Friday after classes begin for fall or spring semester	

Students who drops some, but not all, classes (reduction in class load) prior to 5 p.m. on the third Friday after classes begin will receive a 100% refund for the classes dropped.

Summer Semester

The Student who drops any or all summer classes at New Mexico Tech prior to 5 p.m. on the second Tuesday after classes begin will receive a 100% refund.

No refunds are made to students who drop or withdraw from any or all summer classes after the Second Tuesday after classes begin.

Student Accounts Office

Payment of Fees

1. Tuition and fees must be paid by the first day of classes or the student must be enrolled in a payment plan available on NMT's secure TouchNet site accessed through their account on Banweb (see no. 4). Financial aid that has been awarded to the student will be credited to the student's account at this time.
2. Students with delinquent accounts will not be allowed to register for a new semester.
3. Payment for bookstore merchandise must be made in full at the time of purchase. (The bookstore accepts most major credit cards.)
4. Students are able to set up deferred payments for the semester and have the option to sign up through New Mexico Tech's e- billing system. Currently, a three installment plan is available. Students can establish a payment plan on all costs – tuition, room-and-board and student fees – with a 20 percent down payment due on the first day of classes. A non-refundable $25 setup fee will be charged for students who elect to enroll in the deferred payment plan.
   To log in to the Tech e-billing page, visit **https://secure.touchnet.com/C22533_tsa/web/login.jsp**
5. Students whose accounts are not paid in full by the due date or who have not made alternate arrangements with the Student Accounts Office are subject to permanent loss of academic credit, as well as disenrollment from all classes. Students have the right to appeal to the Dean of Students in writing no later than one week (five working days) before the final payment date.
6. A refund will automatically be issued to students with a credit balance of $100 or more. Refund checks will be issued twice during the first week of classes (actual days will be determined on a semester-by-semester basis) and every Friday afternoon thereafter. Students who have a credit balance of less than $100 must request the refund at the Student Accounts office. Checks will be held at the Cashier's window for pick up by the student. A current, valid student ID must be presented. Students can also elect to have their refunds direct deposited to their checking or savings account via the e-billing system.
7. All financial aid—including scholarships, loans, and grants—is applied during the semester in which it is awarded. Aid cannot be applied retroactively.
8. Rent for Student Family Housing must be paid in advance. Students with delinquent housing accounts may be asked to vacate campus residences.

Student Accounts Office

Definitions of Fees

Admission Fee

An Admission Fee is payable when the applicant is admitted and ensures the student's inclusion in the registration procedures. The fee is not refundable.

Application Fee

Each student applying for admission to New Mexico Tech must submit an application fee for undergraduate or graduate admission. This nonrefundable fee must be received before the application can be processed.

Auxiliary Services Fee

This fee defrays expenses of various auxiliary services on the campus, including the Swim Center, Macey Center, Golf Course, Children's Center, and Student Activity Center.

Bond Retirement Fee

This fee goes toward paying off bonds issued for general purpose facilities built on campus.

Challenge Examination Fee

Challenge examinations must be arranged in advance and a fee per semester hour is charged for each.

Computer Usage Fee

The Tech Computer Center charges a basic fee to each student who uses the machines. Additional fees for file storage space and printouts beyond the minimum will also be charged.

Deferred Payment Plan Fee

A fee is charged to students who qualify for a deferred payment plan covering room and board. If the student chooses not to use the online payment plan system for these charges, One-third of the total amount is due on the first day of classes and the balance is due in accordance with a schedule set by the Business Office. Students will not be allowed to register for a new semester until their accounts are paid in full for the previous semester. Students who have delinquent accounts are subject to administrative withdrawal of current registration and loss of credits for the semester.

Graduation, Thesis, and Dissertation Fees

When candidates for the associate's or bachelor's degree file their candidacy declaration, they pay a graduation fee to cover the cost of diploma and other expenses related to graduation. Students completing the master's and doctoral degrees are charged designated graduation fees.

Health Center Fee

The Health Center Fee provides a base for the support of the Student Health Center including staffing.

I.D. Card Replacement

A fee is charged for the replacement of lost student identification cards. Broken or worn cards are replaced for no charge but must be turned in to the Registrar's Office at the time that the new card is issued.

Institute Activities Fee

The Institute Activities Fee provides a base for the support of student social and cultural activities and corresponding facilities.

Late Registration Fee

Students who fail to register during the designated period are charged a late fee. This stipulation applies to all regular undergraduate and graduate students. Non-degree students are not charged this fee.

Orientation Fee

A fee is charged for new student orientation.

Readmission Fee

A fee is charged for processing readmission to Tech for students who are readmitted through the Academic Standards and Admission Committee.

Room and Board

Room and board are charged through the Residential Life Office. The total amount varies depending upon the type of room occupancy and meal contract. The base rate is calculated for double occupancy of room with 150 block meal plan. Other meal plans are available. At an additional charge, single occupancy is offered when space permits. Students must supply all linens, including a mattress pad protector. More information is provided in the housing agreement, which must be executed for each academic year.

The semester charge for room and board does not include meals during recesses nor during the few days at the beginning and end of each semester when most students are away from the campus. The student may only occupy the room during break periods if they live in an apartment (Altamirano, Desert Willow, and Mountain Springs). The traditional halls (Driscoll, Presidents, West, South, Baca, and Torres) are closed between fall and spring semesters and may be closed at other times between terms when conditions warrant. Schedules for residence halls and dining facilities are published on the Residential Life rate sheet.

Room Reservation/Damage Deposit Fee

A Room Reservation/Damage Deposit is required before housing will be assigned. The deposit will be refunded under the following conditions:

1. The student has been declared academically ineligible to enter, continue, or return to New Mexico Tech.
2. The term of the student's Room and Board Agreement has been completed (i.e., the student has remained in the Residence Hall the entire academic year), and no damage has been noted.

If the student has filled out the necessary paperwork to ensure himself/herself a room for the semester but cancels the room reservation or does not show up for check-in by the first day of classes, the student is subject to the Room Cancellation Policy If a student is unable to check in by the first day of classes, he or she must request, in writing, to have the room set aside for a specific day. This specific day should not exceed a week from the first week of classes.

Sports Activities Fee

This fee is charged each semester in support of the intramurals program and corresponding facilities.

Student Activities Fee

All students pay a Student Activities Fee each semester. The funds collected are disbursed to the student organizations and activities according to a budget prepared by the Student Association and approved by the administration.

Student Center Fee

A Student Center Fee provides monies to amortize and support the Joseph A. Fidel Center.

Student Counseling Fee

Approved by the Student Association, this fee provides a base to make counseling and support available to the students of New Mexico Tech.

Technology Support Fee

The Technology Support Fee provides a base for the support and services to maintain wireless and computer technology across the campus.

Withdrawal Fee

Students who withdraw from a class or classes after registration closes must pay a withdrawal fee for every withdrawal authorization form.

Student Accounts Office

Housing & Meal Plans

Dining Possibilities at New Mexico Tech

https://nmt.edu/reslife/dining.php

Dining at New Mexico Tech is a great aspect to living on campus. NMT Dining, our food service provider, continually strives to improve the dining services to students at New Mexico Tech. We have several meal plan options available to our residents and student population. Every student who lives in a residence hall must purchase a meal plan and there are many options available sure to fit your needs.

The New Mexico Tech food service operations are located on the ground floor of the Joseph A. Fidel Student Services Center, and include the main dining room and Fire and Ice coffee shop. Both are operated by Chartwells, a division of the Compass Group. The main dining room features a variety of stations with food options ranging from international cuisines to burgers and fries to home-style cooking. Special events and theme meals are offered on a regular basis. For more information about dining

and specific meal times, please visit the NMT Dining website: http://www.dineoncampus.com/nmt/.
It is mandatory for all undergraduate residents to purchase a meal plan. The size of the meal plan required depends on the student's living arrangements. The number of meals in a meal plan are for an entire semester. Meals remaining at the end of the semester cannot be carried over to the next semester. No refunds will be given for meals not eaten. Dollars work like cash and are accepted at the Fire and Ice coffee bar, which is just outside the dining room on the ground floor of Fidel. For more information about meal plan choices, please visit our website: https://nmt.edu/reslife/dining.php.

Student Accounts Office

Room Cancellations

Room (Apartment or Residence Hall) Cancellation Policy, Entering Students

Tuition and Applicable Fees, Summer Semester		
• Prior to 5 p.m. on the second Tuesday after summer classes begin	The student who drops any or all summer classes at New Mexico Tech prior to 5 p.m. on the second Tuesday after classes begin will receive a 100% refund.	
• After the second Tuesday after classes begin	No refunds are made to students who drop or withdraw from any or all summer classes after the second Tuesday after classes begin.	
• Financial Aid Implications	Student receiving financial aid who withdraw from all classes are subject to a Return of Title IV Funds policy, which returns funds to the financial aid programs. For further information, see Return of Title IV Funds.	

Students entering University housing for the proceeding semester may cancel their Room & Board Application and License Agreement without financial penalty by June 1 (for the proceeding fall term), December 1 (for the proceeding spring term) and May 1 (for the proceeding summer term).

Between above dates and Opening Day for those respective terms, the student will be charged a $400 fee for breaking the Agreement/ not checking in by the first day of classes.

Room cancellations made after the first day of classes are not eligible for refund of room or board. Fall semester residents who request cancellation of their room & board for the following Spring semester will still be charged for room & board if they remain enrolled at the University.

Term dates are available on the current Residential Life Rates Sheet.

Cancellations must be in writing. No cancellations will be accepted over the phone. Students with extenuating circumstances for canceling the Agreement may request a waiver of the cancellation fee and/or room & board charges by submitting a written waiver request to Residential Life. The request will be reviewed by a committee.

Returning Students

- Returning students may cancel their agreement for the upcoming academic year prior to June 1st without penalty.
- Agreements canceled after June 1st will incur a $400 penalty.
- Room cancellations made after the beginning of the Apartment/Residence Hall term will receive no refund on their room rent.
- Fall semester residents who cancel their room for the following Spring semester will still pay the cost of the room.
- Term dates are available on the Residential Life web site. https://www.nmt.edu/reslife/

Cancellations must be in writing. No cancellations will be accepted over the phone. Students with extenuating circumstances for canceling their residence hall agreement must request a waiver of the penalty fee in writing to the Residential Life Office. The request will be reviewed by a committee.

Boarding Plans

You may not cancel or make any changes to your meal plan after the first week of classes each semester. Students with extenuating circumstances who wish to cancel their meal plan must send a request, in writing, to the Office of Housing & Residential Life (HRL). For more information on HRL's cancellation policy, please follow the associated link: https://www.nmt.edu/reslife/policies/cancellation-policy.php

Community Education

New Mexico Tech Community Education

www.nmt.edu/ce

The New Mexico Tech Community Education Program provides credit and non-credit enrichment courses in Physical Recreation, Studio Arts , Lifestyle Activities, general Community Education, and Certification programs. Courses are open to New Mexico Tech students, faculty, staff, and the surrounding community. No degrees are offered through the Community Education Program.

Community Education courses may be found on Banweb class schedules with the following prefixes:

- CONC (Community Education Non-Credit)
- CERT (Certification programs non-credit)
- CEFA (Studio Art Enrichment courses)
- LIFE (Lifestyle non-credit)
- MUSV (Music Performance enrichment courses)
- CEPR (Physical Recreation enrichment courses)

Community Education classes, which are signified by a "C" following the course number, are graded on an satisfactory/unsatisfactory (S/U also known as pass/fail) basis and can be used as elective credit in most majors. Community Education credit classes do not count towards Core General Education requirements. The Community Education Program also offers non-credit courses such as Wine Tasting and cooking classes.

Full-time undergraduate students do not pay extra tuition when these courses are part of their 12-18 hour course load. Full-time graduate students may enroll for 1 credit of Community Education coursework beyond their 12 hour credit limit, at no extra charge (see graduate catalog for restrictions).

Students who are not pursuing a degree program, such as community members or staff, are classified as non-degree seeking students. They are limited to a maximum of six credit hours per semester. Non-degree students who have never taken a class at Tech need to complete an Application for Admission Form and can do this application through the office of Community Education. After being admitted, students will be able to register for courses and can do so through the Office of the Registrar or Community Education.

A great deal of information may be found at the department website at www.nmt.edu/ce including downloadable catalogs with course descriptions. To speak with someone about the Community Education program, please visit the offices in Speare 138 or call 575.835.6581

Applying for Residency for Tuition Purposes

Residency

Applying for and Changing your Residency

Requirements to establish New Mexico residency: If you are over 18 years of age, you may become a legal resident of New Mexico for tuition purposes by meeting each of the following requirements as defined by the New Mexico Higher Education Department.

1. **Twelve month durational requirement.**

A person must physically reside in New Mexico for the twelve consecutive months immediately preceding the term for which the resident classification is requested.

2. **Financial independence requirement.**

Only persons who are financially independent may establish residency apart from parents or guardians. A student cannot be approved for residency who is financially dependent upon his or her parents or legal guardians who are nonresidents of New Mexico. Dependency is always determined by the status of the student on their parent's or guardians previous year federal income tax form. If the student is shown to be dependent, they will not be considered financially independent or eligible for residency during the current year.

3. **Written declaration of intent requirement.**

The student or person must sign a written declaration of intent to relinquish residency in any other state and to establish it in New Mexico, this is also known as the Application for In-State Residency.

4. **Overt acts requirement.**

Overt acts are required as evidence support of the written declaration of intent to establish permanent residency in New Mexico. The required overt acts are evidence of any two of the following:

- If the applicant is financially dependent, a copy of the parent or guardians' previous year income tax showing the applicant as a dependent and the parent address as New Mexico; or
- A New Mexico high school transcript issued in the past year confirming attendance at a New Mexico public or private high school completing as least 2 semesters (12) months; or
- A transcript from an online high school showing a New Mexico address confirming attendance with the completion of 2 semesters twelve (12) months; or
- A New Mexico driver's license or ID card with an original date of issue or a renewal date issued prior to the application date for admission; or
- Proof of payment of New Mexico state income tax for the previous year; or
- Evidence of employment within the state of New Mexico; or
- New Mexico vehicle registration; or
- Voter registration in New Mexico; or
- A bank account established in New Mexico prior to the application date for admission; or
- Proof of residential property ownership in New Mexico; or
- A rental agreement within New Mexico; or
- Utility bills showing the applicant name and a New Mexico address; or
- Other evidence which would reasonably support the individual's intent to establish and maintain New Mexico residency.

Any act considered inconsistent with being a New Mexico resident will cause the request for resident classification to be denied. As such, other relevant factors may be considered in addition to the items listed in this Section.

The Higher Education Department recognizes that there may be circumstances in which a student would not be able to fulfill the requirements of an overt act as listed in this section, such as: 1) individual is physically disabled and does not have a driver's license, or 2) individual is a convicted felon and therefore cannot vote, etc. In instances such as these, the institution will afford the student an opportunity to provide other documentary evidence or reasonable explanation which demonstrates that permanent residency in New Mexico has been established by the student.

All petitions for New Mexico residency are due on registration day and in no case later than the 21st day of the fall or spring semester. You will not be entitled to any refund of tuition if you become a resident during a semester, summer session, or other term. Detailed information concerning residency requirements is available from the Registrar on NMHED at https://hed.nm.gov/financial-aid/residency-requirements

Requesting a Transcript

In order for your official transcript to be released, you must have a zero balance or a credit balance at New Mexico Tech. Should you have a balance, contact NMT's Student Accounts by phone at 575.835.5338.

New Mexico Tech has partnered with Parchment Send to fulfill transcript orders. Transcripts are ordered online at http://www.nmt.edu/registrar/transcripts.php. The student will initially need to create an account with Parchment using an email and password of choice.

Information Needed to Create a Parchment Account

You must provide the following information:

- Your name, address and phone number.
- The name you had when you attended NM Tech
- Your NM Tech ID and last 4 digits of your Social Security number or your full Social Security number if Tech ID is unknown.
- The approximate years you attended NM Tech

Ordering a Transcript

You can order an official transcript through Parchment to be delivered at https://www.nmt.edu/registrar/transcripts.php:

- Transcripts can be ordered Electronically or by mail. There is a search feature in Parchment to look up institution information; when using this feature, if the institution name, acronym, location, or email does not match the address you would like to send it to, please use the “Send to Yourself, Another Individual, or Third Party” option.
- For pickup by the student (or authorized individual) in the Office of the Registrar. Note that you must request the transcript through the “Send to Yourself, Another Individual, or Third Party” option for pickup.
- There is an option to “Hold for Grades” or “Hold for Degree.” When selected, the order will be processed once final grades have been processed or degree has been conferred, respectively.
- There is an option to upload attachments to the transcript if needed.
- With the exception of transcripts ordered for pickup, all transcript orders are processed and fulfilled through Parchment. Once the order has been processed, the Office of the Registrar cannot track transcripts. Parchment will notify the student once the order has been fulfilled.

Unofficial Transcripts

Unofficial paper transcripts are available for in-person pickup only; the student must provide a valid photo ID. The Office of the Registrar cannot provide electronic unofficial transcripts. Unofficial transcripts can also be obtained by the student through Banweb.

Terms & Abbreviations

Terms and abbreviations of academic policies at New Mexico Tech. *Click the links to the left.*

Terms & Abbreviations

Academic Load

The academic year at Tech consists of two semesters. A class hour is 50 minutes in length; ordinarily, a laboratory period is about three times as long. One class hour or laboratory period a week through a semester gives one credit hour.

Terms & Abbreviations

Undergraduate Student Load

A full-time undergraduate should carry an academic load of approximately 16 credit hours per semester for the fall and spring semesters. During the summer session, 6 credit hours is a full-time load; 3 credit hours is half-time.

Terms & Abbreviations

Graduate Student Load

Full-time graduate students must carry a load of at least 9 credits each fall and spring semester. Graduate students on assistantships must carry at least 12 credits. Fine Arts (FA), Community Education courses (CED), Health and Wellness (HW), and Physics Recreation (PR), do not count toward the minimum credit hours for graduate students. Graduate loads only count courses numbered 3000 and above, except when preapproved with a lower division course approval signed by the Graduate Dean.

Terms & Abbreviations

Veteran Student Load

The Veterans Administration requires students on the GI Bill to carry a minimum of 12 credit hours (6 credit hours in summer) to qualify for full benefits. Physical Recreation (PR), Fine Arts (FA), and Community Education courses (designated by the letter "C" in the course number) do not count toward the minimum credit hours for veterans. Complete information can be obtained in Veterans Affairs located in the Financial Aid Office.

Terms & Abbreviations

Auditing a Class

If you wish to participate in a course to learn about the subject but not be required to earn a letter grade, you can audit the course. You will receive a grade of satisfactory audit (SA) or unsatisfactory audit (UA) as determined by the instructor, but no credit. Payment is the same as for a credit class. Professors will expect you to attend class and to be prepared to participate in the course.

Graduate Auditing a Class

Graduate students who earn unsatisfactory audits are not making satisfactory academic progress. Graduate students may only audit at most one (3-4 credit) course.

Terms & Abbreviations

Challenge Exams

If you think you already know the material in a course you are required to take, ask the department chair for a challenge exam. For a fee, you will be tested on the course material. Please refer to **Course Waviers** for more information on challenge exams.

Terms & Abbreviations

Course Numbers

Courses numbered from 100 -199/1000-1999 are intended primarily for first-year students; 200-299/2000-2999 for second-year students (sophomores); 3000 to 3099 for third-year students (juniors); 4000 to 4099 for fourth-year students (seniors); and 5000 to 5099 for graduate students. Graduate students may be allowed credit for courses numbered 3000 and above. Exceptions for undergraduate students may be made with the approval of the major advisor and instructor, Exceptions for Graduate students may be made with the approval of the Academic advisor, instructor and Dean of Graduate studies.

Terms & Abbreviations

Credit Hours

Credit hours for all courses, including synchronous and asynchronous distance delivery courses, are measured in class hours (cl hrs), lab hours (lab hrs), or recitation/ discussion hours (recitation hrs). “1 cl hr” and “1 recitation hr” correspond roughly to one hour spent in class each week during a standard 16-week semester and is equivalent to one (1) credit hour. “3 lab hrs” equals about three hours per week in the laboratory during a standard 16-week semester and is also equivalent to one (1) credit hour. In addition to class and lab time, students can expect to spend about two hours of study and preparation for each credit hour of class. Most one-semester classes average three credit hours.

Summer courses and other compressed-format courses are required to meet the requirements stated above regardless of their shortened term.

To graduate with a bachelor’s degree, you will need a minimum of 120 credit hours, depending on your chosen major.

Terms & Abbreviations

Directed Study

Directed studies are specialized independent created courses and are usually self-paced 3000- to 5000-level classes. Typically, a directed study is research-oriented and allows you to work and progress in a relatively unstructured situation. To sign up, you will need the instructor’s permission, the approval of the department chair, and a special form from the Office of the Registrar.

Terms & Abbreviations

Graduate Directed Study

Directed Study may only be counted toward graduate degrees with earned letter grades of A through C and permission of the student’s graduate committee.

Terms & Abbreviations

Electives

Electives are courses taken in addition to the specific courses required by your major. Electives bring your credit hours up to the required number for graduation. Some majors allow students to choose many electives; others, few. Please refer to the specific degree requirements for your major.

New Mexico Tech’s Community Education classes (designated by the letter “C” in the course number) may not be used to fulfill the General Education Core Curriculum Requirements for an Undergraduate Degree. However, some majors allow students to use these classes to fulfill elective credit.

Terms & Abbreviations

Graduate Electives

All graduate electives must be 3000-level or above and graded with a letter grade (A through C). See your program requirements for further restrictions.

Terms & Abbreviations

General Education Core Curriculum Requirements

These are courses in humanities, mathematics, and basic science which all undergraduate students must complete in order to graduate. The general degree requirements are generally met by the end of your sophomore year.

Terms & Abbreviations

Good Academic Standing (Undergraduate)

Graduate students: For information on Satisfactory Progress

A regular degree-seeking undergraduate student will be considered to be in good standing if the student maintains the minimum semester grade-point average (GPA) listed below:

Total semester hours Minimum semester GPA needed

attempted (cumulative) to maintain good standing

0-29 1.60

30-59 1.80

60 or more 2.00

For determination of academic standing, “semester hours attempted” means courses in which a student earns grades of A, A-, B+, B, B-, C+, C, C-, D+, D, F, S, U, and all transfer credits. SA, UA, W, or WO. Transfer credits are not used in computing the GPA, but are used to calculate attempted credit hours.

A student whose semester GPA falls below the minimum requirements needed for good standing will be placed on Academic Probation .

Terms & Abbreviations

Academic Warning

Academic Warning is an intervention program designed to help students get back on track with their academics. Students are placed in the Warning program if either their semester or cumulative GPA falls below 2.0 regardless of their academic standing. Students on Warning are required to complete an Academic Success Plan, which is submitted to the Associate Dean for Student Success. A member of the Academic Standards and Admissions Committee will review and approve the plan. A registration hold is placed on the students' account and will be removed once the student is off Warning. While on Warning, all registration processes are done with the appropriate registration form.

Terms & Abbreviations

Grade Point Average (GPA)

Your semester GPA is found by multiplying the number of credit hours for each course with a number corresponding to your grade in the course and then dividing by the total number of credit hours in the semester. A=4, B=3, C=2, D=1, F=0. For example, a student taking two three-hour courses who received an A and a B would have a GPA for that semester of 3.5.

([(3 x 4.0) + (3 x 3.0)]/[3 + 3]=21.0/6=3.5)

See Academic Policies for a complete list of possible grades and their grade points.

Courses taken for grades of S, U, SA, and UA are not calculated in your GPA.

Your cumulative GPA is an average over your entire Tech career. Transfer credits are not included in your cumulative GPA.

Terms & Abbreviations

Major

Your major is your primary field of study. The number of credit hours required in your major varies by program. Since your choice of major determines which courses you are required to take, it is advisable to declare your major as soon as possible. You may change majors at any time, but the earlier the better.

You must declare a major and be assigned a major advisor prior to completing the coursework for the major. You may declare or change your major in the Office of the Registrar.

Terms & Abbreviations

Minor

New Mexico Tech awards minors for your secondary field of study. (See **Degrees Offered** for a list of minors.) The number of credits required for a minor vary from department to department, a minimum of 18 credit hours is required. Students cannot earn a minor with either the Associate of General Studies or Bachelor of General Studies.

You must declare a minor and be assigned a minor advisor prior to completing the coursework for the minor. You may declare or change your minor in the Office of the Registrar. Minors cannot be earned or added after a degree has been conferred.

Terms & Abbreviations

Prerequisites and Corequisites

Some courses have prerequisites, courses you must successfully complete before enrolling in that course. Exceptions may be made with approval of the instructor and advisor. If you enroll in a course in which you do not have the prerequisites without the proper approval, you may be disenrolled.

Corequisites are courses taken during the same semester.

Prerequisites and corequisites are not determined by the student's individual catalog, but rather by the catalog in effect at the time that the course is offered.

Terms & Abbreviations

Satisfactory Academic Progress for Financial Aid

To be in good standing for financial aid purposes, a student must earn at least 67 percent of Total hours attempted with a cumulative G.P.A. of:

1.6 if you have attempted 0 to 29 credit hours

1.8 if you have attempted 30 to 59 credit hours

2.0 if you have attempted 60 or more credit hours

See **Financial Aid** for further information about satisfactory academic progress for financial aid purposes.

Terms & Abbreviations

Validation

Validation is acceptance of your financial responsibilities to New Mexico Tech for all courses you are registered for. You must validate with the New Mexico Tech Business Operations before your registration process can be considered complete. Students who are not validated by the Wednesday before the drop deadline (fall and spring semesters) and on Friday (summer semesters) are subject to disenrollment from classes.

Terms & Abbreviations

Course Abbreviations

AE Aerospace Engineering

ACCT Accounting

ANTH Anthropology

ARTH Art History

AFAS Air Force ROTC

BIOL Biology
BIOT Biotechnology
BMS Biomedical Sciences
CE Civil Engineering
CED Community Education
CERT CED Certificate Program
CH E Chemical Engineering
CHEM Chemistry
CLASS Communication, Liberal Arts and Social sciences
COMM Communication
CYBS Transdisciplinary cybersecurity
CSE Computer Science and Engineering
CSCI Computer Science and Engineering
ECON Economics
EDUC Education
EE Electrical Engineering
EMGT Engineering Management
ENGL English
ENVE Environmental Engineering
ENVS Environmental Science
ES Engineering Science
ARTS Studio Arts (enrichment courses)
FIN Finance
FREN French
GEOB Geobiology
GEOC Geochemistry
GEOL Geology
GEOP Geophysics
GRMN German
HIST History
HUMA Humanities
HYD Hydrology
IT Information Technology
LIFE Lifestyle
MTLS Materials Engineering
MENG Mechanical Engineering
MATH Mathematics
ME Mineral Engineering
MGMT Management
MUSC Music
OPT Optics
PETR Petroleum Engineering
PHIL Philosophy
PHYS Physics
PHED Physical Recreation
POLS Political Science
PSYC Psychology
SPAN Spanish
SOSC Social Science
ST Science Teaching
STC Society for Technical Communication
TCOM Technical Communication
GNDR Women's and Gender Studies

Terms & Abbreviations

Other Abbreviations, Acronyms, and Terms Used at Tech

ACT Academic Center for Technology

AOC Array Operations Center

CED Community Education Program

DE Distance Education

E&ES Department of Earth and Environmental Science

EEG Environmental Evaluation Group

ECO Etscorn Campus Observatory

EMRTC Energetic Materials Research and Testing Center

FacMgmt Facilities Management

FE exam Fundamentals of Engineering exam

GPA Grade Point Average

ICASA Institute for Complex Additive Systems Analysis

IERA Institute for Engineering Research & Applications

ILEA International Law Enforcement Academy

IRIS Incorporated Research Institutions for Seismology

ITC Information Technology Center

LIBROS Tech Library's On-Line Catalog

MEVO Mount Erebus Volcano Observatory

MRO Magdalena Ridge Observatory

MROI Magdalena Ridge Observatory Interferometer

MSEC Mineral Science and Engineering Complex

NCKRI National Cave and Karst Research Institute

NMBGMR New Mexico Bureau of Geology & Mineral Resources (often referred to as "the Bureau")

NMCCNS New Mexico Common Course Numbering System

NRAO National Radio Astronomy Observatory

OCLC Library Database

OST Optical Surfacing Technology

PAS Performing Arts Series

PASSCAL IRIS's Program for Array Seismic Studies of the Continental Lithosphere

PRRC Petroleum Recovery Research Center

R&ED Research and Economic Development Office

RA Resident Assistant /Research Assistant

RCN Residential Computing Network

ROTC Reserve Officer Training Corps

SGA Student Government Association

SAC Student Activities Center

SAIC Science Application International Corporation

SUR Student and University Relations Office

TA Teaching Assistant

TAC Tech Authorization Code (long-distance phone access)

VLA Very Large Array radio telescope

VLBA Very Long Baseline Array radio telescope

VSQ Visiting Scientists' Quarters

WIPP Waste Isolation Pilot Project

NMT Administration

Listing of School Leadership and Senior Administration for NMT can be found withing the corresponding tabs of the left hand side here in the catalog and on the website of NMT at: https://www.nmt.edu/leadership/

NMT Administration

NMT Board of Regents

https://www.nmt.edu/leadership/boardofregents.php

- President: Dr. David Lepre, Sr.
- Secretary/Treasurer: Dr. Yolanda Jones King
- Board member: Jerry A. Armijo
- Board member: Dr. Srinivas Mukkamala
- Student Regent: Cody Johnston

NMT Administration

Senior Administration

https://nmt.edu/leadership/administration.php

Office of the President

- Interim President. ..... Dr. Michael Jackson
- Chief Executive Assistant..... Vanessa Grain
- Chief Information Officer..... Darryl Ackley

Office of Academic Affairs

- Interim Provost & Vice President for Academic Affairs. ..... Dr. Lique Coolen
- Associate Vice President for Academic Affairs..... Dr. Richard Thompson
- Dean of Arts & Sciences. ..... Dr. Steve Simpson
- Dean of Engineering. ..... Dr. Corey Lecrec
- Dean of Graduate Studies. ..... Dr. Aly El-Osery
- Faculty Senate Chair ..... Dr. Linda DeVeaux

Office of Student Affairs

- Vice President for Student Affairs. ..... Dr. David Greene
- Associate Vice President for Student Affairs..... Dr. Peter Phaiah
- Associate Vice President for Strategic Enrollment Management..... Brandon Boulter
- Dean of Students. ..... Jennifer Chapman
- Dean of Student Success..... Elaine DeBrine-Howell
- Administrative Assistant for Student Affairs..... Juliann Ulibarri

Office of Administration and Finance

- Vice President for Administration and Finance. ..... Delilah Walsh
- Associate Vice President for Administration and Finance..... Shaojie "Jenny" Ma
- Administrative Assistant for Administration and Finance ..... Theresa Lucero

Office of Research

- Vice President for Research and Chief Science Officer. ..... Dr. Lique Coolen
- Associate Vice President for Research..... Carlos Romero

New Mexico Bureau of Geology and Mineral Resources

- Director, New Mexico Bureau of Geology and Mineral Resources and State Geologist. ..... Dr. Michael Timmons

New Mexico Petroleum Recovery Research Center

- Director, New Mexico Petroleum Recovery Research Center ..... Dr. Robert Balch

Energetic Materials Research and Testubg Center

- Interim Director, Energetic Materials Research and Testing Center (EMRTC). ..... Darryl Ackley

NMT Administration

Academic Department & Program Chairs

https://www.nmt.edu/contact.php

- Biology ..... Dr. Michael Doyle
- Biomedical Sciences ..... Dr. Kaarin Goncz
- Biotechnology ..... Dr. Praveen Patidar
- Chemical Engineering. ..... Dr. Pabrita Choudhury
- Chemistry ..... Dr. Menake Piyasena
- Civil and Environmental Engineering. ..... Dr. Clint Richardson
- CLASS/PSYC..... Dr. Taffeta Ellliot
- CSE ..... Dr. Jun Zheng
- Business & Technology Management. ..... Dr. Haoying Wang
- Cybersecurity ..... Dr. Lorie Liebrock
- Earth and Environmental Science. ..... Dr. Jaakko Putkonen

- Environmental Science ..... Dr. Ranalda Tsosie
- Electrical Engineering. ..... Dr. Rene Arechiga
- Information Technology. ..... Dr. Subhasish Mazumdar
- Materials Engineering. ..... Dr. Paul Fuierer
- Master of Science for Teachers/PSYC ..... Dr. Megha Khandelwal
- Mathematics. ..... Dr. Brian Borchers
- Mechanical Engineering. ..... Dr. Bin Lim
- Mineral Engineering. ..... Dr. Mehdrad Razavi
- Petroleum Engineering… ..... Dr. Hamid Rahnema
- Physics. ..... Dr. Raul Morales Juberias
- Native American Initiatives ..... Stephan Chase
- STEM Outreach ..... Ann Hatch

NMT Administration

Department Directors

https://www.nmt.edu/contact.php

- Academic Affairs. ..... Lique Coolen
- Academic Center for Technology ..... Jose Gonzales
- Admission. ..... Patrick Clingman
- Advancement. ..... Colleen Foster
- Alumni Relations ..... Sandi Lucero
- Affirmative Action and Compliance. ..... Randy Saavedra
- Auxiliary Services. ..... Nowka Gutierrez
- Bookstore. ..... Scott Botko
- Budget and Analysis. ..... Emma Afloy
- Bureau of Geology ..... Michael Timmons
- Business Office. ..... Arleen Valles
- Campus Dining. ..... David Dettmer
- Campus Police Interim. ..... Jeremiah Benjey
- Capital Projects .... Alex Garcia
- Child Care Center Interim ..... Kiane Garcia
- Community Education. ..... Maureen Trujillo
- Cooperative Education. ..... Valerie Maez
- Counseling Services. ..... Angela Gautier
- EMRTC..... Darryl Ackley
- Facilities Management. ..... Robby Montgomery/Jason Hebert
- Faculaty Senate Chair..... Linda DeVeaux
- Financial Aid. ..... Zelda Vinson
- Finance and Business Operations ..... Patricia Landavazo
- Golf Course. ..... Sabino Grijalva
- Government Affairs ..... David Manzano
- Graduate Studies. ..... Aly El - Osery
- Gymnasium. ..... Melissa Begay
- Human Resources. ..... JoAnne Salome
- ICASA. ..... Mike Smith
- Information Technology & Communication. ..... Darryl Ackley
- Innovation Commercialization .....
- International and Exchange Services. ..... Valerie Maez
- Macey Center ..... Gloria Gutierrez-Anaya
- Marketing and Communications ..... Katie Ismael
- Office for Student Learning. ..... Agnieszka (Aga) Gabor da Silva
- Performing Arts. ..... Ronna Kalish
- Post Office. ..... Amanda Scarborough
- President's Office. ..... Michael Jackson
- Property Office. ..... Steven Hicks
- PRRC. ..... Robert Balch
- Purchasing Services. ..... Lisa Majkowski
- Registrar ..... Heather Juarez
- Research Safety and Compliance ..... Mikell Coleman
- Residential Life. ..... Koreen Kerfoot
- Science Fair and Olympiad. ..... Sharon Sessions
- Skeen Library ..... David Cox
- Sponsored Projects Deelopment ..... Stephanie Sichler
- Student Accounts/Bursar ..... Annette Kaus
- Student Leadership and Engagement. ..... Jaime Wood

NMT Programs

https://catalog.nmt.edu/departments

Air Force Aerospace Studies (program) Department

Air Force ROTC

(AFROTC)

AFROTC Detachment 510
(Aerospace Studies Building 159)
MSC02 1650 / 1901 Las Lomas NE
1 University of New Mexico
Albuquerque, NM 87131-0001
(505) 277-4502

http://afrotc.unm.edu/

The mission of the Air Force ROTC is to provide instruction and experience to all cadets in a diversified college or university environment, so they can graduate with the knowledge, character, and motivation essential to becoming leaders in the United States Air Force. The Air Force ROTC approach to education encourage inquiry, analysis, critical thinking, imagination, judgment, and individual participation on the part of each student.

Air Force ROTC Commissioning Program

The Air Force ROTC commissioning program is open to qualified students in all academic majors that will allow for the necessary AFROTC attendance and participation requirements. The program is divided into a General Military Course (GMC) and a Professional Officer Course (POC). The latter is the final commissioning phase for those students who qualify and desire a commission in the United States Air Force or United States Space Force. Both the GMC and POC programs require students to enroll in an Aerospace Science Leadership Laboratory each semester.

This department is administered by personnel of the United States Air Force and/or United States Space Force under rules promulgated by the Department of the Air Force and the University of New Mexico.

Students may enter Air Force ROTC from any high school, college, or university. Transfer students with a ROTC background can receive credit for previous ROTC experience.

Following successful completion of the Air Force ROTC program, each individual is commissioned as a second lieutenant in the United States Air Force or United States Space Force. Full pay and benefits begin upon initial assignment to active duty.

Courses

AFAS1120 - Areospace Studies I

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Standard Letter

No Requirements

AFAS1120 - Areospace Studies I

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Standard Letter

No Requirements

AFAS1121 - Aerospace Studies 2

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Survey course designed to introduce students to the U.S. Air Force and U.S. Space Force and provides an overview of the basic characteristics, missions, and organization of the Air Force and Space Force.

No Requirements

AFAS1121L - Leadership Laboratory 2

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Standard Letter

Simple Requisites

Course Requisite Requirements

Corequisite Requirements
Type
Completion Requirement

Corequisites

Complete ALL of the following Courses:
- AFAS121 - Heritage and Value II (Inactive)

Additional Comments:

No Requirement Level

AFAS1192 - Leadership Lab I

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Standard Letter

Simple Requisites

Course Requisite Requirements

Corequisite Requirements
Type
Completion Requirement

Corequisites

Complete ALL of the following Courses:
- AFAS250 - Team and Leadership Fundamentals I (Inactive)

Additional Comments:

No Requirement Level

AFAS1192 - Leadership Lab I

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Standard Letter

No Requirements

AFAS1292 - Leadership Laboratory 2

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Continuation of AFAS 120L. Graded S/U.

Simple Requisites

Course Requisite Requirements

Corequisite Requirements
Type
Completion Requirement

Corequisites

Complete ALL of the following Courses:
- AFAS121 - Heritage and Value II (Inactive)

Additional Comments:

No Requirement Level

AFAS2192 - Leadership Laboratory 3

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Standard Letter

No Requirements

AFAS2192 - Leadership Laboratory 3

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Standard Letter

Simple Requisites

Course Requisite Requirements

Corequisite Requirements
Type
Completion Requirement

Corequisites

Complete ALL of the following Courses:
- AFAS120 - Heritage and Value I (Inactive)

Additional Comments:

No Requirement Level

AFAS2229 - Active Duty Phys Training Prep

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Standard Letter

Equivalent Courses: Previous & Current Courses
AFAS329

No Requirements

AFAS2250 - Aerospace Studies 3

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Standard Letter

No Requirements

AFAS2250 - Aerospace Studies 3

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Standard Letter

No Requirements

AFAS2251 - Aerospace Studies 4

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Provides a fundamental understanding of both leadership and team building. The lessons and course flow are designed to prepare cadets for field training and leadership positions in the detachment.

No Requirements

AFAS2292 - Leadership Lab 4

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Continuation of AFAS 250. Graded S/U.

Simple Requisites

Course Requisite Requirements

Corequisite Requirements
Type
Completion Requirement

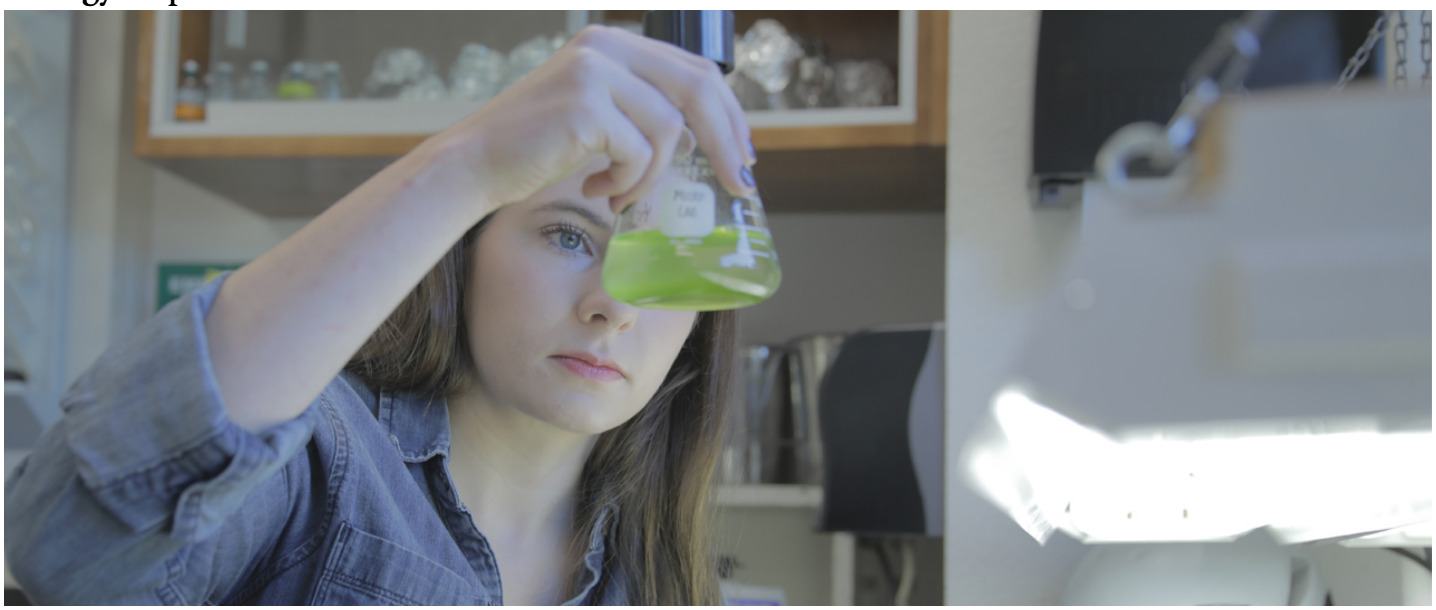
Corequisites

Complete ALL of the following Courses:
- AFAS250 - Team and Leadership Fundamentals I (Inactive)

Additional Comments:

No Requirement Level

Biology Department



CONTACT US		
Office: Jones Annex 219, 801 Leroy Place		
State & Zip: NM 87801		
Phone: 575-835-5612		
website: https://www.nmt.edu/academics/biology/		

- ***Professor:*** *Doyle (Chair of the Department)*
- ***Associate Professor:*** *Duval*
- ***Assistant Professor:*** *Sharbrough*
- ***Associate Teaching Professor:*** *Goncz*
- ***Adjunct Faculty:*** *Aksenov, Beers, Bell, Buelow, Chain, ChoGlueck, Elliott, Jones, Markwell, Pias, Piyasena, Tartis, Thompson, Vuyisich, D. Wilkinson, P. Wilkinson*
- ***Emeritus Faculty:*** *DeVeaux, Kieft, Reiss, Rogelj, Smoake*

Departments participating in the Biomolecular Sciences and Technology Program: *Biology, Chemistry, CLASS, Mathematics, Chemical Engineering, Computer Science and Engineering, Materials Engineering, and Mechanical Engineering*

Degree Programs Offered: *BS-BIOLOGY, B.A. in Biology; B.S. in Biomedical Sciences with options in Biology, Chemistry, and Psychology & Neuroscience; M.S. in Biology; and M.S. in Biology with Specialization in Biochemistry*

Additional Program Offered: *Accelerated M.S. Program*

The mission of the Biology Department is to provide students with a relevant education for Biomedical and Biotechnological careers, to lead in molecular biological and environmental life science research, and to serve the university and the scientific community. The Biology program prepares undergraduate students for graduate education in the allied health professions and in specialized fields of the biological sciences. **Students who are interested in pre-medical, pre-dental, and pre-veterinary science programs should discuss appropriate course electives with their advisor.**

A wide variety of career opportunities is currently available for those individuals possessing advanced knowledge and skills, particularly in the areas of biochemistry, molecular biology, microbiology, ecology, genetics, endocrinology, and immunology. Market demand in these areas will likely remain strong for the foreseeable future.

Undergraduate majors typically have diverse career goals and objectives. To accommodate these differences, the undergraduate program is very flexible; only a minimal number of technical core courses is required. Through the selection of appropriate technical electives, each student customizes their education based on personal academic needs and career objectives.

The main approach in the classroom is to stress the highly quantitative and analytical nature of modern biological inquiry, which utilizes sophisticated biochemical and biophysical techniques to answer fundamental questions about living organisms. Undergraduates are encouraged to undertake research through course-based undergraduate research (CURE courses), various directed study and special topics offerings and are often employed in the research laboratories of the faculty. These research experiences make our students successful in obtaining paid summer internships across the country, and many students enter the accelerated MS program.

Programs

Accelerated M.S. in Biology (pathway)

[Program Overview]

Program Title
Accelerated Master of Science in Biology Program

Department(s)
Biology

Program Description
Exceptionally qualified and motivated students may earn both BS (in Biology or BMS) and MS (in Biology) degrees in as little as five years.

Program Information & Policies
Accepted students may apply up to 12 credits of 5000-level or above coursework to both degrees.

Students should apply for the accelerated Master's program no later than the semester prior to their final undergraduate year. During their final year of undergraduate study, students must select a graduate advisory committee and formalize their graduate research or independent study topic and program of study.

Thesis students must also enroll in BIOL5081 Directed Study (Directed study) for one credit with their research advisor during their final semester of undergraduate study, and pass with a B or better, to remain in the accelerated program. Both thesis and independent study students must receive a B or better in dual counted classes to remain in the accelerated program. Both thesis and independent study students must take BIOL 5079 and BIOL 5082 during their final undergraduate year.

Biology (minor)

[Program Overview]

Program Title
Minor in Biology

Department(s)
Biology

Program Description
Minimum of 18 credit hours required to obtain a minor in Biology

Program Information & Policies
Biology classes required for a minor in biology may not be taken on an S/U basis.

Simple Requisites

Program Requirements

minor in Biology course requirements- 18 credits
Type
Completion Requirement

Required Biology Courses

Complete ALL of the following Courses:

- BIOL2110 - Pinciples of Biology: Cellular & Molecular
  AND BIOL2110L - Pinciples of Biology: Cellular & Molecular Lab
- BIOL2610 - Principles of Biology: Biodiversity, Ecology, and Evolution
  AND BIOL2610L - Principles of Biology: Biodiversity, Ecology, and Evolution Lab
- BIOL3031 - Cell Biology
- BIOL3044 - Ecology
  AND BIOL3044L - Ecology Lab

complete 3 additional credits in a Biology course numbered 3000 or above

Earn at least 3 credits

Additional Comments:

See your respective Degree Program for the Requirements of the Program.

Institute General Requirements

See the Institute **General Education Core Requirements.**

No Requirement Level

BA- BIOLOGY - B.A. in Biology

[Program Overview]

Program Title
Bachelor of Arts in Biology

Department(s)
Biology

Degree & Program Code
BA- BIOLOGY

Program Description
Minimum Degree Requirements 120 credits

The Bachelor of Arts in Biology provides a rigorous and broad education in Biology and supporting sciences, and captures the social and ethical implications pertinent to today's world view. Graduates of this program are well positioned to pursue careers at the interface of Biology and other disciplines, including in such varied areas as patent law, science communication, and secondary education, as well as postgraduate studies.

Program Learning Outcomes: Graduates will be able to
●Understand, critically evaluate, and communicate information related to Biology
●Use the scientific method to collect and analyze quantitative data
● Articulate the ethical implications of biological research and its impact on society

No more than 4 PHED, ARTS or MUS ensemble credits may be applied toward the degree.

Simple Requisites

Program Requirements

Biology Core Course Requirements
Type
Completion Requirement

Biology Core Course Requirements

Complete ALL of the following Courses:

- BIOL1131 - Intro to Biology & BMS
- BIOL2610 - Principles of Biology: Biodiversity, Ecology, and Evolution
  AND BIOL2610L - Principles of Biology: Biodiversity, Ecology, and Evolution Lab
- BIOL3011 - Genetics
- BIOL3031 - Cell Biology
- BIOL3044 - Ecology
- BIOL3045 - Evolutionary Biology
- BIOL4071 - Life Sciences Seminar

Biology Core Course Requirements

Complete ANY of the following Course Sets:

- BIOL3041 & BIOL3041L: Introductory Microbiology and Lab
  OR BIOL3043 & BIOL3043L: Environmental Microbiology and Lab

Additional Comments:

Additional Biology Electives
Type
Completion Requirement

Additional Biology Electives

12 additional credits in Biology courses numbered 2000 & above, & a minimum of 6 credits (2 classes at 3 credits each) in Biology courses numbered 4000 & above.

Choose courses from Biology listed on the following page:

- https://catalog.nmt.edu/departments/BIOL/courses

18 additional credits in Biology Courses numbered 2000 & above.

Additional Comments:

Chemistry Requirements
Type
Completion Requirement

General Chemistry II & Lab

Complete ALL of the following Course Sets:

- CHEM1225 & CHEM1225L: g: General Chemistry II and Lab

Chemistry Elective

Earn at least 3 credits from the following:

- CHEM3033 - Organic Chemistry I
- CHEM3011 - Quantitative Analysis
- CHEM3031 - Physical Chemistry I

Additional Comments:

Other Required Courses
Type
Completion Requirement

Other Required Courses

Complete ALL of the following Courses:

- PHIL1146 - g5:Ethics & Values in STEM
  OR PHIL3042 - g5:Philosophy of Bioethics
- PSYC1110 - g4:Introduction to Psychology
- COMM1130 - g5: Public Speaking

Other required courses:

Earn at least 6 credits from the following:

- MGMT3030 - Management Behavior & Organization
- MGMT4007 - Technology Entrepreneurship
- EDUC3040 - Concepts in Education
- EDUC3041 - Matching Teacher Strategy to Student Learning
- ACCT2110 - Principles of Accounting I
- ACCT2120 - Principles of Accounting II

Additional Comments:

General Electives
Type
Completion Requirement

General Electives to meet 120 degree credits

Generally 5-10 elective credits are needed to meet the minimum degree credit hours of 120.

Any course completion that is not used towards degree requirements may be considered an elective.

Earn at least undefined credits

Additional Comments:

Mathematics
Type
Completion Requirement

Complete ALL of the following Courses:

- MATH1230 - Trigonometry
- MATH1240 - Pre-Calculus

Additional Comments:

Institute General Requirements

Bachelor of Arts Degree General Requirements
Type
Completion Requirement

Area 1: Communications

Complete ALL of the following Course Sets:

- Area 1: Communications (BA Degree) (9 credits)

Area 2: Mathematics and Quantitative Reasoning

Complete ALL of the following Course Sets:

- Area 2: Mathematics (BA Degree) (6 credits)

Area 3: Science Requirements for a Bachelor of Science

Complete ALL of the following Course Sets:

- Area 3: Science (BA Degree) (12 credits)

Area 4a: Policy and Technology for Bachelor of arts

Earn at least 3 credits from the following:

- Area 4a: Social Sciences: Policy and Technology (BA Degree) (3 credits)

Area 4b: Other Social Sciences for Bachelor of Arts

Earn at least 6 credits from the following:

- Area 4b: Other Social Sciences (BA Degree) (6 credits)

Area 5a: Ethics and Technology for Bachelor of Arts

Earn at least 3 credits from the following:

- Area 5a: Humanities: Ethics and Technology (BA Degree) (3 credits)

Area 5b: Other Humanities

Earn at least 6 credits from the following:

- Area 5b: Other Humanities (BA Degree) (6 credits)

Area 6: Creative and Fine Arts

Earn at least 3 credits from the following:

- Area 6: Creative and Fine Arts (BS, BA, or BGS Degree) (3 credits)

Area 7: Additional Humanities/Social Science Requirement for Bachelor of Arts

Earn at least 3 credits from the following:

- Area 7: Additional Courses from Areas 4, 5, 6 (BS, BA, or BGS Degree) (3 credits)

Additional Comments:

No Requirement Level

[Learning Outcomes]

Outcome
1. Understand, critically evaluate, and communicate information related to Biology

Outcome
2. Use the scientific method to collect and analyze quantitative data

Outcome
3. Articulate the ethical implications of biological research and its impact on society

[Sample 4-Year Curriculum Plan(s)]

Degree Map Name
Bachelor of Arts in Biology Sample Curriculum
Total Degree Map Credits
120 - 121
Degree Map Effective Catalog Year
2026 -

Year	Semester	Actual Credits
Year 1	Fall	15

Course
- BIOL1131 - Intro to Biology & BMS

Actual Credits 1

Course
- BIOL2110 & BIOL2110L: Principles of Biology I and Lab

Actual Credits 4

Course
- CHEM1215 & CHEM1215L: g:General Chemistry I and Lab

Actual Credits 4

Course
- ENGL1110 - g1:Composition I

Actual Credits 3

Course
- MATH1240 - Pre-Calculus

Actual Credits 3

Year	Semester	Actual Credits
Year 1	Spring	15 - 16

Course
- BIOL2610 & BIOL2610L: Principles of Biology II and Lab

Actual Credits 4

Course
- CHEM1225 & CHEM1225L: g: General Chemistry II and Lab

Actual Credits 4

Course
- ENGL1120 - g1:Composition II

Actual Credits 3

Course
- MATH1230 - Trigonometry

Actual Credits 3

Course
- Physical Recreation (Generic)
  OR
- Arts (Generic)

Actual Credits 1 - 2

Year	Semester	Actual Credits
Year 2	Fall	15

Course
- BIOL3031 - Cell Biology

Actual Credits 3

Course
- PSYC1110 - g4:Introduction to Psychology

Actual Credits 3

Course
- CHEM3033 - Organic Chemistry I

Actual Credits 3

Course
- Area 4b: Other Social Sciences (BA Degree) (6 credits)

Actual Credits 3

Course
- EDUC3040 - Concepts in Education
  OR
- MGMT3030 - Management Behavior & Organization
  OR
- ACCT2110 - Principles of Accounting I

Actual Credits 3

Year	Semester	Actual Credits
Year 2	Spring	15

Course
- COMM1130 - g5: Public Speaking

Actual Credits 3

Course
- BIOL3045 - Evolutionary Biology

Actual Credits 3

Course
- Area 5b: Other Humanities (BA Degree) (6 credits)

Actual Credits 3

Course
- General Elective (Generic)

Actual Credits 3

Course
- EDUC3041 - Matching Teacher Strategy to Student Learning
  OR
- MGMT4007 - Technology Entrepreneurship
  OR
- ACCT2120 - Principles of Accounting II

Actual Credits 3

Year	Semester	Actual Credits
Year 3	Fall	15

Course
- GEOL1110 - Physical Geology
- **AND** GEOL1110L - Physical Geology Lab

Actual Credits 4

Course
- BIOL3044 - Ecology

Actual Credits 3

Course
- PHYS1113 - g3:Special Topics in Physics
- **AND** PHYS1113L - g3:Special Topics in Physics Lab

Actual Credits 4

Course
- PHIL3042 - g5:Philosophy of Bioethics

Actual Credits 3

Course
- PHED or ARTS (Generic)

Actual Credits 1

Year	Semester	Actual Credits
Year 3	Spring	15

Course
- CSCI1220 - Programming Fund Python
- **AND** CSCI1220L - Programming Fund Python Lab

Actual Credits 4

Course
- BIOL3011 - Genetics

Actual Credits 3

Course
- Biology Elective (Generic)

Actual Credits 3

Course
- ENGL3041 - i1:Technical Writing

Actual Credits 3

Course
- General Elective (Generic)

Actual Credits 2

Year	Semester	Actual Credits
Year 4	Fall	15

Course
- BIOL3041 - Microbiology
- **AND** BIOL3041L - Microbiology Lab

Actual Credits 4

Course
- Biology Elective (Generic)

Actual Credits 3

Course
- Biology Elective 4000 Level (Generic)

Actual Credits 3

Course
- Area 6: Creative and Fine Arts (BS, BA, or BGS Degree) (3 credits)

Actual Credits 3

Course
- General Elective (Generic)

Actual Credits 2

Year	Semester	Actual Credits
Year 4	Spring	15

Course
- BIOL4071 - Life Sciences Seminar

Actual Credits 1

Course
- Biology Elective (Generic)

Actual Credits 3

Course
- Biology Elective 4000 Level (Generic)

Actual Credits 3

Course
- Area 4a: Social Sciences: Policy and Technology (BA Degree) (3 credits)

Actual Credits 3

Course
- General Electives (Generic)

Actual Credits 2

Course
- Biology Elective (Generic)

Actual Credits 3

BS-BIOLOGY - B.S. in Biology

[Program Overview]

Program Title
Bachelor of Science in Biology

Department(s)
Biology

Degree & Program Code
BS-BIOLOGY

Program Description
The Biology program prepares undergraduate students for graduate education in the allied health professions and in specialized fields of the biological sciences. Students who are interested in pre-medical, pre-dental, and pre-veterinary science programs should discuss appropriate course electives with their advisor.

Program Information & Policies
Bachelor of Science in Biology Minimum credit hours required—120;

Biology laboratory classes are required for biology lecture courses that offer an associated laboratory if credit for the lecture course is used to meet the required number of biology credits for a B.S. degree in Biology. Students pursuing a B.S. in Biology must take Biology and Chemistry courses for a letter grade, except for those only offered S/U. Prerequisites for a particular course may be waived only with the written permission of the course instructor and chair of the department.

Simple Requisites

Program Requirements

BS in BIOLOGY
Type
Completion Requirement

Biology Core Courses

Complete ALL of the following Courses:
- BIOL1131 - Intro to Biology & BMS
- BIOL2110 - Pinciples of Biology: Cellular & Molecular
- BIOL2110L - Pinciples of Biology: Cellular & Molecular Lab
  OR BIOL2141 - Seaphage: Phage Discovery
- BIOL2610 - Principles of Biology: Biodiversity, Ecology, and Evolution
- BIOL2610L - Principles of Biology: Biodiversity, Ecology, and Evolution Lab
  OR BIOL2142 - SEAPHAGE: Phage Genome Annotation
- BIOL3011 - Genetics
- BIOL3011L - Genetics Lab
- BIOL3031 - Cell Biology
- BIOL3041 - Microbiology
- BIOL3041L - Microbiology Lab
- BIOL3044 - Ecology
  AND BIOL3044L - Ecology Lab
- BIOL3045 - Evolutionary Biology
- BIOL4043 - Molecular Biology
  AND BIOL4043L - Molecular Biology Lab
- BIOL4071 - Life Sciences Seminar

Additional Biology Courses

Biology courses numbered 2000 & above.

Minimum of 13 credits in additional Biology courses
Choose courses from Biology listed on the following page:

- https://catalog.nmt.edu/departments/BIOL/courses

Additionally, the following courses may be applied to biology electives if not fulfilling the chemistry elective requirement:

- CHEM4041 Biochemistry I
- CHEM4042 Biochemistry II

Chemistry Requirement

Complete ALL of the following Courses:
- CHEM3033 - Organic Chemistry I

Additional Chemistry Course Electives

Earn at least 6 credits from the following:
- CHEM3011 - Quantitative Analysis
- CHEM3011L - Quantitative Analysis Lab
- CHEM3031 - Physical Chemistry I
- CHEM3033L - Organic Chemistry I Lab

- CHEM3034 - Organic Chemistry II
- CHEM3034L - Organic Chemistry II Lab
- CHEM4041 - Biochemistry I
- CHEM4041L - Biochemistry I Lab

Computer Science or Math Elective

Complete at least 1 of the following courses:

- MATH2350 - Statistical Methods
  OR CSCI1220 - Programming Fund Python

Additional Comments:

Electives to Complete 120 credit hours
Type
Completion Requirement

General Electives

Generally students in the B.S. in Biology program will have 10 free elective credits to complete to meet the minimum degree hour requirements. These electives can be fulfilled with any extra credit courses.

Complete electives to meet 120 degree credit hours

Additional Comments:

Institute General Requirements

Bachelor of Science General Education Degree Requirements
Type
Completion Requirement

Area 1: English Requirements for Bachelor of Science

Complete ALL of the following Course Sets:

- Area 1: Communications (BS Degree) (9 credits)

Area 2: Math Requirements for Bachelor of Science

Complete ALL of the following Course Sets:

- Area 2: Mathematics (BS Degree) (8 credits)

Area 3: Science Requirements for a Bachelor of Science

Complete ALL of the following Course Sets:

- Area 3: Science (BS Degree) (18 credits)

Area 4: Social Science Requirements for a Bachelor of Science

Earn at least 6 credits from the following:

- Area 4: Social and Behavioral Science (BS or BGS Degree) (6 credits)

Area 5: Humanities Course Requirements for a Bachelor of Science

Earn at least 6 credits from the following:

- Area 5: Humanities (BS or BGS Degree) (6 credits)

Area 6: Fine & Creative Art Course Requirement for a Bachelor of Science

Earn at least 3 credits from the following:

- Area 6: Creative and Fine Arts (BS, BA, or BGS Degree) (3 credits)

Area 7: Additional Humanities/Social Science Requirement for a Bachelor of Science

Earn at least 3 credits from the following:

- Area 7: Additional Courses from Areas 4, 5, 6 (BS, BA, or BGS Degree) (3 credits)

Additional Comments:

No Requirement Level

[Learning Outcomes]

Outcome
● Demonstrate broad knowledge of biological concepts

Outcome
● Be able to interpret biologically-relevant data

Outcome
● Demonstrate proficiency in lab techniques

Outcome
● Effectively communicate scientific information

[Sample 4-Year Curriculum Plan(s)]

Degree Map Name
Sample Curriculum for the Bachelor of Science in Biology
Total Degree Map Credits
120 - 122
Degree Map Effective Catalog Year
2026 -

Year	Semester	Actual Credits
Year 1	Fall	16

Course

- BIOL1131 - Intro to Biology & BMS

Actual Credits 1

Course

- BIOL2110 & BIOL2110L: Principles of Biology I and Lab

Actual Credits 4

Course

- CHEM1215 & CHEM1215L: g:General Chemistry I and Lab

Actual Credits 4

Course
- ENGL1110 - g1:Composition I

Actual Credits 3

Course
- MATH1510 & MATH1510L: g:Calculus I & Lab

Actual Credits 4

Year	Semester	Actual Credits
Year 1	Spring	15

Course
- BIOL2610 & BIOL2610L: Principles of Biology II and Lab

Actual Credits 4

Course
- CHEM1225 & CHEM1225L: g: General Chemistry II and Lab

Actual Credits 4

Course
- ENGL1120 - g1:Composition II

Actual Credits 3

Course
- MATH1520 - g2:Calculus II

Actual Credits 4

Year	Semester	Actual Credits
Year 2	Fall	15

Course
- BIOL3031 - Cell Biology

Actual Credits 3

Course
- Social Sciences (Area 4) (Generic)

Actual Credits 3

Course
- CHEM3033 - Organic Chemistry I

Actual Credits 3

Course
- PHYS1310 - g3:Calculus-based Physics I
- **AND** PHYS1310L - g3:Calculus-based Physics I Lab

Actual Credits 5

Course
- Physical Recreation or Fine Arts (Generic)

Actual Credits 1

Year	Semester	Actual Credits
Year 2	Spring	15

Course
- BIOL3045 - Evolutionary Biology

Actual Credits 3

Course
- Biology Elective (Generic)

Actual Credits 4

Course
- PHYS1320 - g3:Calculus-based Physics II
- **AND** PHYS1320L - g3:Calculus-based Physics II Lab

Actual Credits 5

Course
- Chemistry Electives (Generic)

Actual Credits 3

Year	Semester	Actual Credits
Year 3	Fall	15

Course
- BIOL3044 - Ecology
- **AND** BIOL3044L - Ecology Lab

Actual Credits 4

Course
- ENGL3041 - i1:Technical Writing

Actual Credits 3

Course
- Chemistry Electives (Generic)

Actual Credits 3

Course
- Social Sciences (Area 4) (Generic)

Actual Credits 3

Course
- Physical Recreation or Fine Arts (Generic)

Actual Credits 2

Year	Semester	Actual Credits
Year 3	Spring	15

Course
- BIOL3011 - Genetics
- **AND** BIOL3011L - Genetics Lab

Actual Credits 4

Course
- Biology Elective (Generic)

Actual Credits 3

Course
- Area 6: Creative and Fine Arts (BS, BA, or BGS Degree) (3 credits)

Actual Credits 3

Course
- Humanities (Area 5) (Generic)

Actual Credits 3

Course
- Generic Elective (Generic)

Actual Credits 2

Year	Semester	Actual Credits
Year 4	Fall	14 - 16

Course
- BIOL3041 - Microbiology
- **AND** BIOL3041L - Microbiology Lab

Actual Credits 4

Course
- Biology Elective (Generic)

Actual Credits 3

Course
- MATH2350 - Statistical Methods
  OR
- CSCI1220 - Programming Fund Python
- **AND** CSCI1220L - Programming Fund Python Lab

Actual Credits 3 - 4

Course
- Humanities (Area 5) (Generic)

Actual Credits 3

Course
- Physical Recreation or Fine Arts (Generic)

Actual Credits 1 - 2

Year	Semester	Actual Credits
Year 4	Spring	15

Course
- BIOL4071 - Life Sciences Seminar

Actual Credits 1

Course
- BIOL4043 - Molecular Biology
- **AND** BIOL4043L - Molecular Biology Lab

Actual Credits 4

Course
- Biology Elective (Generic)

Actual Credits 3

Course
- Social Science/Humanities (Area 7) (Generic)

Actual Credits 3

Course
- Electives (Generic)

Actual Credits 4

BS-BMS - B.S. in Biomedical Sciences

[Program Overview]

Program Title
Bachelor of Science in BMST (all options)

Department(s)
Biology, Biology Dept/ Biomedical Sciences (program)

Degree & Program Code
BS-BMS

Required Specialization/Concentration(s)
Biology Option, Chemistry Option, Psychology & Neuroscience Option

Program Description
The Bachelor of Science in Biomedical Sciences is a broadly interdisciplinary degree, drawing on knowledge from both science and engineering. Students take a common set of core courses from several disciplines. For more in-depth study, they select an option in Biology, Chemistry, or Psychology & Neuroscience along with a concentration in one of four engineering fields: Biochemical Engineering, Bioinformatics, Biomaterials Engineering or Biomechanical Engineering.

Program Information & Policies
A **Science Option** and **Engineering Concentration** must be chosen and be declared with the office of the Registrar.

Simple Requisites

Program Requirements
Minimum credit hours required—120

- One of the **Science Options** described and found in the *"Program Science Options"* tab AND
- One of the **Engineering Concentrations** described and found in the *"Concentration Requirements"* tab.

The **Science option** and **Engineering concentration** must be declared with the office of the Registrar.

In addition to the General Education and Institute Core Curriculum Requirements, the following core program is required of all BMS students. Note that courses marked with an asterisk (*) may also be used to satisfy General Education requirements:

Core Requirements for a Bachelor of Science in BMS (all options)
Type
Completion Requirement

Biology/BMS Core Courses

Complete ALL of the following Courses:

- BIOL1131 - Intro to Biology & BMS
- BMST3001 - Genetic Engineering: At the Bench
- BMST4095 - Biomolecular Research
- BMST4096 - Biomedical Research & Design

Biology Courses

Complete ALL of the following Courses:

- BIOL2110 - Pinciples of Biology: Cellular & Molecular
- BIOL2110L - Pinciples of Biology: Cellular & Molecular Lab
  OR BIOL2141 - Seaphage: Phage Discovery
- BIOL2610 - Principles of Biology: Biodiversity, Ecology, and Evolution
- BIOL2610L - Principles of Biology: Biodiversity, Ecology, and Evolution Lab
  OR BIOL2142 - SEAPHAGE: Phage Genome Annotation
- BIOL3031 - Cell Biology
- BIOL3041 - Microbiology
- BIOL3041L - Microbiology Lab

Chemistry Courses

Complete ALL of the following Courses:

- CHEM3033 - Organic Chemistry I
  AND CHEM3033L - Organic Chemistry I Lab
- CHEM3034 - Organic Chemistry II
  AND CHEM3034L - Organic Chemistry II Lab
- CHEM4041 - Biochemistry I
  AND CHEM4041L - Biochemistry I Lab

Programming Course

Fulfill ANY of the following requirements:

Python

Complete ALL of the following Courses:

- CSCI1220 - Programming Fund Python
  AND CSCI1220L - Programming Fund Python Lab

OR

or Intro to Programming

Complete ALL of the following Courses:

- CSCI1210 - Programming Fundamentals
  AND CSCI1210L - Programming Fundamentals

OR

or Engineer Programming

Complete ALL of the following Courses:

- ES111 - Computer Programming for Engineers
  AND ES111L - Computer Programming Lab

Mathematics

Complete ALL of the following Courses:

- MATH2532 - Calculus III
- MATH3035 - Ordinary Differential Equation
- MATH3083 - Introduction to Biostatistics

Philosophy

Complete ALL of the following Courses:

- PHIL3042 - g5:Philosophy of Bioethics

Psychology

Complete ALL of the following Courses:

- PSYC1110 - g4:Introduction to Psychology
- PSYC2285 - g4:Experimental Psychology
  AND PSYC2285L - g4:Experimental Psychology Lab

Additional Comments:

Institute General Requirements

Bachelor of Science General Education Requirements
Type
Completion Requirement

Area 1: English Requirements for Bachelor of Science

Complete ALL of the following Course Sets:

- Area 1: Communications (BS Degree) (9 credits)

Area 2: Math Requirements for Bachelor of Science

Complete ALL of the following Course Sets:

- Area 2: Mathematics (BS Degree) (8 credits)

Area 3: Science Requirements for a Bachelor of Science

Complete ALL of the following Course Sets:

- Area 3: Science (BS Degree) (18 credits)

Area 4: Social Science Requirements for a Bachelor of Science

Earn at least 6 credits from the following:

- Area 4: Social and Behavioral Science (BS or BGS Degree) (6 credits)

Area 5: Humanities Course Requirements for a Bachelor of Science

Earn at least 6 credits from the following:

- Area 5: Humanities (BS or BGS Degree) (6 credits)

Area 6: Fine & Creative Art Course Requirement for a Bachelor of Science

Earn at least 3 credits from the following:

- Area 6: Creative and Fine Arts (BS, BA, or BGS Degree) (3 credits)

Area 7: Additional Humanities/Social Science Requirement for a Bachelor of Science

Earn at least 3 credits from the following:

- Area 7: Additional Courses from Areas 4, 5, 6 (BS, BA, or BGS Degree) (3 credits)

Additional Comments:

No Requirement Level

[Science Options]

Program Science Option (must be declared with the Registrar Office)

Science Option 1: Title
Biology Option

Requirements
Fulfill ANY of the following Course Set requirements:

Anatomy & Physiology

Complete ALL of the following Courses:

- BIOL3051 - Anatomy & Physiology
  AND BIOL3051L - Anatomy and Physiology Lab I
- BIOL3052 - Anatomy and Physiology II
  AND BIOL3052L - Anatomy & Physiology II Lab

OR

Genetics & Molecular

Complete ALL of the following Courses:

- BIOL3011 - Genetics
  AND BIOL3011L - Genetics Lab
- BIOL4043 - Molecular Biology
  AND BIOL4043L - Molecular biology Lab

The Genetics & Molecular course set is Required for Bioinformatics Concentration

AND

- at least 1 additional 4000-level Biology course of 3 or more credits (Bioinformatics Concentration must take BIOL4035 Bioinformatics).

Program Science Option (must be declared with the Registrar Office)

Science Option 2: Title
Chemistry Option

Requirements
In addition to the General Education and Institute Core Curriculum Requirements, and the core BMS Requirements, the following courses are required:

Complete ALL of the following Course Sets:

- CHEM 3011 & CHEM 3011L: Quantitative Analysis & Lab
- CHEM 3031 & CHEM 3031 Lab: Physical Chemistry I & Physical Chemistry I Lab
- CHEM 4042 & CHEM 4042 L: Biochemistry II & Biochemistry II Lab

Program Science Option (must be declared with the Registrar Office)

Science Option 3: Title
Psychology & Neuroscience Option

Requirements
In addition to the General Education and Institute Core Curriculum Requirements), and the core Biomedical Sciences Requirement, the following courses are required: (may be used to satisfy General Education requirements):

Fulfill ALL of the following requirements:

- At least one 2000-level Psychology course of 3 or more credits.
- AND at least one 3000-level Psychology course with laboratory of 4 credits.
- AND at least two additional 3000- or 4000-level Psychology courses of 3 or more credits each.

[Engineering Concentrations]

Concentration Option (must be declared with the Registrar Office)

Concentration Option 1: Title
Biochemical Engineering Concentration

Requirements
The following courses are required:

- CH E3026 Principles of Chemical Engr I (3)
- AND two of: CH E3027 (3), CH E4068 Surfaces,Interfaces, &Colloids (3), CH E4076 Drug Delivery Techniques (3), CH E4077 Bioprocess Engineering (3), and CH E4049 Nanostructures & Nanotech (3)

Concentration Option (must be declared with the Registrar Office)

Concentration Option 2: Title
Bioinformatics Engineering Concentration

Requirements
With this Concentration choice, Students must take the Biology Science Option (BIOL 3011 & BIOL 3011L AND BIOL 4043 & BIOL 4043L, & BIOL 4035 as the additional 4000 level), and CSCI1220 & CSCI1220L.

The following courses are also required:

- CSCI2222 Data Structures in Python (3)
- AND CSCI2310 Discrete Mathematics for CS (3)
- AND CSE3073 Intro to Database Systems (3)

Concentration Option (must be declared with the Registrar Office)

Concentration Option 3: Title
Biomaterials Engineering Concentration

Requirements
The following courses are required (7 credit hours):

- MTLS202 Materials Engineering I & MTLS202L Materials Engineering I Lab *(4),*
- *PLUS* MTLS235 Materials Engineering II
- *AND* MTLS3010 Proc.& Microstruct. Meth.& Ana *(3) OR* MTLS4020 Biomedical Materials *(3)*

Concentration Option (must be declared with the Registrar Office)

Concentration Option 4: Title
Biomechanical Engineering Concentration

Requirements
The following courses are required:

- MENG110 Intro. to Mechanical Eng. (3)
- AND ES201 Statics (3)
- AND a 4000-level MENG course of at least 3 credits.

[Learning Outcomes]

Outcome
1. Acquire a breadth of knowledge spanning biological and related sciences,

Outcome
2. Design and conduct scientific research,

Outcome
3. Explain and communicate the role of technology in biology and related fields.

[Sample 4-Year Curriculum Plan(s)]

Degree Map Name
Sample Curriculum for the Bachelor of Science in Biomedical Sciences: Biology option with Bioinformatics Concentration
Total Degree Map Credits
125
Degree Map Effective Catalog Year
2026 -
Degree Map Description
Given that there are 3 science Concentrations, and 4 Engineering Options for this degree, there are 12 possible pathways that a student can take for this degree. The sample curriculum is for the Biology Science option with a Bioinformatics concentration. Students should consult with their advisor to design programs that fit their needs.

Year	Semester	Actual Credits
Year 1	Fall	16

Course
- BIOL1131 - Intro to Biology & BMS

Actual Credits 1

Course
- BIOL2110 & BIOL2110L: Principles of Biology I and Lab

Actual Credits 4

Course
- CHEM1215 & CHEM1215L: g:General Chemistry I and Lab

Actual Credits 4

Course
- ENGL1110 - g1:Composition I

Actual Credits 3

Course
- MATH1510 & MATH1510L: g:Calculus I & Lab

Actual Credits 4

Year	Semester	Actual Credits
Year 1	Spring	15

Course
- BIOL2610 & BIOL2610L: Principles of Biology II and Lab

Actual Credits 4

Course
- CHEM1225 & CHEM1225L: g: General Chemistry II and Lab

Actual Credits 4

Course
- ENGL1120 - g1:Composition II

Actual Credits 3

Course
- MATH1520 - g2:Calculus II

Actual Credits 4

Year	Semester	Actual Credits
Year 2	Fall	16

Course
- BIOL3031 - Cell Biology

Actual Credits 3

Course
- BMST3001 - Genetic Engineering: At the Bench

Actual Credits 2

Course
- PHYS1310 & PHYS1310L: g:Calculus-Physics I and Lab

Actual Credits 5

Course
- PSYC1110 - g4:Introduction to Psychology

Actual Credits 3

Course
- Area 5: Humanities (BS or BGS Degree) (6 credits)

Actual Credits 3

Year	Semester	Actual Credits
Year 2	Spring	15

Course
- CSCI1220 - Programming Fund Python
- **AND** CSCI1220L - Programming Fund Python Lab

Actual Credits 4

Course
- MATH2532 - Calculus III

Actual Credits 4

Course
- PHYS1320 & PHYS1320L: g:Calculus-Based Physics II and Lab

Actual Credits 5

Course
- Physical Education/Fine Arts (Generic)

Actual Credits 2

Year	Semester	Actual Credits
Year 3	Fall	16

Course
- CSCI2222 - Data Structures in Python

Actual Credits 3

Course
- CHEM3033 & CHEM3033L: Organic Chemistry I and Lab

Actual Credits 4

Course
- ENGL3041 - i1:Technical Writing

Actual Credits 3

Course
- PHIL3042 - g5:Philosophy of Bioethics

Actual Credits 3

Course
- Area 6: Creative and Fine Arts (BS, BA, or BGS Degree) (3 credits)

Actual Credits 3

Year	Semester	Actual Credits
Year 3	Spring	15

Course
- BIOL3011 & BIOL3011L: Genetics and Lab

Actual Credits 4

Course
- CHEM3034 & CHEM3034L: Organic Chemistry II and Lab

Actual Credits 4

Course
- CSCI2310 - Discrete Mathematics for CS

Actual Credits 3

Course
- PSYC2285 & PSYC2285L: Experimental Psychology and Lab

Actual Credits 4

Year	Semester	Actual Credits
Year 4	Fall	16

Course
- BIOL3041 & BIOL3041L: Introductory Microbiology and Lab

Actual Credits 4

Course
- CHEM4041 & CHEM4041L: Biochemistry I and Lab

Actual Credits 4

Course
- MATH3035 - Ordinary Differential Equation

Actual Credits 3

Course
- CSE3073 - Intro to Database Systems

Actual Credits 3

Course
- BMST4095 - Biomolecular Research

Actual Credits 2

Year	Semester	Actual Credits
Year 4	Spring	16

Course
- BIOL4035 - Bioinformatics

Actual Credits 3

Course
- BIOL4043 & BIOL4043L: Molecular Biology and Lab

Actual Credits 4

Course
- MATH3083 - Introduction to Biostatistics

Actual Credits 3

Course
- BMST4096 - Biomedical Research & Design

Actual Credits 2

Course
- Area 7: Additional Courses from Areas 4, 5, 6 (BS, BA, or BGS Degree) (3 credits)

Actual Credits 3

Course
- Physical Education or Fine Arts (Generic)

Actual Credits 1

MS-BIOLOGY - M.S. in Biology

[Program Overview]

Program Title
Master of Science in Biology

Department(s)
Biology

Degree & Program Code
MS-BIOLOGY

Optional Specialization/Concentration(s)
Specialization in Biochemistry

Program Information & Policies
The master's candidate must demonstrate competence in mathematics, chemistry, and physics comparable to New Mexico Tech's Bachelor of Science in Biology. In addition to the general degree requirements for the Master of Science degree at New Mexico Tech, all Biology MS students must take BIOL 5079 and BIOL 5082 during the first year of graduate study. For courses listed at both the 4000 and 5000 level, graduate students should enroll in the 5000 level course.

Simple Requisites

Program Requirements

Master of Science in Biology

The master's candidate must demonstrate competence in mathematics, chemistry, and physics comparable to New Mexico Tech's Bachelor of Science in Biology. In addition to the general degree requirements for the Master of Science degree at New Mexico Tech, all Biology MS students must take BIOL 5079 and BIOL 5082 during the first year of graduate study. For courses listed at both the 4000 and 5000 level, graduate students should enroll in the 5000 level course.

In addition, the following option-specific requirements must be met:

Master of Science in Biology Options :
Type
Completion Requirement

Thesis Option:

Thesis option:

●Completion of one credit hour of BIOL 5001, Graduate Seminar.

Independent Study Option:

Independent Study option:

●Completion of at least 12 additional credit hours of 5000-level Biology coursework other than thesis, directed study, independent study, or seminar.

●Completion of one credit hour of BIOL 5001, Graduate seminar in Biology.

●Completion of three credit hours of BIOL 5090, Independent study.

Additional Comments:

Institute General Requirements

Master of Science General Requirements
Type
Completion Requirement

Additional Comments:
See the Master of Science information found in the Graduate section of the catalog at Master of Science Degree.

Most Master Degrees at NMT require some out of department course electives, see the Graduate Office or an Academic Advisor for clarification or for additional information.

No Requirement Level

[Specializations/Dissertation Concentration Options]

Specialization/Dissertation Options

Specialization/Dissertation Title
Optional: Specialization in Biochemistry

Specialization/Dissertation Title Description
The master's candidate must demonstrate competence in mathematics, chemistry, and physics comparable to New Mexico Tech's Bachelor of Science in Biology.

Specialization/Dissertation Requirements
The master's candidate must demonstrate competence in mathematics, chemistry, and physics comparable to New Mexico Tech's Bachelor of Science in Biology. In addition to the MS in Biology requirements above, the following are required:

- Completion of at least six credit hours of CHEM 5061 (Advanced Topics in Biochemistry, 3cr) and CHEM 5047 (Medicinal Chemistry, 3cr), or committee-approved substitute 5000-level chemistry course(s).
- Completion of one credit hour of BIOL 5001 (Graduate Seminar) *and* two credit hours of CHEM 5029 (Chemistry Graduate Seminar).

Thesis overlaps the fields of Biology and Chemistry and is supervised by faculty from both Biology and Chemistry Departments.

[Learning Outcomes]

Outcome
1. Use basic principles and advanced knowledge of science to analyze, explain, and apply biological information and concepts.

Outcome
2. Design and implement a biological research project

Outcome
3. Effectively communicate scientific findings orally and in writing

Courses

BIOL1131 - Intro to Biology & BMS

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail

Course Description
A discussion-focused course exploring current topics in biomedical research and innovation. The course promotes a broad view of the biomedical sciences and related challenges, with class discussions stimulated largely by TED talks and other internet videos

Equivalent Courses: Previous & Current Courses
BIOL101, BMS101

No Requirements

BIOL1141 - A Survey of Anatomy & Physiology for Allied Health

General

Credit Hrs
Credit Hrs:
2

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Anatomy and Physiology for Allied Health integrates diseases and disorders within each body system to maximize learning. Easy-to-understand language and numerous illustrations make the course ideal for learners in an introductory anatomy and physiology course with little or no science background or learners continuing their education in Allied Health. This course will also assist the student in developing a better understanding and interest in the medical field.

Equivalent Courses: Previous & Current Courses
BIOL102

No Requirements

BIOL2110 - Pinciples of Biology: Cellular & Molecular

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Corequisite: CHEM 1120 or CHEM 1215. This course introduces students to major topics in general biology. This courses focuses on the principles of structure and function of living things at the molecular, cellular and organismic levels of organization. Major topics included are introduction to the scientific process, chemistry of cells, organization of cells, cellular respiration, photosynthesis, cell division, DNA replication, transcription, and translation. [NMCCNS BIOL 1214: General Education Area III]

Equivalent Courses: Previous & Current Courses
BIOL111

Simple Requisites

Course Requisite Requirements

Corequisite Requirements
Type
Corequisite

Corequisites

Enroll in the following Courses:

- CHEM1120 - Introduction to Chemistry
  OR CHEM1215 - g3:General Chemistry I

Additional Comments:

No Requirement Level

BIOL2110L - Pinciples of Biology: Cellular & Molecular Lab

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Corequisite: BIOL 2110. This course introduces students to major topics in general biology. This course focuses on the principles of structure and function of living things at the molecular, cellular and organismic levels of organization. Major topics included are introduction to the scientific process, chemistry of cells, organization of cells, cellular respiration, photosynthesis, cell division, genetics, DNA replication, transcription, and translation.

Equivalent Courses: Previous & Current Courses
BIOL111L

Simple Requisites

Course Requisite Requirements

Corequisite
Type
Corequisite

Corequisites

Enroll in the following Courses:

- BIOL2110 - Pinciples of Biology: Cellular & Molecular

Additional Comments:

No Requirement Level

BIOL2141 - Seaphage: Phage Discovery

General

Credit Hrs
Credit Hrs:
2

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: Permission of Instructor. Course-based research lab for entry level students focuses on isolation and characterization of novel bacteriophages from the environment.

Equivalent Courses: Previous & Current Courses
BIOL0289, BIOL2140, BIOL289

Simple Requisites

Course Requisite Requirements

Prerequisite: Permission of instructor

No Requirement Level

BIOL2142 - SEAPHAGE: Phage Genome Annotation

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: BIOL 2141 or Permission of Instructor. Course-based computer research for entry level students focuses on assignment of gene function of a bacteriophage genome sequence.

Equivalent Courses: Previous & Current Courses
BIOL0289

Simple Requisites

Course Requisite Requirements

Prerequisite Requirements
Type
Prerequisite

Prerequisites

Complete ALL of the following Courses:

- BIOL2141 - Seaphage: Phage Discovery

or Permission of instructor

Additional Comments:

No Requirement Level

BIOL2331 - Psychobiology of Sex

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: PSYC 1110 or consent of Instructor and Advisor. Sexual reproduction in a broad evolutionary context. Topics include sexual and asexual reproduction, sexual selection, the endocrinology of mammalian reproduction, development of the reproductive system and sexually differentiated behaviors, sex differences in the brain, human behavioral sex differences, and the interaction of culture and sexual behavior. Sexual reproduction in a broad evolutionary context. Topics include sexual and asexual reproduction, sexual selection, the endocrinology of mammalian reproduction, development of the reproductive system and sexually differentiated behaviors, sex differences in the brain, and human behavioral sex differences.(Same as PSYC 2331

Equivalent Courses: Previous & Current Courses
BIOL350, PSY350, PSYC2331

No Requirements

BIOL2610 - Principles of Biology: Biodiversity, Ecology, and Evolution

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Pre or co-requisite: BIOL 2110. This course is an introduction to the dynamic processes of living things. Major topics include the mechanisms of evolution, biological diversity, population genetics, and ecology. The laboratory course is an introduction to the dynamic processes of living things. [NMCCNS BIOL 1224: General Education Area III]

Equivalent Courses: Previous & Current Courses
BIOL112

Simple Requisites

Course Requisite Requirements

Pre/Corequisite Requirements
Type
Completion Requirement

Pre/Corequisite

Pre or Corequisite

Complete ALL of the following Courses:
- BIOL2110 - Pinciples of Biology: Cellular & Molecular

Additional Comments:

No Requirement Level

BIOL2610L - Principles of Biology: Biodiversity, Ecology, and Evolution Lab

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Pre or co-requisite: BIOL 2110L. Co-requisite: BIOL 2610. This laboratory course is an introduction to the dynamic processes of living things. This course introduces students to the methods used in the study of evolution, ecology, and biological diversity. Designed for students continuing in life sciences.

Equivalent Courses: Previous & Current Courses
BIOL112L

Simple Requisites

Course Requisite Requirements

Pre or Corequisite Requirements
Type
Completion Requirement

Pre or Corequisites

Complete ALL of the following Courses:
- BIOL2110L - Pinciples of Biology: Cellular & Molecular Lab

Additional Comments:

Corequisite Requirements
Type
Completion Requirement

Corequisites

Complete ALL of the following Courses:
- BIOL2610 - Principles of Biology: Biodiversity, Ecology, and Evolution

Additional Comments:

No Requirement Level

BIOL3011 - Genetics

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
An overview of the storage, transmission, and expression of biological information.

Equivalent Courses: Previous & Current Courses
BIOL311

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Completion Requirement

Prerequisite

Complete ALL of the following Courses:

- BIOL2610 - Principles of Biology: Biodiversity, Ecology, and Evolution
  AND CHEM1215 - g3:General Chemistry I

Additional Comments:

No Requirement Level

BIOL3011L - Genetics Lab

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: BIOL 2610L or BIOL 2142. Co-requisites: BIOL 3011. This course is designed to help students develop basic genetics tools and techniques while simultaneously reinforcing concepts from the associated lecture. Students will learn to distinguish various patterns of inheritance, extract and analyze DNA, and evaluate genotype-phenotype connections. Students will also learn basic skills in data analysis, data presentation, and scientific writing

Equivalent Courses: Previous & Current Courses
BIOL311L

Simple Requisites

Course Requisite Requirements

Corequisite
Type
Completion Requirement

Corequisite

Complete ALL of the following Courses:

- BIOL3011 - Genetics

Additional Comments:

No Requirement Level

BIOL3031 - Cell Biology

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisites: BIOL 2110; CHEM 1215. Studies of life at the cellular level. The structure and functions of eukaryotic cells and their organelles. The molecular basis for energy transfers, growth and development, and their regulation.

Equivalent Courses: Previous & Current Courses
BIOL331

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Completion Requirement

Prerequisites

Complete ALL of the following Courses:

- BIOL2610 - Principles of Biology: Biodiversity, Ecology, and Evolution
  AND CHEM1215 - g3:General Chemistry I

Additional Comments:

No Requirement Level

BIOL3041 - Microbiology

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Structure, function, reproduction, growth, metabolism, and genetics of bacteria, archaea, and micro-eukarya, with emphasis on bacteria and viruses and their relation to health and disease.

Equivalent Courses: Previous & Current Courses
BIOL341

No Requirements

BIOL3041L - Microbiology Lab

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Corequisite: BIOL 3041. Laboratory exercises for observing microorganisms, quantifying microbial activities, and identifying medically important microbes.

Equivalent Courses: Previous & Current Courses
BIOL341L

No Requirements

BIOL3043 - Environmental Microbiology

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: BIOL 2110. Prerequisite or Corequisite for Biology majors: BIOL 3031; BIOL 3031 recommended for other majors. A study of the relationship between microorganisms and water and soil environments with emphasis on biogeochemical cycles.

Equivalent Courses: Previous & Current Courses
BIOL343

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Completion Requirement

Prerequisite

Complete ALL of the following Courses:
- BIOL2110 - Pinciples of Biology: Cellular & Molecular
  AND GEOL206 - Earth History

Additional Comments:

No Requirement Level

BIOL3043L - Environmental Microbiology Lab

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Laboratory procedures for quantifying microorganisms and their metabolic activities and for characterizing microbial communities in natural environments, e.g. water and soil.

Equivalent Courses: Previous & Current Courses
BIOL343L

Simple Requisites

Course Requisite Requirements

Corequisite
Type
Completion Requirement

BIOL 3043 corequisite

Complete ALL of the following Courses:
- BIOL3043 - Environmental Microbiology

Additional Comments:

No Requirement Level

BIOL3044 - Ecology

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisites: BIOL 2610 or ERTH 206. A study of the principles governing interactions between organisms and the environment, and biological organization at the population, community and ecosystem level.

Equivalent Courses: Previous & Current Courses
BIOL344

No Requirements

BIOL3044L - Ecology Lab

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Co-requisite: BIOL 3044This lab course is complementary to Ecology (BIOL 3044) and is aimed at Biology majors and non-majors wishing to expand their quantitative understanding of the natural world. We aim to provide students with hands-on field and laboratory experience exploring aspects of plant and soil ecology and data collection, as well as develop skills in data presentation both orally and in written form.

Equivalent Courses: Previous & Current Courses
BIOL344L

Simple Requisites

Course Requisite Requirements

Corerequisite

Type
Completion Requirement

Corequisite

Complete ALL of the following Courses:

- BIOL3044 - Ecology

Additional Comments:

No Requirement Level

BIOL3045 - Evolutionary Biology

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisites: BIOL 2610 or ERTH 206. The mechanisms and implications of biological evolution. Topics include early Earth evolution, population genetics, adaptation and natural selection, geologic evidence, molecular evidence and human evolutionary origins.

Equivalent Courses: Previous & Current Courses
BIOL345

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ANY of the following Courses:

- BIOL2610 - Principles of Biology: Biodiversity, Ecology, and Evolution
  OR GEOL206 - Earth History

Additional Comments:

No Requirement Level

BIOL3050 - Psychobiology of Sex

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Sexual reproduction in a broad evolutionary context. Topics include sexual and asexual reproduction, sexual selection, the endocrinology of mammalian reproduction, development of the reproductive system and sexually differentiated behaviors, sex differences in the brain, and human behavioral sex differences. (Same as PSY 350)

Equivalent Courses: Previous & Current Courses
BIOL350, PSYC350

Simple Requisites

Course Requisite Requirements

Prerequisite Requirement
Type
Prerequisite

Prerequisite

Prerequisite: PSYC 1110 or consent of instructor and advisor

Complete ANY of the following Courses:

- PSYC1110 - g4:Introduction to Psychology

OR Consent of Instructor and Advisor

- Complete PSYC 1110 prior to enrolling in BIOL3050 or receive "Consent of Instructor and Advisor".

See the Office of the Registrar for any questions to this rule

Additional Comments:

No Requirement Level

BIOL3051 - Anatomy & Physiology

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: BIOL 2610, BIOL 3031. An in-depth study of the form, function, and evolution of the following human systems: skeletal, muscular, nervous, cardiovascular, and respiratory. Gross and microanatomy and detailed physiological concepts covered. This is the first course in a two-semester sequence

Equivalent Courses: Previous & Current Courses
BIOL351

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- BIOL2610 - Principles of Biology: Biodiversity, Ecology, and

Evolution
- BIOL3031 - Cell Biology

Additional Comments:

No Requirement Level

BIOL3051L - Anatomy and Physiology Lab I

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Corequisite: BIOL 3051. Laboratory to accompany BIOL 3051. Focus on gross and microanatomy through dissection and physiology through inquiry-driven exercises.

Equivalent Courses: Previous & Current Courses
BIOL351L

No Requirements

BIOL3052 - Anatomy and Physiology II

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: BIOL 3051. A continuation of the in-depth study of the form, function, and evolution of the following human systems: endocrine, digestive, immune, lymphatic, integumentary, urinary, and reproductive. Gross and microanatomy and detailed physiological concepts covered. Focus on modern research in physiology. This is the second course in a two-semester sequence

Equivalent Courses: Previous & Current Courses
BIOL352

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:
- BIOL3051 - Anatomy & Physiology

Additional Comments:

No Requirement Level

BIOL3052L - Anatomy & Physiology II Lab

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: BIOL 3051, BIOL 3051L. Corequisite: BIOL 3052. Laboratory to accompany BIOL 3051. Focus on gross and microanatomy through dissection and physiology through inquiry-driven exercises.

Equivalent Courses: Previous & Current Courses
BIOL362

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

BIOL 3051 & 3051L Prerequisite Requirement

Complete ALL of the following Courses:
- BIOL3051 - Anatomy & Physiology
- BIOL3051L - Anatomy and Physiology Lab I

Additional Comments:

No Requirement Level

BIOL3062 - Animal Behavior

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisites: PSYC 1110; BIOL 2610; or Consent of Instructor and Advisor. An overview of the study of animal behavior, focusing on presentation, adaptive advantage and mechanisms of specific behaviors. (Same as PSY 362)

Equivalent Courses: Previous & Current Courses
BIOL362

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Completion Requirement

Prerequisites

Fulfill ANY of the following requirements:

Prerequsite

Prerequisites: PSYC 1110; BIOL 2610; or consent of instructor and advisor

Complete ALL of the following Courses:

- BIOL2610 - Principles of Biology: Biodiversity, Ecology, and Evolution
- PSYC1110 - g4:Introduction to Psychology

OR

OR Receive Special Permission

Consent of Instructor and Advisor

Additional Comments:

No Requirement Level

BIOL4002 - Ecosystem Biology

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: BIOL 3044. An approach to ecology that treats organisms and the physical environment as an integrated system. Focus on abiotic feedbacks between plant and microbial function including decomposition, greenhouse gas flux, and major biogeochemical cycles. Potentially strenuous field work is a component of the course. Laboratory analysis of field samples are part of projects that develop quantitative skills using student- collected data. Shares lecture with BIOL 5002 with additional expectations for graduate credit

Equivalent Courses: Previous & Current Courses
BIOL402

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- BIOL3044 - Ecology

Additional Comments:

No Requirement Level

BIOL4009 - Cell and Molecular Neuroscience

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
A study of neurological systems from neurons and glia to differentiation and development, neural circuits, and how neural systems preform selected tasks: sensing environment, controlling, physiology, directing movement. Same as PSYC 4009. Shares lectures with PSYC 5009 which has additional expectations for graduate credit. Pre-Reqs: BIOL 2110

Equivalent Courses: Previous & Current Courses
BIOL409, BIOL5009, BIOL509, BIOT5009, BIOT509, PSY409, PSY509, PSYC4009

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Completion Requirement

Prerequisite

Complete ALL of the following Courses:

- PSYC1110 - g4:Introduction to Psychology
  OR BIOL2110 - Pinciples of Biology: Cellular & Molecular

Additional Comments:

No Requirement Level

BIOL4010 - Neurology

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: BIOL 2110. An examination of the mechanisms and effects of neuropathology and the different approaches to diagnosis and treatment of neurological diseases and disorders such as pain, epilepsy, and Alzheimer's disease. Same as PSYC 4010. Shares lectures with PSYC 5010, which has additional expectations for graduate credit.

Equivalent Courses: Previous & Current Courses
BIOL410, BIOL510, BIOL589, PSY410, PSYC5010

No Requirements

BIOL4011 - Advanced Genetics

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisites: BIOL 3011 and either BIOL 4043 or BIOL 3041, or Consent of Instructor and Advisor. A study of current topics in genetics, including the molecular basis of gene structure and action in eukaryotes and/or prokaryotes.

Equivalent Courses: Previous & Current Courses
BIOL411, BIOL511

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Biology Prerequisites

Complete ALL of the following Courses:

- BIOL3011 - Genetics
- BIOL4043 - Molecular Biology
  OR BIOL3041 - Microbiology

OR

Receive Consent of Instructor and Advisor

Additional Comments:

No Requirement Level

BIOL4019 - Ecotoxicology

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisites: BIOL 3041 or BIOL 3043; BIOL 3044, CHEM 3033; or Consent of the Instructor. Normally offered: Even Spring. A survey of the effects of naturally occurring and anthropogenic contaminants and toxic compounds on a range of organismal and ecosystem functions. Historical examples and modern case studies across the breadth of biological diversity (microbes to mammals) are used to better understand human influence on the “chemosphere” and how organisms are challenged by, and have adapted to, changing chemical environments. The history of environmental pollution and modern statistical techniques to evaluate environmental chemical data will also be covered.

Equivalent Courses: Previous & Current Courses
BIOL5019

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Biology 4019 Prerequisite Requirements

Complete ALL of the following Courses:

- BIOL3041 - Microbiology
  OR BIOL3043 - Environmental Microbiology
- BIOL3044 - Ecology
- CHEM3033 - Organic Chemistry I

OR

Receive Consent of Instructor and Advisor

Additional Comments:

No Requirement Level

BIOL4031 - Virology

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: BIOL 3011, BIOL 3031. An intensive course focusing on mammalian, plant and bacterial viruses as obligate cellular parasites. This program will examine strategies for sustaining an efficient infectious cycle through discussions around current research, including social implications of study in the field. Shares lecture with BIOL 5031 with additional expectations for graduate credit.

Equivalent Courses: Previous & Current Courses
BIOL431

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- BIOL3011 - Genetics
- BIOL3031 - Cell Biology

Additional Comments:

No Requirement Level

BIOL4035 - Bioinformatics

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: BIOL 3011 or Consent of Instructor and Advisor. Computer analysis of biological sequence data used to perform in silico experiments. Students will design and perform experiments using public domain software and databases. Shares lecture with BIOL 5035 and BIOT 535 with additional expectations for graduate credit.

Equivalent Courses: Previous & Current Courses
BIOL435

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Completion Requirement

Prerequisite

Complete ALL of the following Courses:

- BIOL3011 - Genetics

OR

Receive Consent of Instructor and Advisor

Additional Comments:

No Requirement Level

BIOL4037 - Infection and Immunity

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: BIOL 3041. Study of human infectious disease and the immune system. Pathogenic microorganisms and mechanisms of pathogenicity. Innate and acquired immune responses. Disease ecology and evolution in infectious disease systems.

Equivalent Courses: Previous & Current Courses
BIOL437, BIOL537

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- BIOL3041 - Microbiology

Additional Comments:

No Requirement Level

BIOL4043 - Molecular Biology

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Standard Letter

Course Description
Prerequisites: BIOL 3031 and BIOL 3011 & BIOL 3011L; CHEM 1225. Principles of modern molecular biology

Equivalent Courses: Previous & Current Courses
BIOL3033, BIOL333, BIOL443, BIOL5043, BIOL543, BIOT5002, BIOT502

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- BIOL3031 - Cell Biology
  AND BIOL3011 - Genetics
  AND BIOL3011L - Genetics Lab
- CHEM1225 - g3:General Chemistry II

Additional Comments:

No Requirement Level

BIOL4043L - Molecular Biology Lab

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Standard Letter

Course Description
Co-requisite: BIOL 4043. This course covers current techniques in molecular biology, organized as a semester-long project.

Equivalent Courses: Previous & Current Courses
BIOL443L, BIOL5043L, BIOL543L

Simple Requisites

Course Requisite Requirements

Corequisite
Type
Corequisite

Corequisite

Complete ALL of the following Courses:

- BIOL4043 - Molecular Biology

Additional Comments:

No Requirement Level

BIOL4049 - Astrobiology

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisites: CHEM 1215, CHEM 1225, PHYSICS 1310, PHYS 1320 plus one other science course and Consent of Instructor. Offered on demand.An in–depth and interdisciplinary study of astrobiology, including interactions between living and non-living systems at multiple scales: stellar, planetary, meso, and microscopic. Addresses fundamental questions regarding the origin of life, and the possible extent and distribution of life in the universe. Combines principles of astrophysics, geosciences, planetary science, chemistry, and biology. Innovative interactive exercises and projects working in interdisciplinary groups and individually. Shares lecture with BIOL 5049, with additional expectations for graduate credit. (Same as GEOL 4049.)

Equivalent Courses: Previous & Current Courses
BIOL449, GEOL4049, GEOL449

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

BIOL 4049 Prerequisite Requirements

Complete ALL of the following Courses:

- CHEM1215 - g3:General Chemistry I
- CHEM1225 - g3:General Chemistry II
- PHYS1310 - g3:Calculus-based Physics I
- PHYS1320 - g3:Calculus-based Physics II

Plus one other science course and Consent of Instructor.

Additional Comments:
Course offered on demand.

No Requirement Level

BIOL4055 - Molecular Ecology

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Equivalent Courses: Previous & Current Courses
BIOL455

Simple Requisites

Course Requisite Requirements

Prerequisite Requirement
Type
Prerequisite

BIOL 4055 Prerequisite Requirements

Complete ALL of the following Courses:

- BIOL3011 - Genetics
- BIOL3044 - Ecology

OR

Receive Consent of Instructor and Advisor

Additional Comments:

No Requirement Level

BIOL4070 - Biology CURE

General

Credit Hrs
Credit Hrs:
2

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisites: BIOL 3031 and one of the following: BIOL 3011L, BIOL 3031L, BIOL 3041L, BIOL 3043L or BIOL 3001. In this Course-based Undergraduate Research Experience (CURE) students will plan and conduct independent research projects under the supervision of the Instructor. The topic of research will change each year, and be related to the faculty member's research interests. Students will learn the background of the project, design and perform experiments, read literature, and present their results, all with minimal oversight. Distribution of time between lecture and lab each week may vary considerably during semester.

Equivalent Courses: Previous & Current Courses
BIOL470

No Requirements

BIOL4071 - Life Sciences Seminar

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail

Course Description
Prerequisite: Senior standing in biology or Consent of Instructor and Advisor. Review, discussion, and student presentations of the current literature on a single topic in biology. Topics are chosen with the aim of integrating multiple levels of biological organization and research approaches.

Equivalent Courses: Previous & Current Courses
BIOL471

Simple Requisites

Course Requisite Requirements

Prerequisite: Senior standing in biology or consent of instructor and advisor

No Requirement Level

BIOL4081 - Advanced Topics in Biology

General

Credit Hrs

Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: Senior or Graduate Standing. Exploratory, interdisciplinary seminar-style class utilizing web resources focused on recent developments in Biology and Biology-related areas.

Equivalent Courses: Previous & Current Courses
BIOL481

Simple Requisites

Course Requisite Requirements

Prerequisite: Senior or Graduate Standing

No Requirement Level

BIOL4091 - Special Problems

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
6

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisites: Two semesters of advanced courses and Consent of Instructor. An introduction to methods of research. Problems are chosen from the fields of biology and may be small independent investigations or part of a research program being directed by the Advisor.

Equivalent Courses: Previous & Current Courses
BIOL491

Simple Requisites

Course Requisite Requirements

Prerequisites: Two semesters of advanced courses and consent of instructor

No Requirement Level

BIOL5000 - Directed Research

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
12

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course may not be used to fulfill graduate degree requirements. This course is mainly for PhD students who have not passed their candidacy exam yet. Research under the guidance of a faculty member. May Be Repeated.

Equivalent Courses: Previous & Current Courses
BIOL500

No Requirements

BIOL5001 - Graduate Seminar

General

Credit Hrs

Credit Hrs:
1

Grade Modes
Audit, Pass/Fail

Course Description
Prerequisite: Graduate–level standing in Biology or Biotechnology, or Consent of Instructor and Advisor. Readings, interaction with outside seminar speakers, discussions, student thesis/dissertation update talks.

Equivalent Courses: Previous & Current Courses
BIOL501

No Requirements

BIOL5002 - Ecosystem Biology

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: Graduate–level standing in Biology or Biotechnology, or Consent of Instructor and Advisor. An approach to ecology that treats organisms and the physical environment as an integrated system. Focus on abiotic feedbacks between plant and microbial function including decomposition, greenhouse gas flux, and major biogeochemical cycles. Potentially strenuous field work is a component of the course. Laboratory analysis of field samples are part of projects that develop quantitative skills using student-collected data. Shares lecture with Ecosystem Biology BIOL 4002 with additional expectations for

Equivalent Courses: Previous & Current Courses
BIOL338, BIOL448, BIOL512, BIOL548

Course Description: Prerequisites: Graduate standing or Consent of Instructor. Provides training in data collection and group work sessions (including field and laboratory components) and leading manuscript preparation for final group assignments.

Simple Requisites

Course Requisite Requirements

Prerequisite: Graduate–level standing in Biology or Biotechnology, or consent of instructor and advisor

No Requirement Level

BIOL5011 - Advanced Genetics

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisites: Graduate–level standing in Biology or Biotechnology, or Consent of Instructor and Advisor. A study of current topics in genetics, including the molecular basis of gene structure and action in eukaryotes and prokaryotes. Shares lecture with BIOL 4011, with additional expectations for graduate credit.

Equivalent Courses: Previous & Current Courses
BIOL411, BIOL511

Simple Requisites

Course Requisite Requirements

Prerequisites: Graduate–level standing in Biology or Biotechnology, or consent of instructor and advisor

No Requirement Level

BIOL5019 - Ecotoxicology

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisites: Graduate standing or Consent of Instructor. A survey of the effects of naturally occurring and anthropogenic contaminants and toxic compounds on a range of organismal and ecosystem functions. Historical examples and modern case studies across the breadth of biological diversity (microbes to mammals) are used to better understand human influence on the “chemosphere” and how organisms are challenged by, and have adapted to, changing chemical environments. The history of environmental pollution and modern statistical techniques to evaluate environmental chemical data will also be covered. Shares lectures with BIOL 4019, with additional expectations for graduate credit.

Simple Requisites

Course Requisite Requirements

Prerequisites: Graduate standing or consent of instructor

No Requirement Level

BIOL5031 - Virology

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: Graduate–level standing in Biology or Biotechnology, or Consent of Instructor and Advisor. An intensive course focusing on mammalian, plant and bacterial viruses as obligate cellular parasites. This program will examine strategies for sustaining an efficient infectious cycle through discussions around current research, including social implications of study in the field. Shares lecture with Virology BIOL 4031, with additional expectations for graduate credit.

Equivalent Courses: Previous & Current Courses
BIOL531

Simple Requisites

Course Requisite Requirements

Prerequisite: Graduate–level standing in Biology or Biotechnology, or consent of instructor and advisor

No Requirement Level

BIOL5035 - Bioinformatics

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: Graduate–level standing in Biology or Biotechnology, or Consent of Instructor and Advisor. Computer analysis of biological sequence data used to perform in silico experiments. Students will design and perform experiments using public domain software and databases. Shares lecture with BIOL 4035 with additional expectations for graduate credit. (Same as BIOT 535.)

Equivalent Courses: Previous & Current Courses
BIOL535

Simple Requisites

Course Requisite Requirements

Prerequisite: Graduate–level standing in Biology or Biotechnology, or consent of instructor and advisor

No Requirement Level

BIOL5037 - Infection and Immunity

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: Graduate–level standing in Biology or Biotechnology, or Consent of Instructor and Advisor. Study of human infectious disease and the immune system. Pathogenic microorganisms and mechanisms of pathogenicity. Innate and acquired immune responses. Immunochemistry, cellular immunity, and immunopathology lecture with BIOL 4037, with additional expectations for graduate credit.

Equivalent Courses: Previous & Current Courses
BIOL437, BIOL537

Simple Requisites

Course Requisite Requirements

Prerequisite: Graduate–level standing in Biology or Biotechnology, or consent of instructor and advisor

No Requirement Level

BIOL5042 - Advanced Microbiology

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: Graduate–level standing in Biology or Biotechnology, or Consent of Instructor and Advisor. A study of the current topics in structure, function, genetics, and biochemistry of microorganisms, with emphasis on recent scientific literature. Medical and environmental topics will be covered.

Equivalent Courses: Previous & Current Courses
BIOL542

Simple Requisites

Course Requisite Requirements

Prerequisite: Graduate–level standing in Biology or Biotechnology, or consent of instructor and advisor

No Requirement Level

BIOL5043 - Molecular Biology

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Standard Letter

Course Description
Prerequisites: Graduate–level standing in Biology or Biotechnology, or Consent of Instructor and Advisor. Principles of modern molecular biology. Shares lecture with BIOL 4043 with additional expectations for graduate credit.

Equivalent Courses: Previous & Current Courses
BIOL333, BIOL4043, BIOL443, BIOL543, BIOT502

Simple Requisites

Course Requisite Requirements

Prerequisites: Graduate–level standing in Biology or Biotechnology, or consent of instructor and advisor

No Requirement Level

BIOL5043L - Molecular Biology Lab

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Standard Letter

Course Description
Co-requisite: BIOL 5043 or equivalent. Prerequisites: Graduate–level standing in Biology or Biotechnology, or Consent of Instructor and Advisor.Covers current techniques in molecular biology, organized as a semester-long project.

Equivalent Courses: Previous & Current Courses
BIOL333L, BIOL443L, BIOL543L

Simple Requisites

Course Requisite Requirements

Corequisite
Type
Corequisite

Corequisite: BIOL 5043 or equivalent

Complete ALL of the following Courses:
- BIOL5043 - Molecular Biology

Additional Comments:

Prerequisites: Graduate–level standing in Biology or Biotechnology, or consent of instructor and advisor

No Requirement Level

BIOL5049 - Astrobiology

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisites: Graduate status or Consent of Instructor and Advisor. Offered on demand. An in–depth and interdisciplinary study of astrobiology, including interactions between living and non-living systems at multiple scales: stellar, planetary, meso, and microscopic. Addresses fundamental questions regarding the origin of life, and the possible extent and distribution of life in the universe. Combines principles of astrophysics, geosciences, planetary science, chemistry, and biology. Innovative interactive exercises and projects working in interdisciplinary groups and individually. Shares lecture with BIOL 4049, with additional expectations for graduate credit. (Same as GEOL 549.)

Equivalent Courses: Previous & Current Courses
BIOL549

Simple Requisites

Course Requisite Requirements

Prerequisites: Graduate status or consent of instructor and advisor. Offered on demand.

No Requirement Level

BIOL5064 - Molecular Ecology

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: Graduate–level standing in Biology or Biotechnology, or Consent of Instructor and Advisor. Molecular ecology is the application of molecular genetics to ecological and environmental issues. The current literature in the field is reviewed. Participants choose a topic to research and develop a research proposal as the final project. Graduate students present a public seminar.

Equivalent Courses: Previous & Current Courses
BIOL564

Simple Requisites

Course Requisite Requirements

Prerequisite: Graduate–level standing in Biology or Biotechnology, or consent of instructor and advisor

No Requirement Level

BIOL5079 - BioGradverse

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

No Requirements

BIOL5081 - Directed Study

General

Credit Hrs

Credit Hrs:
0

Credit Hours Max:
12

Credit Hours Operator:
TO

Grade Modes
Pass/Fail, Standard Letter

Course Description
Study under the guidance of a member of the biology staff. In general, subject matter will supplement that available in other graduate offerings in biology.

Equivalent Courses: Previous & Current Courses
BIOL581

No Requirements

BIOL5082 - Advanced Topics in Biology

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: Graduate Standing in Biology. Exploratory, interdisciplinary seminar-style class focused on recent developments in Biology and Biology-related areas.

Equivalent Courses: Previous & Current Courses
BIOL582

No Requirements

BIOL5090 - Independent Study

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
12

Grade Modes
Pass/Fail, No Report

Credit Hours Operator:
TO

Course Description
Organized independent student research coordinated with a faculty member and documented in a final written report.

Equivalent Courses: Previous & Current Courses
BIOL590

No Requirements

BIOL5091 - Thesis

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
12

Credit Hours Operator:
TO

Grade Modes
Pass/Fail, No Report

Course Description
Thesis, cr. to be arranged

Equivalent Courses: Previous & Current Courses
BIOL591

No Requirements

BMST3001 - Genetic Engineering: At the Bench

General

Credit Hrs

Credit Hrs:
2

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course introduces basic biology lab techniques through experiments involving genetic engineering. Students will learn the fundamentals of genetic engineering through the direct manipulation of genetic sequences studied in easily grown model organisms, such as bacteria. Students are required to schedule their own lab time in addition to attending a scheduled class each week Cross-listed with BIOL 301.

Equivalent Courses: Previous & Current Courses
BMS301

No Requirements

BMST4095 - Biomolecular Research

General

Credit Hrs

Credit Hrs:
2

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Students participate in novel, topical research and design projects that are related to ongoing research interests of the faculty. Students will collaborate as a team to solve authentic problems that are inherently interdisciplinary with Biomedical Science implications. This is part of a 2 semester course. In this course, students participate in an original science investigation. Students will be mentored but are expected to manage the project, write papers, present and communicate their results to the professional community. Project topics will vary each semester depending on the Instructor. Shares lecture with BMS 593, with additional expectations for graduate credit.

Equivalent Courses: Previous & Current Courses
BMS495, BMS5093, BMS593

No Requirements

BMST4096 - Biomedical Research & Design

General

Credit Hrs

Credit Hrs:
2

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: Senior Standing in BMST or consent of the instructorReview, discussion, and student presentations of the current literature on a single topic in biotechnology. Topics are chosen with the aim of how modern technologies are applied in the fields of biology, chemistry, and neuroscience.

Equivalent Courses: Previous & Current Courses
BMS496

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Completion Requirement

Prerequisite

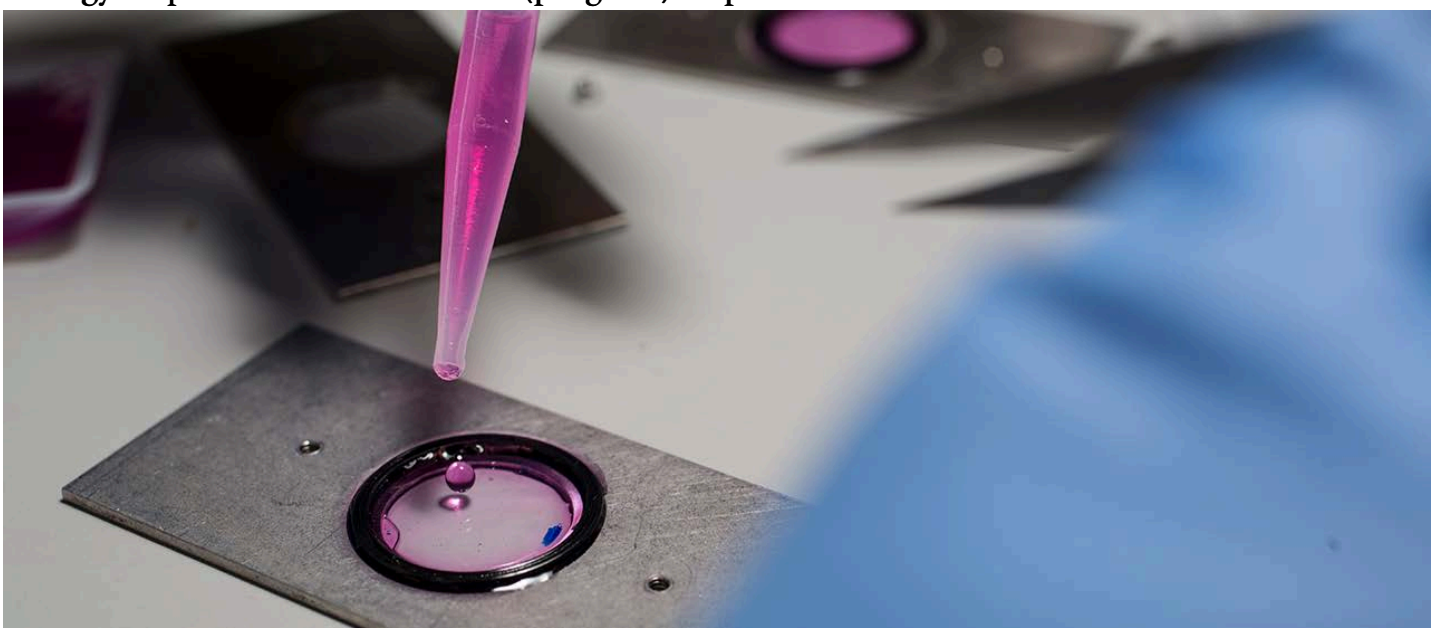
Senior Standing in BMST or consent of the instructor

Prerequisite

Additional Comments:

No Requirement Level

Biology Dept/ Biomedical Sciences (program) Department



Bachelor of Science in BMS (all options)

The Bachelor of Science in Biomedical Sciences is a broadly interdisciplinary degree, drawing on knowledge from both science and engineering. Students take a common set of core courses from several disciplines. For more in-depth study, they select an option in Biology, Chemistry, or Psychology & Neuroscience along with a concentration in one of four engineering fields: Biochemical Engineering, Bioinformatics, Biomaterials Engineering or Biomechanical Engineering.

Minimum credit hours required—120

Program Educational Objectives:

Our graduates will

- Acquire breadth of knowledge spanning biological sciences and engineering,
- Design and conduct scientific research, and conduct engineering design projects,
- Understand research and career opportunities in BMS.

Science Options:

- Biology Option
- Chemistry Options
- Psychology & Neuroscience Option

Engineering Concentrations:

- Biochemical Engineering
- Bioinformatics
- Biomaterials Engineering
- Biomechanical Engineering

Programs

BS-BMS - B.S. in Biomedical Sciences

[Program Overview]

Program Title
Bachelor of Science in BMST (all options)

Department(s)
Biology, Biology Dept/ Biomedical Sciences (program)

Degree & Program Code
BS-BMS

Required Specialization/Concentration(s)
Biology Option, Chemistry Option, Psychology & Neuroscience Option

Program Description
The Bachelor of Science in Biomedical Sciences is a broadly interdisciplinary degree, drawing on knowledge from both science and engineering. Students take a common set of core courses from several disciplines. For more in-depth study, [illegible] Biology, Chemistry, or Psychology & Neuroscience along with a [illegible] and [illegible] in one of four engineering fields: Biochemical Engineering, Bioinformatics, Biomaterials Engineering or Biomechanical Engineering.

Simple Requisites

Program Requirements
Minimum credit hours required—120

- One of the **Science Options** described and found in the *"Program Science Options"* tab AND
- One of the **Engineering Concentrations** described and found in the *"Concentration Requirements"* tab.

The **Science option** and **Engineering concentration** must be declared with the office of the Registrar.

In addition to the General Education and Institute Core Curriculum Requirements, the following core program is required of all BMS students. Note that courses marked with an asterisk (*) may also be used to satisfy General Education requirements:

Core Requirements for a Bachelor of Science in BMS (all options)
Type
Completion Requirement

Biology/BMS Core Courses

Complete ALL of the following Courses:

- BIOL1131 - Intro to Biology & BMS
- BMST3001 - Genetic Engineering: At the Bench
- BMST4095 - Biomolecular Research
- BMST4096 - Biomedical Research & Design

Biology Courses

Complete ALL of the following Courses:

- BIOL2110 - Pinciples of Biology: Cellular & Molecular
- BIOL2110L - Pinciples of Biology: Cellular & Molecular Lab
  OR BIOL2141 - Seaphage: Phage Discovery
- BIOL2610 - Principles of Biology: Biodiversity, Ecology, and Evolution
- BIOL2610L - Principles of Biology: Biodiversity, Ecology, and Evolution Lab
  OR BIOL2142 - SEAPHAGE: Phage Genome Annotation
- BIOL3031 - Cell Biology
- BIOL3041 - Microbiology
- BIOL3041L - Microbiology Lab

Chemistry Courses

Complete ALL of the following Courses:

- CHEM3033 - Organic Chemistry I
  AND CHEM3033L - Organic Chemistry I Lab
- CHEM3034 - Organic Chemistry II
  AND CHEM3034L - Organic Chemistry II Lab
- CHEM4041 - Biochemistry I
  AND CHEM4041L - Biochemistry I Lab

Programming Course

Fulfill ANY of the following requirements:

Python

Complete ALL of the following Courses:

- CSCI1220 - Programming Fund Python
  AND CSCI1220L - Programming Fund Python Lab

OR

or Intro to Programming

Complete ALL of the following Courses:

- CSCI1210 - Programming Fundamentals
  AND CSCI1210L - Programming Fundamentals

OR

or Engineer Programming

Complete ALL of the following Courses:

- ES111 - Computer Programming for Engineers
  AND ES111L - Computer Programming Lab

Mathematics

Complete ALL of the following Courses:

- MATH2532 - Calculus III
- MATH3035 - Ordinary Differential Equation
- MATH3083 - Introduction to Biostatistics

Philosophy

Complete ALL of the following Courses:

- PHIL3042 - g5:Philosophy of Bioethics

Psychology

Complete ALL of the following Courses:

- PSYC1110 - g4:Introduction to Psychology
- PSYC2285 - g4:Experimental Psychology
  AND PSYC2285L - g4:Experimental Psychology Lab

Additional Comments:

Institute General Requirements

Bachelor of Science General Education Requirements
Type
Completion Requirement

Area 1: English Requirements for Bachelor of Science

Complete ALL of the following Course Sets:

- Area 1: Communications (BS Degree) (9 credits)

Area 2: Math Requirements for Bachelor of Science

Complete ALL of the following Course Sets:

- Area 2: Mathematics (BS Degree) (8 credits)

Area 3: Science Requirements for a Bachelor of Science

Complete ALL of the following Course Sets:

- Area 3: Science (BS Degree) (18 credits)

Area 4: Social Science Requirements for a Bachelor of Science

Earn at least 6 credits from the following:

- Area 4: Social and Behavioral Science (BS or BGS Degree) (6 credits)

Area 5: Humanities Course Requirements for a Bachelor of Science

Earn at least 6 credits from the following:

- Area 5: Humanities (BS or BGS Degree) (6 credits)

Area 6: Fine & Creative Art Course Requirement for a Bachelor of Science

Earn at least 3 credits from the following:

- Area 6: Creative and Fine Arts (BS, BA, or BGS Degree) (3 credits)

Area 7: Additional Humanities/Social Science Requirement for a Bachelor of Science

Earn at least 3 credits from the following:

- Area 7: Additional Courses from Areas 4, 5, 6 (BS, BA, or BGS Degree) (3 credits)

Additional Comments:

No Requirement Level

[Science Options]

Program Science Option (must be declared with the Registrar Office)

Science Option 1: Title
Biology Option

Requirements
Fulfill ANY of the following Course Set requirements:

Anatomy & Physiology

Complete ALL of the following Courses:

- BIOL3051 - Anatomy & Physiology
  AND BIOL3051L - Anatomy and Physiology Lab I
- BIOL3052 - Anatomy and Physiology II
  AND BIOL3052L - Anatomy & Physiology II Lab

OR

Genetics & Molecular

Complete ALL of the following Courses:

- BIOL3011 - Genetics
  AND BIOL3011L - Genetics Lab
- BIOL4043 - Molecular Biology
  AND BIOL4043L - Molecular biology Lab

The Genetics & Molecular course set is Required for Bioinformatics Concentration

AND

- at least 1 additional 4000-level Biology course of 3 or more credits (Bioinformatics Concentration must take BIOL4035 Bioinformatics).

Program Science Option (must be declared with the Registrar Office)

Science Option 2: Title
Chemistry Option

Requirements
In addition to the General Education and Institute Core Curriculum Requirements, and the core BMS Requirements, the following courses are required:

Complete ALL of the following Course Sets:

- CHEM 3011 & CHEM 3011L: Quantitative Analysis & Lab
- CHEM 3031 & CHEM 3031 Lab: Physical Chemistry I & Physical Chemistry I Lab
- CHEM 4042 & CHEM 4042 L: Biochemistry II & Biochemistry II Lab

Program Science Option (must be declared with the Registrar Office)

Science Option 3: Title
Psychology & Neuroscience Option

Requirements
In addition to the General Education and Institute Core Curriculum Requirements), and the core Biomedical Sciences Requirement, the following courses are required: (may be used to satisfy General Education requirements):

Fulfill ALL of the following requirements:

- At least one 2000-level Psychology course of 3 or more credits.
- AND at least one 3000-level Psychology course with laboratory of 4 credits.
- AND at least two additional 3000- or 4000-level Psychology courses of 3 or more credits each.

[Engineering Concentrations]

Concentration Option (must be declared with the Registrar Office)

Concentration Option 1: Title
Biochemical Engineering Concentration

Requirements
The following courses are required:

- CH E3026 Principles of Chemical Engr I (3)
- AND two of: CH E3027 (3), CH E4068 Surfaces,Interfaces, &Colloids (3), CH E4076 Drug Delivery Techniques (3), CH E4077 Bioprocess Engineering (3), and CH E4049 Nanostructures & Nanotech (3)

Concentration Option (must be declared with the Registrar Office)

Concentration Option 2: Title
Bioinformatics Engineering Concentration

Requirements
With this Concentration choice, Students must take the Biology Science Option (BIOL 3011 & BIOL 3011L AND BIOL 4043 & BIOL 4043L, & BIOL 4035 as the additional 4000 level), and CSCI1220 & CSCI1220L.

The following courses are also required:

- CSCI2222 Data Structures in Python (3)
- AND CSCI2310 Discrete Mathematics for CS (3)
- AND CSE3073 Intro to Database Systems (3)

Concentration Option (must be declared with the Registrar Office)

Concentration Option 3: Title
Biomaterials Engineering Concentration

Requirements
The following courses are required (7 credit hours):

- MTLS202 Materials Engineering I & MTLS202L Materials Engineering I Lab *(4),*
- *PLUS* MTLS235 Materials Engineering II
- *AND* MTLS3010 Proc.& Microstruct. Meth.& Ana *(3) OR* MTLS4020 Biomedical Materials *(3)*

Concentration Option (must be declared with the Registrar Office)

Concentration Option 4: Title
Biomechanical Engineering Concentration

Requirements
The following courses are required:

- MENG110 Intro. to Mechanical Eng. (3)
- AND ES201 Statics (3)
- AND a 4000-level MENG course of at least 3 credits.

[Learning Outcomes]

Outcome
1. Acquire a breadth of knowledge spanning biological and related sciences,

Outcome
2. Design and conduct scientific research,

Outcome
3. Explain and communicate the role of technology in biology and related fields.

[Sample 4-Year Curriculum Plan(s)]

Degree Map Name
Sample Curriculum for the Bachelor of Science in Biomedical Sciences: Biology option with Bioinformatics Concentration
Total Degree Map Credits
125
Degree Map Effective Catalog Year
2026 -
Degree Map Description
Given that there are 3 science Concentrations, and 4 Engineering Options for this degree, there are 12 possible pathways that a student can take for this degree. The sample curriculum is for the Biology Science option with a Bioinformatics concentration. Students should consult with their advisor to design programs that fit their needs.

Year	Semester	Actual Credits
Year 1	Fall	16

Course
- BIOL1131 - Intro to Biology & BMS

Actual Credits 1

Course
- BIOL2110 & BIOL2110L: Principles of Biology I and Lab

Actual Credits 4

Course
- CHEM1215 & CHEM1215L: g:General Chemistry I and Lab

Actual Credits 4

Course
- ENGL1110 - g1:Composition I

Actual Credits 3

Course
- MATH1510 & MATH1510L: g:Calculus I & Lab

Actual Credits 4

Year	Semester	Actual Credits
Year 1	Spring	15

Course
- BIOL2610 & BIOL2610L: Principles of Biology II and Lab

Actual Credits 4

Course
- CHEM1225 & CHEM1225L: g: General Chemistry II and Lab

Actual Credits 4

Course
- ENGL1120 - g1:Composition II

Actual Credits 3

Course
- MATH1520 - g2:Calculus II

Actual Credits 4

Year	Semester	Actual Credits
Year 2	Fall	16

Course
- BIOL3031 - Cell Biology

Actual Credits 3

Course
- BMST3001 - Genetic Engineering: At the Bench

Actual Credits 2

Course
- PHYS1310 & PHYS1310L: g:Calculus-Physics I and Lab

Actual Credits 5

Course
- PSYC1110 - g4:Introduction to Psychology

Actual Credits 3

Course
- Area 5: Humanities (BS or BGS Degree) (6 credits)

Actual Credits 3

Year	Semester	Actual Credits
Year 2	Spring	15

Course
- CSCI1220 - Programming Fund Python
- **AND** CSCI1220L - Programming Fund Python Lab

Actual Credits 4

Course
- MATH2532 - Calculus III

Actual Credits 4

Course
- PHYS1320 & PHYS1320L: g:Calculus-Based Physics II and Lab

Actual Credits 5

Course
- Physical Education/Fine Arts (Generic)

Actual Credits 2

Year	Semester	Actual Credits
Year 3	Fall	16

Course
- CSCI2222 - Data Structures in Python

Actual Credits 3

Course
- CHEM3033 & CHEM3033L: Organic Chemistry I and Lab

Actual Credits 4

Course
- ENGL3041 - i1:Technical Writing

Actual Credits 3

Course
- PHIL3042 - g5:Philosophy of Bioethics

Actual Credits 3

Course
- Area 6: Creative and Fine Arts (BS, BA, or BGS Degree) (3 credits)

Actual Credits 3

Year	Semester	Actual Credits
Year 3	Spring	15

Course
- BIOL3011 & BIOL3011L: Genetics and Lab

Actual Credits 4

Course
- CHEM3034 & CHEM3034L: Organic Chemistry II and Lab

Actual Credits 4

Course
- CSCI2310 - Discrete Mathematics for CS

Actual Credits 3

Course
- PSYC2285 & PSYC2285L: Experimental Psychology and Lab

Actual Credits 4

Year	Semester	Actual Credits
Year 4	Fall	16

Course
- BIOL3041 & BIOL3041L: Introductory Microbiology and Lab

Actual Credits 4

Course
- CHEM4041 & CHEM4041L: Biochemistry I and Lab

Actual Credits 4

Course
- MATH3035 - Ordinary Differential Equation

Actual Credits 3

Course
- CSE3073 - Intro to Database Systems

Actual Credits 3

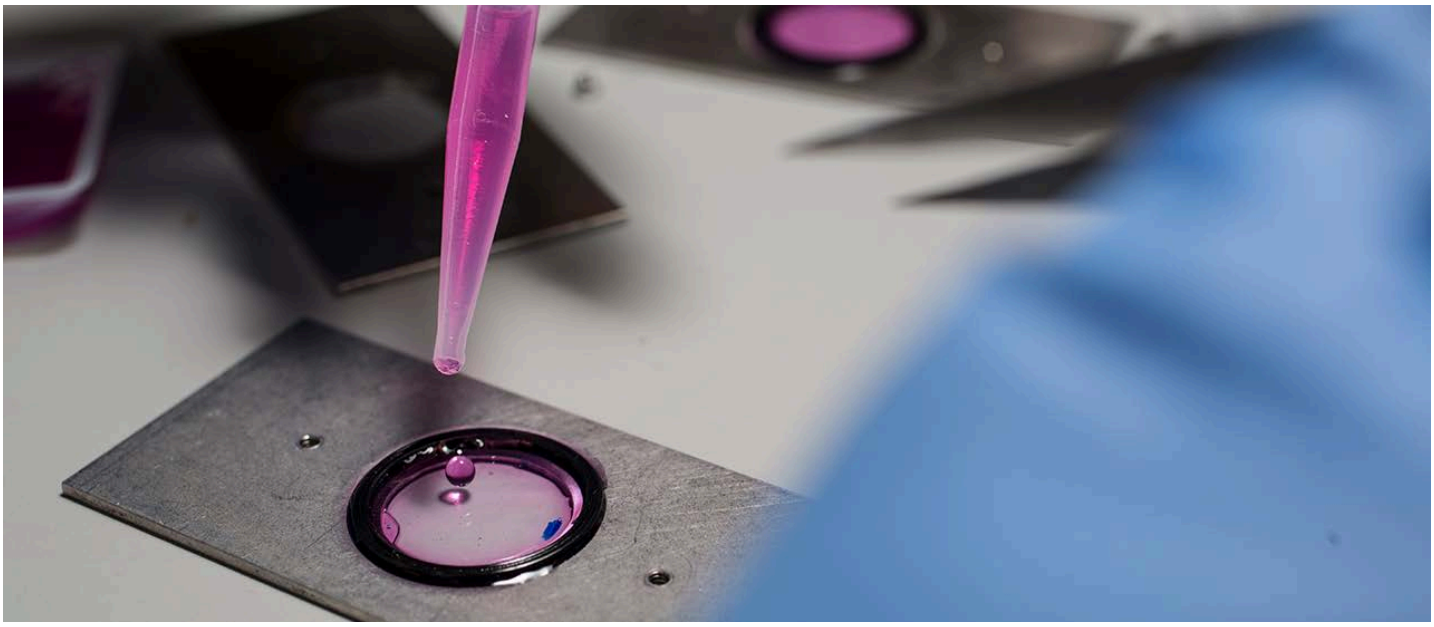
Course
- BMST4095 - Biomolecular Research

Actual Credits 2

Year	Semester	Actual Credits
Year 4	Spring	16

Course	• BIOL4035 - Bioinformatics
Actual Credits	3
Course	• BIOL4043 & BIOL4043L: Molecular Biology and Lab
Actual Credits	4
Course	• MATH3083 - Introduction to Biostatistics
Actual Credits	3
Course	• BMST4096 - Biomedical Research & Design
Actual Credits	2
Course	• Area 7: Additional Courses from Areas 4, 5, 6 (BS, BA, or BGS Degree) (3 credits)
Actual Credits	3
Course	• Physical Education or Fine Arts (Generic)
Actual Credits	1

Biotechnology (program) Department



Degree Offered: *Doctor of Philosophy in Biotechnology*

Graduate Program

Doctor of Philosophy in Biotechnology

Students of exceptional ability, as demonstrated in previous courses or in a Master's degree program, may pursue a program leading to the Doctoral degree.

The Prospective doctoral candidate in Biotechnology should develop a good background in biology, chemistry, and mathematics plus at least one of the following: computer science, mechanical engineering, chemical engineering, or Materials engineering. Additionally, students should achieve a high level of competence in the field of specialization defined by their dissertation research. Additional information is found in the Graduate Program section of the catalog.

Research fields appropriate for the biotechnology candidate include bioengineering, molecular biology, microbiology, tissue engineering, pathogen detection, drug discovery, drug delivery, medical instrument development, neuroscience, and biochemistry. Interdisciplinary projects are strongly encouraged.

Programs

PHD-BIOT - Ph.D. in Biotechnology

[Program Overview]

Program Title
Doctor of Philosophy in Biotechnology

Department(s)
Biotechnology (program)

Degree & Program Code
PHD-BIOT

Program Description
Students of exceptional ability, as demonstrated in previous courses or in a master's degree program, may pursue a program leading to the doctoral degree.

The Prospective doctoral candidate in Biotechnology should develop a good background in biology, chemistry, and mathematics plus at least one of the following: Computer Science, Mechanical Engineering, Chemical Engineering, or Materials Engineering. Additionally, students should achieve a high level of competence in the field of specialization defined by their dissertation research. Additional information is found in the Graduate Program section of the catalog.

Research fields appropriate for the biotechnology candidate include bioengineering, molecular biology, microbiology, tissue engineering, pathogen detection, drug discovery, drug delivery, medical instrument development, neuroscience, and biochemistry. Interdisciplinary projects are strongly encouraged.

Simple Requisites

Program Requirements

Degree Requirements

• Up to 30 credit hours from an appropriate master's degree, excluding thesis and S/U courses, may be included.

• Students are normally expected to take BIOL 5001 each semester that they are in residence on the New Mexico Tech campus.

• 48 hours of coursework approved by the student's advisory committee, to include:

1. Core Biotechnology courses:

BIOT 5002 Molecular Biotechnology

BIOT 5003 Biochemical Technology

BIOT 5004 Biophysical Technology

BIOT 5005 Biomechanical Technology

2. 12 hours of upper-division or graduate-level coursework outside the Biology Department.

• Dissertation (24 credit hours): BIOT 5095

Qualifying Examination

Core competency in two or more academic disciplines relevant to biotechnology must be demonstrated. The qualifying exam will also assess a student's ability to rationally approach novel problems and apply engineering and analytical tools. The student will take written exams in two topic areas as selected by the student with approval of the academic advisor. Exam Topic Areas:

• Molecular Biology

• Bioinformatics

• Microbiology

• Biochemistry

• Biophysics

• Biomechanical engineering

• BioMaterials

• Biomathematical modeling

• A topic from one other academic area related to the interdisciplinary Biotechnology Program can be selected with approval from the Biotechnology Advisory Panel.

The exam questions will be written and graded by faculty members with expertise in each of these disciplines. Results

of these exams will be used to evaluate the student's knowledge of core topics at the undergraduate level and their

ability to a) apply advanced knowledge of mathematics, science, and engineering, b) identify, formulate, and solve

problems.

The exam will be just before the start of each semester. The exam must be first taken before the beginning of the 3rd

semester and is subject to the following:

• Students must take exams from two selected topics at the first exam attempt.

• A student who does not pass a topic exam may retake that topic exam (or another topic exam with advisor approval) at the next offering, i.e., before the beginning of the next semester; they do not need to retake exams that they have passed.

• A student who has not passed exams in two topics by the completion of their second exam attempt (beginning of the 4th semester) does not advance, and will leave the program. The student may be able to purse a M.S. in an appropriate NMT program subject to those degree requirements.

Degree Requirements
Type
Completion Requirement

Core Biotechnology Courses

Complete ALL of the following Courses:

- BIOT5002 - Molecular Biotechnology
- BIOT5003 - Biochemical Technology

- BIOT5004 - Biophysical Technology
- BIOT5005 - Biomechanical Technology

Dissertation (24 Credit Hrs.)

Complete ALL of the following Courses:

- BIOT5095 - Dissertation

Additional Comments:

Institute General Requirements
Admission Requirements

Completion of a bachelor's degree in a relevant field (e.g. biology, biotechnology, chemistry, biochemistry, bioengineering, biophysics, computer science with a biology minor, etc.) or the expectation of completing such a degree before the beginning of the first semester of graduate study. Students are expected to have competencies in math, chemistry, and physics equivalent to those required for completion of a B.S. degree at New Mexico Tech. Students who are deficient in one or more of these areas will be required by their advisory committee to complete undergraduate coursework in the area(s) of deficiency. Students should have an academic record that indicates a good potential for success in a doctoral program. An undergraduate GPA of 3.0 or higher is used as a general guideline in New Mexico Tech's Graduate School.

No Requirement Level

Courses

BIOT5000 - Directed Research

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
12

Credit Hours Operator:
TO

Grade Modes
Pass/Fail, No Report

No Requirements

BIOT5000 - Directed Research

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
12

Credit Hours Operator:
TO

Grade Modes
Pass/Fail, No Report

Course Description
This course may not be used to fulfill graduate degree requirements. This course is mainly for PhD students who have not passed their candidacy exam yet. Research under the guidance of a faculty member. May Be Repeated.

No Requirements

BIOT5002 - Molecular Biotechnology

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
A lecture-supported, laboratory-based course on molecular biotechnology of microbial and mammalian systems. Used in prokaryotic and mammalian molecular biotechnology. Recombinant DNA methodologies (DNA/RNA isolation and manipulation, restriction mapping, cloning, PCR, site-directed mutagenesis, DNA sequencing, Crispr/CAS editing combined with classical biochemical protein (SDS-PAGE protein gels, ELISA, Western blotting, enzyme assay) techniques. Textbook: Molecular Biotechnology by Glick & Pasternak.

Equivalent Courses: Previous & Current Courses
BIOL443, BIOL502, BIOT502

No Requirements

BIOT5003 - Biochemical Technology

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
After an introduction to basic biochemistry and cell biology this course covers biotechnology routes to foods, drugs, polymers and fuels. Fermentation reactions with immobilized enzymes, bacteria, fungi, plants and animal cells are covered; also separation and purification. Offered mostly online with occasional in person classes.

Equivalent Courses: Previous & Current Courses
BIOT503

No Requirements

BIOT5004 - Biophysical Technology

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Covers Biomedical Materials and devices including properties of hard and soft tissue, orthopedic implants, cardiovascular devices, skin, cartilage and tendon, eye and ear implants, neural prosthetics, cyto- and biocompatibility. Offered as an online course with occasional meetings.

Equivalent Courses: Previous & Current Courses
BIOT504

No Requirements

BIOT5005 - Biomechanical Technology

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
The mechanical functionality of the human body. Covers mechanics of cells, fluid mechanics of blood, respiration and lymph, muscle, bone, and joints, gait analysis, exercise, injury and orthopedic fixtures, eyes and ears.

Equivalent Courses: Previous & Current Courses
BIOT505

No Requirements

BIOT5010 - Behavioral Neuroscience

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Study of the neural bases of behavior, including functional neuroanatomy of sensory and motor system, and clinical correlates of neurological abnormalities. Behavioral neuroscience plus directed review and discussion of current research in application of biotechnology in the neurosciences.

Equivalent Courses: Previous & Current Courses
BIOT510

No Requirements

BIOT5015 - Geomicrobiology

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course will explore the basis for interactions between the microorganisms and the geosphere. Topics include redox geochemistry, microbial metabolism and the diversity of microbial lifestyles, microbe mineral interactions, contaminant degradation and bioremediation, microbial paleobiology, and the co-evolution of life and the Earth. The course will include a mandatory weekend field trip. Shares lectures with GEOL 415, with additional expectations for graduate credit. Cross listed with GEOB 5015, GEOC 5015, HYD 5015

Equivalent Courses: Previous & Current Courses
BIOT515, ERTH415, GEOB515, GEOC515, GEOL415, HYD515, HYD515D

Simple Requisites

Course Requisite Requirements

No Requirement Level

Prerequisites: Graduate Standing

BIOT5020 - Biomedical Materials

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

No Requirements

BIOT5031 - Experimental Cell Biology & Biotechnology

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This advanced course explores in detail the methodological tools of experimental cell biology. These include prokaryotic and eukaryotic cell culture, cloning and gene transfections, biochemical studies of signaling pathways, membrane behavior and analysis of change in gene expression; (SEM, TEM, fluorescence , confocal) microscopy, electrophoresis, fractionation, microbiological assays (MIC/MBC) transgenic animals, preclinical studies for drug development as well as finding and interpreting methodologies available in the literature and other resources.

Equivalent Courses: Previous & Current Courses
BIOT531

Simple Requisites

Course Requisite Requirements

No Requirement Level

Prerequisite
Type
Prerequisite

Complete ALL of the following Courses:
- BIOL3031 - Cell Biology

Additional Comments:

BIOT5031L - Experimental Cell Biology Lab

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Lab component of BIOL 3051 lecture.

Equivalent Courses: Previous & Current Courses
BIOT531L

No Requirements

BIOT5035 - Bioinformatics

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Computer analysis of biological sequence data used to perform in silico experiments. Students will design and perform experiments using public domain software and databases. Shares lecture with BIOL 4035 with additional expectations for graduate credit. (Same as BIOL 5035.)

Equivalent Courses: Previous & Current Courses
BIOT535

Simple Requisites

Course Requisite Requirements

No Requirement Level

Prerequisite
Type
Prerequisite

Prerequisite: BIOL 3011 or consent of instructor and advisor

Complete ALL of the following Courses:
- BIOL3011 - Genetics

Additional Comments:

BIOT5041 - Applied Microbiology

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Principles of applied and industrial microbiology and microbial technology. Application of microbes in various products and processes, biofermentors and scale-up of microbial culturing, molecular engineering of microbes, bioenergy.

Equivalent Courses: Previous & Current Courses
BIOT541

Simple Requisites

Course Requisite Requirements

No Requirement Level

Prerequisite
Type
Prerequisite

Prerequisite: BIOL 3041 or BIOL 3043, graduate standing or consent of instructor and advisor

Complete ALL of the following Courses:

- BIOL3041 - Microbiology
  OR BIOL3043 - Environmental Microbiology

Additional Comments:

BIOT5076 - Drug Delivery

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Focus is on current development in drug delivery techniques, with only a brief discussion of common clinical techniques. The first portion of the class focuses on various delivery mechanisms and the tools needed to validate successful targeted drug delivery (both in vitro, in vivo and diagnostic tools). The second part of the course focuses on current developments in drug delivery based on published research articles. Students will read, digest, and critically analyze scientific work from leading research laboratories. Students will also gain valuable communication tools, as each student will present an article of interest to the class. Finally, the third part of the course focuses on important Materials characterization methods such as biological sample prep, SEM, TEM, DSC, flow Cytometry, Fluorescence Microscopy, ELISA Assays. Same as MTLS 5076. Shares lecture with ChE 4076 with additional expectations for graduate credit.

Equivalent Courses: Previous & Current Courses
BIOT576

No Requirements

BIOT5078 - Principles of Drug Design

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Principles in Drug Design course provides an overview of the multilayered and multidisciplinary processes involved in starting from a druggable-problem and ending with a novel clinically-used drug. This includes molecular or phenotypic target identification, compound design (including computational, combinatorial chemistry and structure-based drug design methods), drug synthesis, development of model assays, discovery of a lead, optimization of the lead, identification of mode of action, kinetics of molecular targeting, prodrug design and drug development from this in vitro analysis via preclinical studies to clinical studies and introduction of new drugs into clinical practice. Regulations pertaining to each of these steps will be discussed.

Equivalent Courses: Previous & Current Courses
BIOT578

No Requirements

BIOT5080 - Entrepreneurial Biotechnology

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Rules and regulations governing product development and post-approval marketing from medical devices and pharmaceuticals. From cGMP compliance to federal regulations. Introduction of students to the creation of a company; from pitching a concept and securing funding as a venture capital investment. Current research and industrial trends in the evolution of a biotechnological idea to a biotech venture. Strategic and tactical approaches for marketing of biotechnological products and services.

Equivalent Courses: Previous & Current Courses
BIOT580

No Requirements

BIOT5081 - Directed Study

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
12

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, No Report, Standard Letter

No Requirements

BIOT5095 - Dissertation

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
12

Credit Hours Operator:
TO

Grade Modes
No Report

Course Description
Prerequisites: Successful completion of PhD candidacy exam and Academic Advisor recommendation for candidacy.

Equivalent Courses: Previous & Current Courses
BIOT595

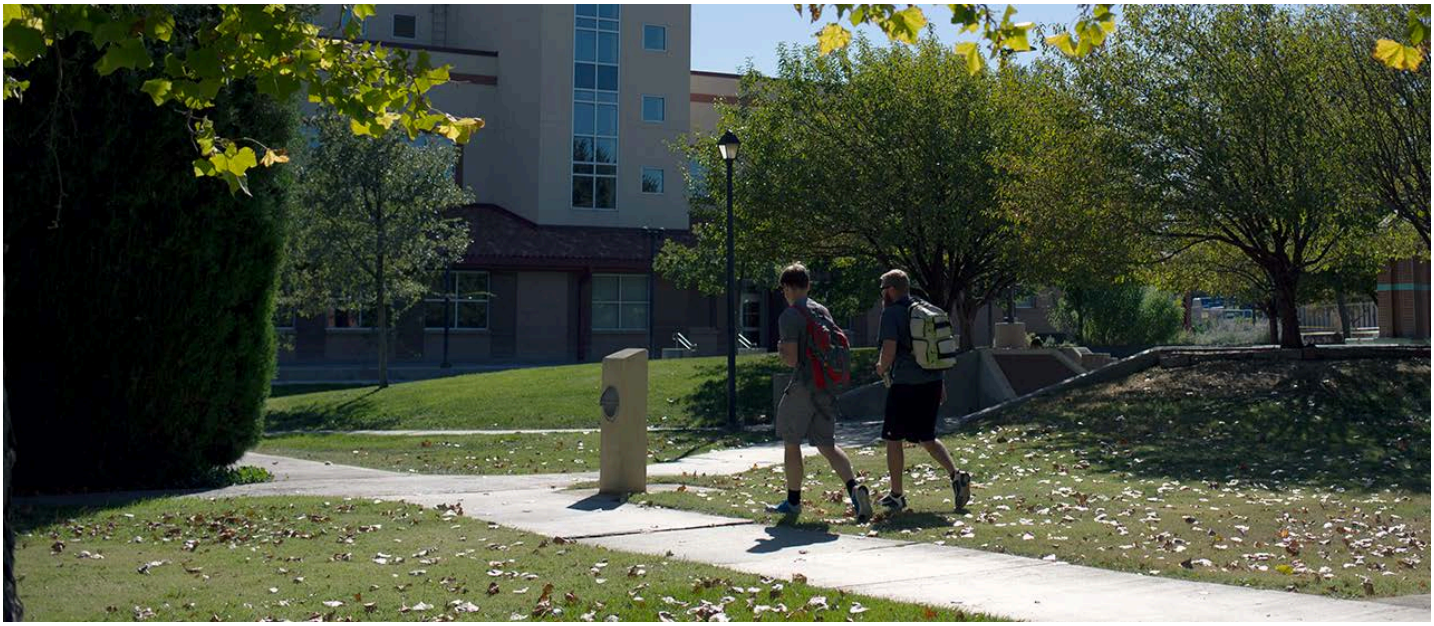
Simple Requisites

Course Requisite Requirements

No Requirement Level

Prerequisites: Successful completion of PhD candidacy exam and Academic Advisor recommendation for candidacy.

CEE Dept/ Civil Engineering Department



Civil Engineering

(Civil and Environmental Engineering)

CONTACT US		
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State & Zip: NM 87801		
Phone: 575-835-5500		
website: https://www.nmt.edu/academics/ceeng/		

- ***Professors:*** *Richardson (Chair of the Department)*
- ***Associate Professor:*** *Cook, Morris, Wilson*
- ***Adjunct Faculty:*** *Ghosh, Kuhn, Razavi*

Degree Offered: *B.S. in Civil Engineering*
M.S. in Civil & Environmental Engineering

Department Mission Statement

The primary objective of this program is to produce well-balanced civil engineers capable of entering the Civil Engineering profession or continuing their studies at the graduate level. Graduates will be well-prepared to solve current Civil Engineering problems, and they will have the ability to adapt to problems of the future.

The achievements of civil engineers are well-known to the general public, because civil engineers build the world's infrastructure. In doing so, they can shape the history of nations. Projects that civil engineers work on include: airports, bridges, buildings, dams and waterways, drainage and sewer systems, city roads, and highways.

The undergraduate program offers a balanced approach to civil engineering education. Students take a common core of Civil Engineering courses, and they can specialize in the areas of geotechnical, water resources, or structural engineering. The program is also designed to give students a solid foundation in engineering and science. Students take courses in chemistry, physics, and math, in addition to a core set of engineering courses common to most engineering disciplines.

The civil engineering courses teach students the fundamentals of engineering design, as well as potential applications. Students are taught how to use computer software to expedite the design process, and they are also taught how to balance engineering designs with economic constraints. During their senior year, undergraduate students work with a professor on a design project.

Program Educational Objectives

1. To develop graduates that function successfully in the fundamental areas of civil engineering, and within a specialty, such as structural, geotechnical or water resources engineering.

2. To prepare graduates for advanced education in civil engineering and related fields, and for professional licensure.

Faculty Interests:

Cook — Full-scale infrastructure destructive testing, bridge risk assessment (observed failures).

Ghosh — Macro behavior of composites, structural health monitoring and restoration.

Kuhn — Geotechnical engineering.

Morris — Concrete materials, nondestructive material characterization, near surface geophysics, culvert inspection and inspection technologies.

Richardson — Environmental assessment, groundwater contamination, site remediation.

Wilson — Structural vibration control, fuzzy control, earthquake engineering.

Programs

Accelerated M.S. in Civil & Environmental Engineering (pathway)

[Program Overview]

Program Title
Accelerated Master of Science in Civil & Environmental Engineering

Department(s)
CEE Dept/ Civil Engineering, CEE Dept/ Environmental Engineering

Program Description
Qualified students may apply for admissions to the Accelerated Masters program in Civil and
Environmental Engineering.

Program Information & Policies
Students are expected to apply for admission to this program after the first semester of their junior year. In fulfillment of the requirements for both B.S. and M.S. degrees in Civil and Environmental Engineering, as outlined in their respective sections, accepted students may apply up to 6 credits of 5000-level courses to both degrees.

[Specializations/Dissertation Concentration Options]

Specialization/Dissertation Options

Specialization/Dissertation Title
Civil or Environmental Engineering

Specialization/Dissertation Requirements
See MS-Civil & Environmental Engr degree.

Civil Engineering (minor)

[Program Overview]

Department(s)
CEE Dept/ Civil Engineering

Program Description
18 total credit hours of CE courses, ME 4020, or ME 4022

Simple Requisites

Program Requirements

Minor in Civil Engineering
Type
Completion Requirement

Minor in Civil Engineering

Minimum credit hours required – 18

Earn at least 18 credits from the following:

- CE101 - Civil Engineering Seminar
- CE3002 - Introduction to Structural Engineering
- CE4001 - Finite Element Analysis for Civil Engineers
- CE4002 - Introduction to Transportation Engineering
- CE4003 - Infrastructure
- CE4006 - Design of Steel Structures
- CE4007 - Design of Concrete Structures
- CE4008 - Cooperative Education
- CE4009 - NDT and SHM (Inactive)
- CE4010 - Reinforced Masonry and Wood Design
- CE4011 - Minimum Design Loads Buildings
- CE4012 - Adv. Design Of Steel Struct.
- CE4013 - Foundation Design & Analysis
- CE4014 - Adv Design of Concrete Struct
- CE4015 - Green Building
- CE4018 - Structural Dynamics
- CE4020 - Pavement Materials & Design (Inactive)
- CE4022 - Geotechnical Waste Containment
- CE4023 - Open Channel Hydraulics
- CE4081 - Senior Engineering Design I
- CE4082 - Senior Engineering Design II
- CE4091 - Special Topics
- ME4020 - Soil Mechanics
  OR ME4022 - Rock Mechanics

Additional Comments:

Institute General Requirements

See the Institute **General Education Core Requirements.**

No Requirement Level

BS-CE - B.S. in Civil Engineering

[Program Overview]

Program Title
Bachelor of Science in Civil Engineering

Department(s)
CEE Dept/ Civil Engineering

Degree & Program Code
BS-CE

Program Description
The undergraduate program offers a balanced approach to civil engineering education. Students take a common core of civil engineering courses, and they can specialize in the areas of geotechnical, water resources, or structural engineering. The program is also designed to give students a solid foundation in engineering and science. Students take courses in chemistry, physics, and math, in addition to a core set of engineering courses common to most engineering disciplines.

The civil engineering courses teach students the fundamentals of engineering design, as well as potential applications. Students are taught how to use

computer software to expedite the design process, and they are also taught how to balance engineering designs with economic constraints. During their senior year, undergraduate students work with a professor on a design project.

Program Information & Policies

Students pursuing a B.S. in Civil Engineering must take all courses counting towards their degree (including technical electives) for a letter grade, except for courses in Areas 4, 5, 6, and 7 of the institute requirements, which may be taken on an S/U basis.

Civil engineering majors must maintain a minimum GPA of 2.0 in required courses (including technical electives) in order to graduate. Civil engineering majors are required to take the Fundamentals in Engineering (FE) exam as a requirement for graduation.

Simple Requisites

Program Requirements

Students pursuing a B.S. in Civil Engineering must take all engineering courses for a letter grade.

Civil engineering majors must maintain a minimum GPA of 2.0 in required courses in order to graduate. Civil engineering majors are required to take the Fundamentals in Engineering (FE) exam as a requirement for graduation.

Bachelor of Science in Civil Engineering: Required Courses
Type
Completion Requirement

In addition to the General Education and Institute Core Curriculum, the following courses are required:

Complete ALL of the following Courses:

- CE101 - Civil Engineering Seminar
  AND CE201 - Construction Matl/ Prop/Test
  AND CE3001 - Introduction to Construction Engineering
  AND CE3002 - Introduction to Structural Engineering
  AND CE4001 - Finite Element Analysis for Civil Engineers
  AND CE4002 - Introduction to Transportation Engineering
  AND CE4006 - Design of Steel Structures
  AND CE4007 - Design of Concrete Structures
  AND CE4013 - Foundation Design & Analysis
  AND CE4023 - Open Channel Hydraulics
  AND CE4081 - Senior Engineering Design I
  AND CE4082 - Senior Engineering Design II
- ES110 - Intro to Engineering Design
  AND ES111 - Computer Programming for Engineers
  AND ES201 - Statics
  AND ES216 - Engineering Fluid Mechanics
  AND ES3002 - Mechanics of Materials
  AND ES3016 - Engineering Economics
- MATH2532 - Calculus III
  AND MATH2350 - Statistical Methods
  AND MATH3035 - Ordinary Differential Equation
- ME4020 - Soil Mechanics

Additional Comments:

Basic Science Elective
Type
Completion Requirement

Basic Science Elective

Earn at least 3 credits from the following:

- BIOL2110 - Pinciples of Biology: Cellular & Molecular
  OR GEOL1110 - Physical Geology
  OR GEOL2120 - Introduction to Oceanography
  OR GEOL1170 - Spaceship Earth (Inactive)
  OR GEOL1185 - Water in the Rise & Fall of Civilizations
  OR GEOL1140 - Geological Disasters

Students are not required to take the accompanying lab unless it is required by the Biology/Earth Science department.

Additional Comments:

Technical Electives (15) minimum credits: from the following Approved Civil Engineering Elective lists:
Type
Completion Requirement

Water Resources Engineering

Complete ANY of the following Courses:

- ENVE201 - Introduction to Environmental Science & Engineering
- ENVE3001 - Applied Priciples of Environmental Engineering
- ENVE3003 - Water Treatment Process Design
- ENVE3004 - Wastewater Treatment Process Design
- ENVE4006 - Environmental Engineering Unit Operations
- GEOL4040 - Hydrology Theory & Field Methods
- ES3047 - Thermodynamics
- ES3050 - Heat & Mass Transfer

Geotechnical Engineering

Complete ANY of the following Courses:

- CE4022 - Geotechnical Waste Containment
- ME3060 - Exploration & Field Mapping
- ME4022 - Rock Mechanics
- ME4034 - Drilling & Blasting Engineering

3 credits in Some explosives (EXPL) courses – check with Department Chair

Structural Engineering

Complete ANY of the following Courses:

- CE4003 - Infrastructure
- CE4009 - NDT and SHM (Inactive)
- CE4010 - Reinforced Masonry and Wood Design
- CE4011 - Minimum Design Loads Buildings
- CE4012 - Adv. Design Of Steel Struct.
- CE4014 - Adv Design of Concrete Struct
- CE4015 - Green Building
- CE4018 - Structural Dynamics
- MENG3004 - Advanced Strength of Materials
- MENG4041 - Dynamics & Vibrations in Structural Design
- ME4034 - Drilling & Blasting Engineering
- CE4016 - Non-Destructive Testing & Structural Health Monitoring

3 credits in Some explosives (EXPL) courses – check with Department Chair

Additional Electives

Complete ANY of the following Courses:

- ENVE4021 - Green Engineering
- ENVE4014 - Energy & Environment
- ENVE4091 - Special Topics
- CE4091 - Special Topics
- GEOL4012 - Introduction to Geographic Information Systems

Additional Comments:
Additional technical electives must be approved by the Department Chair

CE students must take a minimum of 15 credit hours from the list of approved civil engineering electives. Students may take approved elective courses from more than one specialty area to satisfy the B.S. degree without prior approval from their advisor or the Department Chair. Courses are grouped by specialty to assist students who may want to specialize in a particular area.

Institute General Requirements

Bachelor of Science General Education Requirements
Type
Completion Requirement

Bachelor of Science General Education Requirements

Area 1: Communications

Complete ALL of the following Course Sets:

- Area 1: Communications (BS Degree) (9 credits)

Area 2: Mathematics and Quantitative Reasoning

Complete ALL of the following Course Sets:

- Area 2: Mathematics (BS Degree) (8 credits)

Area 3: Science

Complete ALL of the following Course Sets:

- Area 3: Science (BS Degree) (18 credits)

Area 4: Social Science

Earn at least 6 credits from the following:

- Area 4: Social and Behavioral Science (BS or BGS Degree) (6 credits)

Area 5: Humanities

Earn at least 6 credits from the following:

- Area 5: Humanities (BS or BGS Degree) (6 credits)

Area 6: Creative and Fine Arts

Earn at least 3 credits from the following:

- Area 6: Creative and Fine Arts (BS, BA, or BGS Degree) (3 credits)

Area 7: Additional Courses

Earn at least 3 credits from the following:

- Area 7: Additional Courses from Areas 4, 5, 6 (BS, BA, or BGS Degree) (3 credits)

Additional Comments:

No Requirement Level

[Learning Outcomes]

Outcome
an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics

Outcome
an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors

Outcome
an ability to communicate effectively with a range of audiences

Outcome
an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

Outcome
an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives

Outcome
an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions

Outcome
an ability to acquire and apply new knowledge as needed, using appropriate learning strategies

[Sample 4-Year Curriculum Plan(s)]

Degree Map Name
Sample Curriculum for the Bachelor of Science Degree in Civil Engineering

Total Degree Map Credits
132 - 134
Degree Map Effective Catalog Year
2025 -

Year	Semester	Actual Credits
Year 1	Fall	17

Course
- CE101 - Civil Engineering Seminar

Actual Credits 1

Course
- CHEM1215 & CHEM1215L: g:General Chemistry I and Lab

Actual Credits 4

Course
- ENGL1110 - g1:Composition I

Actual Credits 3

Course
- ES110 & ES110L: Introduction to Engineering Design and Lab

Actual Credits 2

Course
- MATH1510 & MATH1510L: g:Calculus I & Lab

Actual Credits 4

Course
- BIOL2110 - Pinciples of Biology: Cellular & Molecular
  OR
- GEOL1110 - Physical Geology
  OR
- GEOL2120 - Introduction to Oceanography
  OR
- GEOL1170 - Spaceship Earth (Inactive)
  OR
- GEOL1185 - Water in the Rise & Fall of Civilizations
  OR
- GEOL1140 - Geological Disasters

Actual Credits 3

Year	Semester	Actual Credits
Year 1	Spring	15

Course
- ENGL1120 - g1:Composition II

Actual Credits 3

Course
- ES111 & ES111L: Computer Programming for Engineers and Lab

Actual Credits 3

Course
- MATH1520 - g2:Calculus II

Actual Credits 4

Course
- PHYS1310 & PHYS1310L: g:Calculus-Physics I and Lab

Actual Credits 5

Year	Semester	Actual Credits
Year 2	Fall	16

Course
- CHEM1225 & CHEM1225L: g: General Chemistry II and Lab

Actual Credits 4

Course
- ES201 - Statics

Actual Credits 3

Course
- MATH2532 - Calculus III

Actual Credits 4

Course
- PHYS1320 & PHYS1320L: g:Calculus-Based Physics II and Lab

Actual Credits 5

Year	Semester	Actual Credits
Year 2	Spring	18

Course
- ES216 - Engineering Fluid Mechanics

Actual Credits 3

Course
- ES3002 - Mechanics of Materials

Actual Credits 3

Course
- MATH3035 - Ordinary Differential Equation

Actual Credits 3

Course
- ES3016 - Engineering Economics

Actual Credits 3

Course
- Area 7: Additional Courses from Areas 4, 5, 6 (BS, BA, or BGS Degree) (3 credits)

Actual Credits 6

Year	Semester	Actual Credits
Year 3	Fall	18

Course
- CE201 - Construction Matl/ Prop/Test

Actual Credits 3

Course
- CE3002 - Introduction to Structural Engineering

Actual Credits 3

Course
- ME4020 - Soil Mechanics

Actual Credits 3

Course
- ENGL3041 - i1:Technical Writing

Actual Credits 3

Course
- MATH2350 & MATH2350L: Statistical Methods and Lab

Actual Credits 3

Course
- Area 4: Social and Behavioral Science (BS or BGS Degree) (6 credits)

Actual Credits 3

Year	Semester	Actual Credits
Year 3	Spring	18

Course
- CE3001 - Introduction to Construction Engineering

Actual Credits 3

Course
- CE4001 - Finite Element Analysis for Civil Engineers

Actual Credits 3

Course
- CE4002 - Introduction to Transportation Engineering

Actual Credits 3

Course
- CE Electives

Actual Credits 3

Course
- CE Electives

Actual Credits 3

Course
- Area 5: Humanities (BS or BGS Degree) (6 credits)

Actual Credits 3

Year	Semester	Actual Credits
Year 4	Fall	16 - 18

Course
- CE4006 - Design of Steel Structures

Actual Credits 3

Course
- CE4007 - Design of Concrete Structures

Actual Credits 3

Course
- CE4081 - Senior Engineering Design I

Actual Credits 1 - 3

Course
- CE Electives

Actual Credits 6

Course
- Area 6: Creative and Fine Arts (BS, BA, or BGS Degree) (3 credits)

Actual Credits 3

Year	Semester	Actual Credits
Year 4	Spring	14

Course
- CE413 - Foundation Design & Analysis (Inactive)

Actual Credits 3

Course
- CE423 - Open Channel Hydraulics (Inactive)

Actual Credits 3

Course
- CE482 - Senior Engineering Design II (Inactive)

Actual Credits 2

Course
- Area 7: Additional Courses from Areas 4, 5, 6 (BS, BA, or BGS Degree) (3 credits)

Actual Credits 3

Course
- CE Electives

Actual Credits 3

MS-CEE - M.S. in Civil & Environmental Engineering

[Program Overview]

Program Title
Master of Science in Civil and Environmental Engineering

Department(s)
CEE Dept/ Civil Engineering, CEE Dept/ Environmental Engineering

Degree & Program Code
MS-CEE

Required Specialization/Concentration(s)
w spec. in Civil Engineering, w spec. in Environmental Eng

Program Description
The Civil and Environmental Engineering graduate program at New Mexico Tech provides a unique educational and research experience in the engineering and science of the natural and the built environment and environmental protection. The plan of study and research is suited to each individual, drawing upon the strengths of the student, taking advantage of program capabilities, and complementing research activities within and outside New Mexico. A thesis or independent study project is required to complete the degree. General requirements common to all Master of Science degree curricula also apply.

Program Information & Policies
Admission to the Master of Science in Civil and Environmental Engineering program requires competence in mathematics, chemistry, physics, and engineering science comparable to the Bachelor of Science in Civil or Environmental Engineering. The department chair, or an advisory committee, will evaluate the scholastic record of every entering student to determine whether any deficiencies exist in their educational background. For example, students entering the program without an engineering degree may be required to take additional course work in such areas as fluid mechanics, heat and mass transfer, and differential equations before being granted a M.S. in Civil and Environmental Engineering. It is up to the student and his or her graduate committee to determine the specific plan of study for the student after the first semester of graduate work. Transfer credit for courses taken at another institution will be evaluated on an individual basis.

Simple Requisites

Program Requirements

Thesis Option
Type
Completion Requirement

Additional Comments:
A total of 30 credit hours are required for a M.S. in Civil and Environmental Engineering, which must include a minimum of 18 credit hours of Civil and Environmental Engineering coursework, and 6 credit hours of CEE 5091 (thesis). All students must take a minimum of 12 credit hours of 5000-level Civil and Environmental Engineering courses.

Independent Study Option
Type
Completion Requirement

Additional Comments:
A student may petition the department with the approval of the Department Chair to pursue a Master of Science degree with an independent study option. Candidates for the non-thesis Master of Science option must complete a minimum of 30 credit hours, of which 3 credit hours must be independent study (CEE 5090). All students must take a minimum of 12 credit hours of 5000-level Civil and Environmental Engineering courses, and an additional 6 credits of 4000- or 5000-level Civil and Environmental Engineering courses (18 credits total). The student's course of study must be approved by the student's advisory committee, and it must fulfill the other requirements of the M.S. in Civil and Environmental Engineering degree program with the exception of 6 credit hours of thesis (CEE 5091).

Institute General Requirements
See the Master of Science information found in the Graduate section of the catalog at Master of Science Degree.

No Requirement Level

[Specializations/Dissertation Concentration Options]

Specialization/Dissertation Options

Specialization/Dissertation Title
Specialization in Environmental Engineering

Specialization/Dissertation Requirements
The Area of Specialization in Environmental Engineering requires a minimum of 4 courses be taken from the following list of CEE courses:

CEE 5001, Physicochemical and Biological Processes

CEE 5003, Environmental Risk Assessment

CEE 5010, Advanced Water Chemistry

CEE 5011, Water Quality Management and Control

CEE 5012, Industrial Water and Wastewater Treatment

CEE 5013, Air Resources Engineering

CEE 5014, Energy & Environment

CEE 5020, Hazardous Waste Site Remediation

CEE 5021, Green Engineering

CEE 5022, Geotechnical Waste Containment

CEE 5023, Open Channel Hydraulics

CEE 5071, Special Topics

Specialization/Dissertation Options

Specialization/Dissertation Title
Specialization in Civil Engineering

Specialization/Dissertation Requirements
The Area of Specialization in Civil Engineering requires a minimum of 4 courses be taken from the following list of CEE courses:

CEE 5001, Finite Element Analysis for Civil Engineers

CEE 5002, Introduction to Transportation Engineering

CEE 5006, Design of Steel Structures

CEE 5007, Design of Concrete Structures

CEE 5004, Reinforced Masonry and Timber Design

CEE 5005, Infrastructure

CEE 5018 Structural Dynamics

CEE 5041, Minimum Design Loads for Buildings

CEE 5043, Foundation Design and Analysis

CEE 5008, Advanced Design of Steel Structures

CEE 5009, Advanced Design of Concrete Structures

CEE 5023, Open Channel Hydraulics

CEE 5071, Special Topics

[Learning Outcomes]

Outcome
1. Graduates of the Civil and Environmental Engineering MS Program will be able to: Assess various infrastructure issues associated with planning and development of the urban and natural environment and their accompanying social impacts

Outcome
2. Synthesize technical knowledge of engineering analysis and design to identify, formulate, and solve traditional or emerging problems of professional interest and importance by selecting and applying appropriate tools and techniques

Outcome
3. Specify or design an experiment to meet a need, conduct the experiment, and analyze and explain the resulting data

Outcome
4. Demonstrate the technical and communication skills needed to be successful in their professional practice, both in writing and through oral presentations

Courses

CE101 - Civil Engineering Seminar

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Brief overview of civil engineering topics, including structures, water resources, geotechnical and transportation engineering in the form of seminars by faculty, and guest speakers from industry, consulting, and government.

Equivalent Courses: Previous & Current Courses
CE1001

No Requirements

CE201 - Construction Matl/ Prop/Test

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Mechanical behavior of engineering Materials, including metals, ceramics, polymers, concrete, wood, bitumens, and asphaltic concretes; explanations of macroscopic behavior in terms of phenomena at the microscopic level.

Equivalent Courses: Previous & Current Courses
CE2001

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:
- CHEM1225 - g3:General Chemistry II

Additional Comments:

No Requirement Level

CE3001 - Introduction to Construction Engineering

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Topics covered include: contracting and bonding, planning and scheduling, estimating, project control, and productivity models.

Equivalent Courses: Previous & Current Courses
CE301, CE301D

Simple Requisites

Course Requisite Requirements

Prerequisite: Junior standing or consent of instructor

No Requirement Level

CE3002 - Introduction to Structural Engineering

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Basic topics in the analysis, behavior, and design of trusses and framed structures under static loads; analysis topics include member forces in trusses, shear and moment diagrams, deflections, simple applications of the force and slope–deflection.

When Offered
Fall

Equivalent Courses: Previous & Current Courses
CE302, CE302D

Simple Requisites

Course Requisite Requirements

Prerequisite Requirements
Type
Prerequisite

ES 2001 Prerequisite requirement

Complete ALL of the following Courses:
- ES201 - Statics

Additional Comments:

Corequisite Requirements
Type
Corequisite

ES 3002 Corequisite requirement

Enroll in the following Courses:
- ES3002 - Mechanics of Materials

Additional Comments:

No Requirement Level

CE4001 - Finite Element Analysis for Civil Engineers

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Introduction to finite element analysis (FEA) for Civil Engineering students. Students will learn the fundamentals of FEA, and they will learn to use software packages to analyze complex structures. Topics include: 1-systems, trusses, 2-D problems, axis-symmetric solids, beams, frames, and some types of 3-D problems. (cross-listed with CEE 5001; additional course expectations for graduate credit).

Equivalent Courses: Previous & Current Courses
CE401, CEE501

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisite: CE 3002 , and ES 3002 passed with a grade of C- or better, or consent of instructor and advisor

Complete ALL of the following Courses:

- CE3002 - Introduction to Structural Engineering
  AND ES3002 - Mechanics of Materials

Additional Comments:

No Requirement Level

CE4002 - Introduction to Transportation Engineering

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Overview of the field of Transportation Engineering. Topics covered include: description of transportation systems; traffic engineering studies; highway safety studies; traffic flow characteristics; transportation planning; travel demand; geometric design of highways; characteristics of drivers, pedestrians, vehicles, and roads and their applications to the determination of braking distance, stopping sight distance, passing sight distance, sign placement, and timing of change and clearance intervals. (cross-listed with CEE 5002; additional course expectations for graduate credit)

Equivalent Courses: Previous & Current Courses
CE402, CEE502

Simple Requisites

Course Requisite Requirements

Prerequisites: junior standing or consent of instructor

No Requirement Level

CE4003 - Infrastructure

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Standard Letter

Course Description
Infrastructure systems have been deteriorating at an alarming rate and resources available for their rehabilitation or replacement have been limited. This course considers the current challenges to managing infrastructure. It focuses on current issues and through case studies addresses: the social, economic and political importance of infrastructure, the ASCE Report Card and its purposes, planning approaches economic and other strategies for comparing infrastructure alternatives, sustainability, risk, and resilience. (cross-listed with CEE 5005; additional course expectations for graduate credit)

Equivalent Courses: Previous & Current Courses
CE403, CEE5005, CEE505

Simple Requisites

Course Requisite Requirements

Prerequisite: Junior standing or consent of instructor

No Requirement Level

CE4006 - Design of Steel Structures

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Behavior and design of steel members subjected to tension, compression and flexural loads, according to AISC specifications. Topics covered include: elastic and inelastic design, buckling of beams and columns, and structural connections. (cross-listed with CEE 5006; additional course expectations for graduate credit)

Equivalent Courses: Previous & Current Courses
CE406, CE5006, CE506

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisite: CE 3002 and ES 3002, or consent of instructor and advisor

Complete ALL of the following Courses:

- CE3002 - Introduction to Structural Engineering
  AND ES3002 - Mechanics of Materials

Additional Comments:

No Requirement Level

CE4007 - Design of Concrete Structures

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Study of the strength, behavior and design of reinforced concrete members, including beams, columns and slabs. Topics covered will include serviceability of beams and slabs, control of deflections and cracking, shear design, and bonding. (cross-listed with CEE 5007; additional course expectations for graduate credit)

Equivalent Courses: Previous & Current Courses
CE407, CE5007, CE507

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisite: CE 3002, ES 3002, or consent of instructor and advisor

Complete ALL of the following Courses:

- CE3002 - Introduction to Structural Engineering
  AND ES3002 - Mechanics of Materials

Additional Comments:

No Requirement Level

CE4010 - Reinforced Masonry and Wood Design

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Reinforced masonry design topics covered include: the properties and performance of Masonry Materials; design criteria and methods in reinforced masonry; and design examples including reinforced masonry walls, masonry columns and pilasters, and rectangular beams. Timber topics covered include: design of beams, columns, trusses, and diaphragms in wood; design of glue laminated beams; design of wood connections; use of timber design codes and the International Building Code (IBC). (cross-listed with CEE 5004; additional course expectations for graduate credit)

Equivalent Courses: Previous & Current Courses
CE410, CEE5004, CEE504

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisite: CE 3002 and ES 3002, or consent of instructor and advisor

Complete ALL of the following Courses:

- CE3002 - Introduction to Structural Engineering
  AND ES3002 - Mechanics of Materials

Additional Comments:

No Requirement Level

CE4011 - Minimum Design Loads Buildings

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Introduction to risk concepts, behavior and determination of design loads acting on structures. Topics covered include development of codes and laws, in-depth discussion of minimum design loads (dead, live, snow, earthquake and wind) and load combinations, risk assessment in terms of uncertainty in material properties, consequences, heuristic loading assumptions, general structural integrity, and comprehension and application of codified documents. (cross-listed with CEE 5041; additional course expectation for graduate credit)

Equivalent Courses: Previous & Current Courses
CE411, CEE5041, CEE541

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

CE 3002 & ES 3002 Prerequisite requirements

Complete ALL of the following Courses:

- CE3002 - Introduction to Structural Engineering
  AND ES3002 - Mechanics of Materials

Additional Comments:

No Requirement Level

CE4012 - Adv. Design Of Steel Struct.

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Behavior and design of structural steel beams, columns, frames, and connections. Topics include: elastic and inelastic design, composite beam design, stability of beams and columns, behavior of steel frame structures, design of bolted and welded connections, metallurgical and mechanical properties of welds, braced frame and moment frame design for lateral loads. Extensive use of the current AISC-LRFD design code. (cross-listed with CEE 50xx; additional course expectation for graduate credit)

Equivalent Courses: Previous & Current Courses
CE412, CEE5008, CEE508

Simple Requisites

Course Requisite Requirements

CE4012 course requirement
Type
Prerequisite

CE4006

Complete ALL of the following Courses:

- CE4006 - Design of Steel Structures

Prerequisite: CE 4006 or consent of instructor and advisor

Additional Comments:

No Requirement Level

CE4013 - Foundation Design & Analysis

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Principles of soil mechanics and foundation engineering. Immediate and time dependent settlements, service loads, lateral loads, loading, approximate analysis methods, performance requirements, shallow foundations, lateral earth pressure, design of retaining walls, deep foundations, special footings, slope stability, and computer modeling of foundations. (Same as ME 4013). (cross-listed with CEE 50xx) performance requirements, shallow foundations, lateral earth pressure, design of retaining walls, deep foundations, special footings, slope stability, and computer modeling of foundations. (Same as ME 4013). (cross-listed with CEE 5043)

Equivalent Courses: Previous & Current Courses
CE413, CEE5043, CEE543, ME4013, ME413, ME5031, ME531

No Requirements

CE4014 - Adv Design of Concrete Struct

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Topics covered include: strut and tie models, footings, retaining walls, principles of prestressed concrete, Materials and techniques used in these systems, advantages and disadvantages of pre-stressing methods over regular reinforced concrete, and the design of prestressed concrete structures, such as axially loaded members, beams (for flexure and shear), and slabs. (cross-listed with CEE 5009; additional course expectations for graduate credit)

Equivalent Courses: Previous & Current Courses
CE414, CEE5009, CEE509

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisite: CE 4007 or consent of instructor and advisor

Complete ALL of the following Courses:

- CE4007 - Design of Concrete Structures

Additional Comments:

No Requirement Level

CE4015 - Green Building

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Green building is an emerging interdisciplinary field at the intersection of environmental, civil, and construction engineering as well as architecture. This course takes an engineering approach to evaluating green building techniques and materials, their environmental impacts, and their economics. We examine the built environment from inside to out in looking at minimizing environmental impacts. Energy use and efficiency are key concerns. The course will help prepare the students to take the Leadership in Energy and Environmental Design accreditation exam—an important program and credential in this field. (shares lectures with CEE 5015 with additional expectations for graduate credit)

Equivalent Courses: Previous & Current Courses
CE415, CEE5015

Simple Requisites

Course Requisite Requirements

Prerequisites: Junior Standing or consent of instructor and advisor

No Requirement Level

CE4016 - Non-Destructive Testing & Structural Health Monitoring

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course will cover two aspects of existing structures: investigating in situ conditions and monitoring changes in those conditions over time. Structural health monitoring (SHM) topics include: monitoring strategies, long and short term SHM, sensor types (vibration, temperature, strain), error and uncertainty propagation, interpreting and presenting monitoring results, and case studies of SHM projects. Many aspects of SHM utilize nondestructive testing and evaluation. We will also cover the methods, use, and analysis of data from nondestructive test methods, including ultrasonic, rebound, electrical, magnetic, radar, and visual methods, through a number of case studies and discussions. (shares lectures with CEE 5016 with additional expectations for graduate credit)

Equivalent Courses: Previous & Current Courses
CEE5016

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

CE 4016 prerequisites

Prerequisite: CE 3002 and ES 3002, or permission of instructor and advisor

Complete ALL of the following Courses:

- CE3002 - Introduction to Structural Engineering
  AND ES3002 - Mechanics of Materials

Additional Comments:

No Requirement Level

CE4018 - Structural Dynamics

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, No Report, Standard Letter

Course Description
Fundamentals of structural dynamics. Analysis of single and multi-degree-of-freedom structures subjected to various types of vibrations. Topics covered will include structural responses to free, harmonic and periodic excitations, step and pulse excitations, and earthquake loads.

Equivalent Courses: Previous & Current Courses
CE418, CEE5018, CEE518

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prequisites

Prerequisites: MATH 3035 and CE 3002 or consent of instructor and advisor

Complete ALL of the following Courses:

- MATH3035 - Ordinary Differential Equation
  AND CE3002 - Introduction to Structural Engineering

Additional Comments:

No Requirement Level

CE4022 - Geotechnical Waste Containment

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Design procedures consisting of waste disposal methods, various containment systems, and associated remediation techniques. Waste characterization and soil-waste interactions, contaminant transport in low permeability soils, geosynthetics and soil Materials use in waste containment, remedial issues of solidification and stabilization and barrier design, and landfill- and surface impoundment-related design, including liners, leachate and gas collection and removal, final covers, static and seismic slope stability, and settlement analysis. Geotechnical problem definition, application of field and laboratory test data, use of computer models for analysis and design.

Equivalent Courses: Previous & Current Courses
CE422

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisites

Complete ALL of the following Courses:

- ME4020 - Soil Mechanics
- MATH3035 - Ordinary Differential Equation

Additional Comments:

No Requirement Level

CE4023 - Open Channel Hydraulics

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Analysis and characteristics of flow in natural and artificial open channel systems using energy, continuity, and momentum equations as applied to steady-state uniform, gradually varied, and rapidly varied flow profiles with emphasis on design of hydraulic structures. The students will use their knowledge of fluid mechanics, calculus, numerical analysis, and computer science to solve practical open channel flow problems. A variety of hydraulic conveyance and structures are covered, including rigid and flexible boundary channels, culverts, sluice gates, fumes, weirs, spillways, stilling basins, and bridges.

Equivalent Courses: Previous & Current Courses
CE423

Simple Requisites

Course Requisite Requirements

Prerequisite Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- ES216 - Engineering Fluid Mechanics

Additional Comments:

No Requirement Level

CE4081 - Senior Engineering Design I

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
3

Credit Hours Operator:
OR

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Semester-long civil engineering design project organized and directed by a faculty member.

When Offered
Fall

Equivalent Courses: Previous & Current Courses
CE481

Simple Requisites

Course Requisite Requirements

Prerequisite: Senior standing in Civil Engineering

Offered in fall semester

No Requirement Level

CE4082 - Senior Engineering Design II

General

Credit Hrs

Credit Hrs:
2

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Continuation of CE 4081. A semester-long civil engineering design project organized and directed by a faculty member.

Equivalent Courses: Previous & Current Courses
CE482

Simple Requisites

Course Requisite Requirements

Prerequisite: Senior standing in Civil Engineering

Offered in spring semester

No Requirement Level

CE4091 - Special Topics

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
3

Credit Hours Operator:
OR

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
New and developing areas of knowledge in Civil Engineering offered to augment the formal course offerings.

Equivalent Courses: Previous & Current Courses
CE491

Simple Requisites

Course Requisite Requirements

Prerequisite: Senior standing or consent of instructor and advisor

No Requirement Level

CEE4091 - Special Topics

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
3

Credit Hours Operator:
OR

Grade Modes
Standard Letter

No Requirements

CEE5001 - Finite Element Analysis for Civil Engineers

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Standard Letter

Course Description
Prerequisite: Graduate Standing in Civil & Environmental Engineering, or consent of Instructor. Introduction to finite element analysis (FEA) for Civil Engineering students. Students will learn the fundamentals of FEA, and they will learn to use software packages to analyze complex structures. Topics include: 1-D systems, trusses, 2-D problems, axis-symmetric solids, beams, frames, and some types of 3-D problems. (cross-listed with CE 4001; additional course expectations for graduate credit)

Equivalent Courses: Previous & Current Courses
CE4001, CEE501

Simple Requisites

Course Requisite Requirements

Prerequisite: Graduate Standing in Civil & Environmental Engineering, or consent of instructor

No Requirement Level

CEE5002 - Intro to Transport Engineering

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Standard Letter

Course Description
Overview of the field of Transportation Engineering. Topics covered include: description of transportation systems; traffic engineering studies; highway safety studies; traffic flow characteristics; transportation planning; travel demand; geometric design of highways; characteristics of drivers, pedestrians, vehicles, and roads and their applications to the determination of braking distance, stopping sight distance, passing sight distance, sign placement, and timing of change and clearance intervals. (cross-listed with CE 4002; additional course expectations for graduate credit)

Equivalent Courses: Previous & Current Courses
CEE502

Simple Requisites

Course Requisite Requirements

Prerequisite: Graduate Standing in Civil & Environmental Engineering, or consent of instructor

No Requirement Level

CEE5003 - Risk Assessment

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Standard Letter

Course Description
Multi-disciplinary approaches required to develop credible risk analysis within the U.S. regulatory and social framework. Philosophical contexts, regulatory framework, and economic implications. Components of risk and performance assessments, including source term, contaminant transport, exposure, and consequences. Computer models and case studies.

Equivalent Courses: Previous & Current Courses
CEE503

No Requirements

CEE5004 - Reinforced Masonry and Timber

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Pass/Fail, Standard Letter

Course Description
Reinforced masonry design topics covered include: the properties and performance of Masonry Materials; design criteria and methods in reinforced masonry; and design examples including reinforced masonry walls, masonry columns and pilasters, and rectangular beams. Timber topics covered include: design of beams, columns, trusses, and diaphragms in wood; design of glue

laminated beams; design of wood connections; use of timber design codes and the International Building Code (IBC). (cross-listed with CE 4010; additional course expectations for graduate credit)

Equivalent Courses: Previous & Current Courses
CEE504

Simple Requisites

Course Requisite Requirements

Prerequisite: Graduate Standing in Civil & Environmental Engineering, or consent of instructor

No Requirement Level

CEE5005 - Infrastructure

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Infrastructure systems have been deteriorating at an alarming rate and resources available for their rehabilitation or replacement have been limited. This course considers the current challenges to managing infrastructure. It focuses on current issues and through case studies addresses: the social, economic and political importance of infrastructure, the ASCE Report Card and its purposes, planning approaches economic and other strategies for comparing infrastructure alternatives, sustainability, risk, and resilience). (cross-listed with CE 4003; additional course expectations for graduate credit)

Equivalent Courses: Previous & Current Courses
CEE505

Simple Requisites

Course Requisite Requirements

Prerequisite: Graduate Standing in Civil & Environmental Engineering, or consent of instructor

No Requirement Level

CEE5006 - Design of Steel Structures

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Behavior and design of steel members subjected to tension, compression and flexural loads, according to AISC specifications. Topics covered include: elastic and inelastic design, buckling of beams and columns, and structural connections. (cross-listed with CE 4006; additional course expectations for graduate credit)

Equivalent Courses: Previous & Current Courses
CE4006, CEE506

Simple Requisites

Course Requisite Requirements

Prerequisite: Graduate Standing in Civil & Environmental Engineering, or consent of instructor

No Requirement Level

CEE5007 - Design of Concrete Structures

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Standard Letter

Course Description
Study of the strength, behavior and design of reinforced concrete members, including beams, columns and slabs. Topics covered will include serviceability of beams and slabs, control of deflections and cracking, shear design, and bonding. (cross-listed with CE 4007; additional course expectations for graduate credit)

Equivalent Courses: Previous & Current Courses
CEE507

Simple Requisites

Course Requisite Requirements

Prerequisite: Graduate Standing in Civil & Environmental Engineering, or consent of instructor

No Requirement Level

CEE5009 - Adv Des of Concrete Structures

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course will cover two aspects of existing structures: investigating in situ conditions and monitoring changes in those conditions over time. Structural health monitoring (SHM) topics include: monitoring strategies, long and short

When Offered
Spring

term SHM, sensor types (vibration, temperature, strain), error and uncertainty propagation, interpreting and presenting monitoring results, and case studies of SHM projects. Many aspects of SHM utilize nondestructive testing and evaluation. We will also cover the methods, use, and analysis of data from nondestructive test methods, including ultrasonic, rebound, electrical, magnetic, radar, and visual methods, through a number of case studies and discussions. (shares lectures with CE 4009 with additional expectations for graduate credit)

Course Equivalencies
CE4009 NDT and SHM (Summer 2024)

Equivalent Courses: Previous & Current Courses
CE4014, CE514, CEE509

Simple Requisites

Course Requisite Requirements

Prerequisite: Graduate Standing in Civil & Environmental Engineering, or consent of instructor

No Requirement Level

CEE5010 - Advanced Water Chemistry

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Advanced study of physical and organic chemistry as applicable to natural water bodies and water and wastewater treatment. Chemical cycles, equilibrium chemistry, chemical thermodynamics, reaction kinetics, precipitation and dissolution, oxidation and reduction, colloidal and surface chemistry, complexation phenomena, electroneutrality, mass balances, and transport and fate of chemical species. Relevance of these topics to water quality control are discussed.

Equivalent Courses: Previous & Current Courses
CEE510

No Requirements

CEE5011 - Water quality management

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Fundamentals of water quality, including water bodies and their natural setting, water uses and waste input, and water quality cause-effect relationships. Water quality parameters, criteria, and standards; principles of water quality systems analysis, both in the formulation and application of water quality models; engineering controls and socio-economic concepts of water quality management and control, including cost/benefit analysis and management modeling.

Equivalent Courses: Previous & Current Courses
CEE511

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisite: MATH 3035 or consent of instructor and advisor

Complete ALL of the following Courses:
- MATH3035 - Ordinary Differential Equation

Additional Comments:

No Requirement Level

CEE5012 - Industrial Water and Wastewater Treatment

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Advanced study of treatment unit operations and processes within industry-specific water and wastewater situations. Process design, specifications, and costing of physical, chemical, or biological technology to meet a particular treatment objective. Subject matter is developed through references to current practice, critique of completed designs, design exercises, and field trips.

Equivalent Courses: Previous & Current Courses
CEE512

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisites

Prerequisites: ENVE 3003, 3004, CEE 5001 or ENVE 5001; or consent of instructor and advisor

Complete ALL of the following Courses:
- ENVE3003 - Water Treatment Process Design
  OR ENVE3004 - Wastewater Treatment Process Design
  OR CEE5001 - Finite Element Analysis for Civil Engineers

Additional Comments:

No Requirement Level

CEE5013 - Air Resources Engineering

General

Credit Hrs
Credit Hrs:
4

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Sources, behavior, and fate of gaseous and particulate air pollutants. Principles of meteorology and atmospheric diffusion in relation to modeling pollutant transport and dispersion. Design of air pollution control equipment for removal of gases and particles from air streams. Unit operations examined include cyclones, electrostatic precipitators, fabric filters, wet scrubbers, incinerators, biofiltration, adsorbers, and absorbers. In the laboratory section, students will develop an air permit, and complete projects using dispersion modeling and air pollution engineering software. Graduate students complete an additional project and a classroom presentation. Shares lecture with ENVE 4013, with additional expectations for graduate credit.

Equivalent Courses: Previous & Current Courses
CEE513

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisites: ES 216 and 3050; or consent of instructor and advisor

Complete ALL of the following Courses:

- ES216 - Engineering Fluid Mechanics
- ES3050 - Heat & Mass Transfer

Additional Comments:

No Requirement Level

CEE5014 - Energy & Environment

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course takes an engineering approach to evaluating energy systems and their environmental impacts. Particular attention is focused upon multimedia environmental impacts to land, water, air, and climate -- all energy sources. In the beginning, students review the fundamental principles of energy, heat, work, power and efficiency. The students apply these concepts of physic, chemistry, thermodynamics, heat transfer, and economics in evaluating various energy systems. Student evaluate major energy resources including advanced fossil-fuel, renewables, energy efficiency and conservation techniques, and nuclear power systems. The course also explores the full gamut of energy end uses as well -- electrical, space heating and cooling, transportation, and lighting. The course emphasizes group project work and includes a special project for graduate credit. Shares lecture with ENVE 4014, with additional expectations for graduation credit.

Equivalent Courses: Previous & Current Courses
CEE514

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisites

Prerequisites: MATH 1520, PHYS 1320, CHEM 1225 or consent of instructor and advisor

Complete ALL of the following Courses:

- MATH1520 - g2:Calculus II
- PHYS1320 - g3:Calculus-based Physics II
- CHEM1225 - g3:General Chemistry II

Additional Comments:

No Requirement Level

CEE5015 - Green Building

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Green building is an emerging interdisciplinary field at the intersection of environmental, civil, and construction engineering as well as architecture. This course takes an engineering approach to evaluating green building techniques and materials, their environmental impacts, and their economics. We examine the built environment from inside to out in looking at minimizing environmental impacts. Energy use and efficiency are key concerns. The course will help prepare the students to take the Leadership in Energy and Environmental Design accreditation exam—an important program and credential in this field. (shares lectures with CE 4015 with additional expectations for graduate credit)

Equivalent Courses: Previous & Current Courses
CE4015, CEE515

Simple Requisites

Course Requisite Requirements

Graduate Standing in Civil & Environmental Engineering, or consent of instructor

No Requirement Level

CEE5016 - NDT & SHM

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course will cover two aspects of existing structures: investigating in situ conditions and monitoring changes in those conditions over time. Structural health monitoring (SHM) topics include: monitoring strategies, long and short term SHM, sensor types (vibration, temperature, strain), error and uncertainty propagation, interpreting and presenting monitoring results, and case studies of SHM projects. Many aspects of SHM utilize nondestructive testing and evaluation. We will also cover the methods, use, and analysis of data from nondestructive test methods, including ultrasonic, rebound, electrical, magnetic, radar, and visual methods, through a number of case studies and discussions. (shares lectures with CE 4016 with additional expectations for graduate credit)

Equivalent Courses: Previous & Current Courses
CE4009, CEE516

Simple Requisites

Course Requisite Requirements

Graduate Standing in Civil & Environmental Engineering, or consent of instructor

No Requirement Level

CEE5018 - Structural Dynamics

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Fundamentals of structural dynamics. Analysis of single and multi-degree-of-freedom structures subjected to various types of vibrations. Topics covered will include structural responses to free, harmonic and periodic excitations, step and pulse excitations, and earthquake loads. Graduate students complete an additional project and a classroom presentation. Graduate work is graded separately. Lectures shared with CE 4018.

Equivalent Courses: Previous & Current Courses
CE418, CEE518

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisite: MATH 3035 and CE 3002 or consent of instructor and advisor

Complete ALL of the following Courses:

- MATH3035 - Ordinary Differential Equation
- CE3002 - Introduction to Structural Engineering

Additional Comments:

No Requirement Level

CEE5020 - Hazardous Waste Site Remediation

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Design and specification of various physical, chemical, thermal, and biological technologies commonly used in the cleanup of hazardous waste sites. Special emphasis on innovative and emerging technologies for site remediation. Proper sampling and monitoring procedures. Emergency technology in hazardous waste management.

Equivalent Courses: Previous & Current Courses
CEE520

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisites: ENVE 4011, ENVE 5001 or CEE 5001; or consent of instructor and advisor

Complete ALL of the following Courses:

- ENVE4011 - Solid & Hazardous Waste Engineering
  OR CEE5001 - Finite Element Analysis for Civil Engineers

Additional Comments:

No Requirement Level

CEE5021 - Green Engineering

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Evaluating the full range of environmental effects associated with products and services from raw Materials acquisition and manufacturing to use and disposal. Industrial processes, potential waste minimization procedures, relevant regulations as well as life-cycle analysis. Shares lecture with ENVE 4021, with additional expectations for graduate credit.

Equivalent Courses: Previous & Current Courses
CEE521

No Requirements

CEE5022 - Geotechnical Waste Containment Design

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Design procedures consisting of waste disposal methods, various containment systems, and associated remediation techniques. Waste characterization and soil-waste interactions, contaminant transport in low permeability soils, geosynthetics and soil Materials use in waste containment, remedial issues of solidification and stabilization and barrier design, and landfill- and surface impoundment-related design, including liners, leachate and gas collection and removal, final covers, static and seismic slope stability, and settlement analysis. Geotechnical problem definition, application of field and laboratory test data, use of computer models for analysis and design.

Equivalent Courses: Previous & Current Courses
CEE522

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisite: ME 4020 or consent of instructor and advisor

Complete ALL of the following Courses:
- ME4020 - Soil Mechanics

Additional Comments:

No Requirement Level

CEE5023 - Open Channel Hydraulics

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Analysis and characteristics of flow in natural and artificial open channel systems using energy, continuity, and momentum equations as applied to steady-state uniform, gradually varied, and rapidly varied flow profiles with emphasis on design of hydraulic structures. The students will use their knowledge of fluid mechanics, calculus, numerical analysis, and computer science to solve practical open channel flow problems. A variety of hydraulic conveyance and structures are covered, including rigid and flexible boundary channels, culverts, sluice gates, fumes, weirs, spillways, stilling basins, and bridges. Shares lecture with CE 4023, with additional expectations for graduate credit.

Equivalent Courses: Previous & Current Courses
CE4023, CE423, CEE523

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisite: ES 216 or consent of instructor and advisor

Complete ALL of the following Courses:
- ES216 - Engineering Fluid Mechanics

Additional Comments:

No Requirement Level

CEE5024 - Physicochemical and Biological Processes

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Fundamentals of physical, chemical, and microbial processes in natural and engineered remedial systems. Phase interactions, chemical transformations, transport phenomena, and separation processes in the natural and engineered systems. Characteristics of microorganisms, microbial ecology, biokinetics, and nutrient requirements. The role of microorganisms in treatment processes and the monitoring and enhancement of in-situ activity.

No Requirements

CEE5041 - Min Design Loads for Buildings

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Introduction to risk concepts, behavior and determination of design loads acting on structures. Topics covered include development of codes and laws, in-depth discussion of minimum design loads (dead, live, snow, earthquake and wind) and load combinations, risk assessment in terms of uncertainty in material properties, consequences, heuristic loading assumptions, general structural integrity, and comprehension and application of codified documents. (cross-listed with CE 4011; additional course expectation for graduate credit)

Equivalent Courses: Previous & Current Courses
CE4011, CE411, CEE541

Simple Requisites

Course Requisite Requirements

Prerequisite: Graduate Standing in Civil & Environmental Engineering, or consent of instructor

No Requirement Level

CEE5043 - Foundation Design & Analysis

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Principles of soil mechanics and foundation engineering. Immediate and time dependent settlements, service loads, lateral loads, loading, approximate analysis methods, performance requirements, shallow foundations, lateral earth pressure, design of retaining walls, deep foundations, special footings, slope stability, and computer modeling of foundations. (Same as ME 5031). (cross-listed with CE 4013; additional course expectations for graduate credit)

Equivalent Courses: Previous & Current Courses
CE4013, CE413, CEE543, ME4013, ME413, ME5031, ME531

Simple Requisites

Course Requisite Requirements

Prerequisite: Graduate Standing in Civil & Environmental Engineering, or consent of instructor

No Requirement Level

CEE5051 - Graduate Seminar

General

Credit Hrs

Credit Hrs:
1

Grade Modes
Pass/Fail

Course Description
Seminar presentations by faculty, graduate students, and guest speakers on their interests and current research topics. Graded on S/U basis.

Equivalent Courses: Previous & Current Courses
CEE551

No Requirements

CEE5071 - Special Topics in Environmental Engineering

General

Credit Hrs

Credit Hrs:
2

Credit Hours Max:
4

Credit Hours Operator:
TO

Grade Modes
Standard Letter

Course Description
Special topics in Environmental Engineering.

Equivalent Courses: Previous & Current Courses
CE491, CEE571

Simple Requisites

Course Requisite Requirements

Prerequisite: Consent of instructor

Offered on sufficient demand

No Requirement Level

CEE5081 - Directed Study

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
12

Credit Hours Operator:
TO

Grade Modes
Standard Letter

Course Description
Independent design project conducted by the student under the direction of the student's advisor. A written final report and oral presentation are required.

Equivalent Courses: Previous & Current Courses
CEE581

No Requirements

CEE5090 - Independent Study

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
12

Credit Hours Operator:
TO

Grade Modes
Pass/Fail, No Report

Course Description
Independent research organized and conducted by the student under the direction of the student's advisor. A written final report is required.

Equivalent Courses: Previous & Current Courses
CEE590

No Requirements

CEE5091 - Thesis

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
12

Credit Hours Operator:
TO

Grade Modes
Audit, No Report

Equivalent Courses: Previous & Current Courses
CEE591

No Requirements

CEE Dept/ Environmental Engineering Department

Environmental Engineering

(Civil and Environmental Engineering)

CONTACT US		
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Phone: 575-835-5500		
website: https://www.nmt.edu/academics/ceeng/		

- ***Professors:*** *Richardson (Chair of the Department)*
- ***Associate Professor:*** *Carrico*
- ***Assistant Professor:*** *Harb*
- ***Adjunct Faculty:*** *Brady, Cal, Schluep*

Degrees Offered: B.S. in Environmental Engineering; M.S. in Civil and Environmental Engineering (please refer here for additional information on the graduate degree)

Department Mission Statement

The primary objective of this program is to produce well-balanced environmental engineers capable of entering the environmental engineering profession or continuing their studies at the graduate level. Graduates will be well-prepared to solve current environmental engineering problems, and they will have the ability to adapt to problems of the future.

By providing relevant experiences and building requisite technical skills and judgment cumulatively through rigorous problem solving, the program will instill the confidence needed for students to emerge as leaders in the field of environmental engineering

Program Educational Objectives

- To develop graduates that function successfully in areas of environmental engineering, such as air pollution, water and wastewater treatment, and solid and hazardous waste engineering.
- To prepare graduates for advanced education in environmental engineering and related fields, and for professional licensure.

The achievements of environmental engineers are well-known to the general public, because environmental engineers are charged with producing clean water, disposing of waste responsibly, and maintaining air quality. Projects that environmental engineers work on include: design of water and wastewater treatment facilities, landfill design, design of air pollution control devices, and environmental law and permitting. The undergraduate program offers a balanced approach to environmental engineering education.

Students take a common core of engineering science and environmental engineering courses, including courses in environmental law, water and wastewater treatment, soil mechanics, soil and hazardous waste, hydrology and air pollution control. The environmental engineering courses teach students the fundamentals of engineering design, as well as potential applications. Students are taught how to use computer software to expedite the design process, and they are also taught how to balance engineering designs with economic constraints. During their senior year, undergraduate students work with a professor on a design thesis

Programs

Accelerated M.S. in Civil & Environmental Engineering (pathway)

[Program Overview]

Program Title
Accelerated Master of Science in Civil & Environmental Engineering

Department(s)
CEE Dept/ Civil Engineering, CEE Dept/ Environmental Engineering

Program Description
Qualified students may apply for admissions to the Accelerated Masters program in Civil and
Environmental Engineering.

Program Information & Policies
Students are expected to apply for admission to this program after the first semester of their junior year. In fulfillment of the requirements for both B.S. and M.S. degrees in Civil and Environmental Engineering, as outlined in their respective sections, accepted students may apply up to 6 credits of 5000-level courses to both degrees.

[Specializations/Dissertation Concentration Options]

Specialization/Dissertation Options

Specialization/Dissertation Title
Civil or Environmental Engineering

Specialization/Dissertation Requirements
See MS-Civil & Environmental Engr degree.

Environmental Engineering (minor)

[Program Overview]

Program Title
Minor in Environmental Engineering

Department(s)
CEE Dept/ Environmental Engineering

Program Description
Minimum of 18 credit hours required to obtain a minor in Environmental Engineering

Simple Requisites

Program Requirements

Minor in Environmental Engineering
Type
Completion Requirement

ENVE Courses

Complete ALL of the following Courses:

- ENVE201 - Introduction to Environmental Science & Engineering

- ENVE3001 - Applied Priciples of Environmental Engineering

12 additional hours of approved courses from the following

Earn at least 12 credits from the following:

- Approved ENVE courses
- OR ME4020 Soil Mechanics - Soil Mechanics
- OR GEOL4040 Hydro. Theory & Field Methods - Hydro Theory & Field Method

Additional Comments:
Minimum credit hours required – 18

Institute General Requirements
See the Institute **General Education Core Requirements.**

No Requirement Level

BS-ENVE - B.S. in Environmental Engineering

[Program Overview]

Program Title
B.S. in Environmental Engineering

Department(s)
CEE Dept/ Environmental Engineering

Degree & Program Code
BS-ENVE

Program Description
The primary objective of this program is to produce well-balanced environmental engineers capable of entering the environmental engineering profession or continuing their studies at the graduate level. Graduates will be well-prepared to solve current environmental engineering problems, and they will have the ability to adapt to problems of the future.

By providing relevant experiences and building requisite technical skills and judgment cumulatively through rigorous problem solving, the program will instill the confidence needed for students to emerge as leaders in the field of environmental engineering.

Program Information & Policies
Students pursuing a B.S. in Environmental Engineering must take all courses counting towards their degree (including technical electives) for a letter grade, except for courses in Areas 4, 5, 6, and 7 of the institute requirements, which may be taken on an S/U basis. Environmental engineering majors must maintain a minimum GPA of 2.0 in required courses (including technical electives) in order to graduate.

Simple Requisites

Program Requirements
Minimum Hours Required—132

In addition to the General Education and Institute Core Curriculum , the following courses are required:

Program Requirements
Type
Completion Requirement

Mathematics Requirements

Complete ALL of the following Courses:

- MATH2532 - Calculus III
- MATH2350 - Statistical Methods
  AND MATH2350L - Statistical Methods Lab
- MATH3035 - Ordinary Differential Equation
  AND MATH3035L - Ordinary Differential Equations Computer Lab

Biology Requirements

Complete ALL of the following Courses:

- BIOL2110 - Pinciples of Biology: Cellular & Molecular
  AND BIOL2110L - Pinciples of Biology: Cellular & Molecular Lab
  AND BIOL3043 - Environmental Microbiology

Geology Requirements

Complete ALL of the following Course Sets:

- GEOL4040 & GEOL4040L: Hydrology Theory & Field Methods and Lab

Engineering Science Requirements

Complete ALL of the following Courses:

- ES110 - Intro to Engineering Design
  AND ES110L - Intro. to Engineering Lab
- ES111 - Computer Programming for Engineers
  AND ES111L - Computer Programming Lab
- ES201 - Statics
- ES216 - Engineering Fluid Mechanics
- ES3002 - Mechanics of Materials
- ES3016 - Engineering Economics
- ES3047 - Thermodynamics
- ES3050 - Heat & Mass Transfer

Environmental Engineering Requirement

Complete ALL of the following Courses:

- ENVE101 - Environmental Engineering Seminar
- ENVE201 - Introduction to Environmental Science & Engineering
- ENVE3001 - Applied Priciples of Environmental Engineering
- ENVE3002 - Environmental Law & Regulations
- ENVE3003 - Water Treatment Process Design
- ENVE3004 - Wastewater Treatment Process Design
- ENVE4011 - Solid & Hazardous Waste Engineering
- ENVE4013 - Air Resources Engineering
- ENVE4080 - Environmental Engineering Senior Design
  OR ENVE4090 - Senior Design Thesis I
- ENVE4092 - Senior Design Thesis II
- ME4020 - Soil Mechanics
- ENVS4012 - Geographic Information Systems

Mineral Engineering Requirement

Complete ALL of the following Course Sets:

- ME4020 & ME4020L: Soil Mechanics and Lab

Environmental Science Requirement

Complete ALL of the following Courses:

- ENVS4012 - Geographic Information Systems

Additional Comments:

Approved Technical Electives include the following (3)

Type
Completion Requirement

Technical Electives Minimum of 3 Cr. required

Earn at least 3 credits from the following:

- ENVE4014 - Energy & Environment
- ENVE4021 - Green Engineering
- ENVE4091 - Special Topics
- CE201 - Construction Matl/ Prop/Test
- CE3001 - Introduction to Construction Engineering
- CE3002 - Introduction to Structural Engineering
- CE4001 - Finite Element Analysis for Civil Engineers
- CE4013 - Foundation Design & Analysis
- CE4015 - Green Building
- CE4020 - Pavement Materials & Design (Inactive)
- CE4022 - Geotechnical Waste Containment
- CE4023 - Open Channel Hydraulics
- CH E3051 - Chemical Process Kinetics
- CH E3052 - Separation Process
- CH E4043 - Process Dynamics & Control
- CHEM3033 - Organic Chemistry I
- CHEM4022 - Environmental Chemistry
- EE211 - Circuits & Signals I
- ES3032 - Electrical Engineering
- ME4010 - Environmental Issues
- ME4022 - Rock Mechanics
- ME4027 - Site Investigation (Inactive)
- MENG3004 - Advanced Strength of Materials
- MENG3005 - Numerical Methods & Analysis
- MENG4021 - Finite Element Analysis & Design

Or other electives approved by the department chair.

Additional Comments:

Institute General Requirements

General Education Requirements for Undergraduate Students
Type
Completion Requirement

Bachelor of Science General Requirements

Area 1: Communications

Complete ALL of the following Course Sets:

- Area 1: Communications (BS Degree) (9 credits)

Area 2: Mathematics and Quantitative Reasoning

Complete ALL of the following Course Sets:

- Area 2: Mathematics (BS Degree) (8 credits)

Area 3: Science

Complete ALL of the following Course Sets:

- Area 3: Science (BS Degree) (18 credits)

Area 4: Social and Behavioral Science

Earn at least 6 credits from the following:

- Area 4: Social and Behavioral Science (BS or BGS Degree) (6 credits)

Area 5: Humanities

Earn at least 6 credits from the following:

- Area 5: Humanities (BS or BGS Degree) (6 credits)

Creative and Fine Arts

Earn at least 3 credits from the following:

- Area 6: Creative and Fine Arts (BS, BA, or BGS Degree) (3 credits)

Area 7: Additional Courses from Areas 4, 5, 6

Earn at least 3 credits from the following:

- Area 7: Additional Courses from Areas 4, 5, 6 (BS, BA, or BGS Degree) (3 credits)

Additional Comments:

No Requirement Level

[Learning Outcomes]

Outcome
An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics

Outcome
An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors

Outcome
An ability to communicate effectively with a range of audiences

Outcome
An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

Outcome
An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives

Outcome
An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions

Outcome
An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

[Sample 4-Year Curriculum Plan(s)]

Degree Map Name
Sample Curriculum 1 for Bachelor of Science in Environmental Engineering
Total Degree Map Credits
132
Degree Map Effective Catalog Year
2025 -
Degree Map Description
** In order to earn or retain the NM Lottery Scholarship, students must earn 15 credits each semester. Please see your advisor for more information.

Year	Semester	Actual Credits
Year 1	Fall	18

Course
- ENVE1001 - Environmental Engr Seminar (Inactive)

Actual Credits 1

Course
- ENGL1110 - g1:Composition I

Actual Credits 3

Course
- BIOL2110 & BIOL2110L: Principles of Biology I and Lab

Actual Credits 4

Course
- CHEM1215 & CHEM1215L: g:General Chemistry I and Lab

Actual Credits 4

Course
- MATH1510 & MATH1510L: g:Calculus I & Lab

Actual Credits 4

Course
- ES110 - Intro to Engineering Design

Actual Credits 2

Year	Semester	Actual Credits
Year 1	Spring	17

Course
- ENGL1120 - g1:Composition II

Actual Credits 3

Course
- ES111 - Computer Programming for Engineers

Actual Credits 3

Course
- MATH1520 - g2:Calculus II

Actual Credits 4

Course
- CHEM1225 & CHEM1225L: g: General Chemistry II and Lab

Actual Credits 4

Course
- Social Science/Humanities/Fine & Creative Arts Requirements

Actual Credits 3

Year	Semester	Actual Credits
Year 2	Fall	18

Course
- MATH2532 - Calculus III

Actual Credits 4

Course
- PHYS1310 & PHYS1310L: g:Calculus-Physics I and Lab

Actual Credits 5

Course
- ENVE201 - Introduction to Environmental Science & Engineering

Actual Credits 3

Course
- Social Science/Humanities/Fine & Creative Arts Requirements

Actual Credits 3

Course
- Humanities/Social Science

Actual Credits 3

Year	Semester	Actual Credits
Year 2	Spring	17

Course
- ENVE3001 - Applied Priciples of Environmental Engineering

Actual Credits 3

Course
- MATH3035 - Ordinary Differential Equation

Actual Credits 3

Course
- PHYS1320 & PHYS1320L: g:Calculus-Based Physics II and Lab

Actual Credits 5

Course
- BIOL3043 - Environmental Microbiology

Actual Credits 3

Course
- ES201 - Statics

Actual Credits 3

Year	Semester	Actual Credits
Year 3	Fall	15

Course
- ENVE3003 - Water Treatment Process Design

Actual Credits 3

Course
- ES216 - Engineering Fluid Mechanics

Actual Credits 3

Course
- ES3002 - Mechanics of Materials

Actual Credits 3

Course
- ES3047 - Thermodynamics

Actual Credits 3

Course
- MATH2350 - Statistical Methods

Actual Credits 3

Year	Semester	Actual Credits
Year 3	Spring	17

Course
- ENVE3002 - Environmental Law & Regulations

Actual Credits 2

Course
- ENVE3004 - Wastewater Treatment Process Design

Actual Credits 3

Course
- ES3016 - Engineering Economics

Actual Credits 3

Course
- ES3050 - Heat & Mass Transfer

Actual Credits 3

Course
- ENGL3041 - i1:Technical Writing

Actual Credits 3

Course
- Humanities/Social Science

Actual Credits 3

Year	Semester	Actual Credits
Year 4	Fall	16

Course
- ENVE4011 - Solid & Hazardous Waste Engineering

Actual Credits 4

Course
- ENVE4013 - Air Resources Engineering

Actual Credits 4

Course
- ENVE4090 - Senior Design Thesis I

Actual Credits 1

Course
- GEOL4040 & GEOL4040L: Hydrology Theory & Field Methods and Lab

Actual Credits 4

Course
- ME4020 - Soil Mechanics

Actual Credits 3

Year	Semester	Actual Credits
Year 4	Spring	14

Course
- ENVS4012 - Geographic Information Systems

Actual Credits 3

Course
- ENVE4092 - Senior Design Thesis II

Actual Credits 2

Course
- ENVE Approved Technical Electives

Actual Credits 3

Course
- Social Science/Humanities/Fine & Creative Arts Requirements

Actual Credits 3

Course
- Humanities/Social Science

Actual Credits 3

Degree Map Name
Alternate Sample Curriculum 2 Bachelor of Science in Environmental Engineering
Total Degree Map Credits
30
Degree Map Effective Catalog Year
2025 -

Year	Semester	Actual Credits
Year 4	Summer	3

Course
- CEE5081 - Directed Study

Actual Credits 3

Year	Semester	Actual Credits
Year 4	Fall	16

Course
- ENVE4011 - Solid & Hazardous Waste Engineering

Actual Credits 4

Course
- ENVE4013 - Air Resources Engineering

Actual Credits 4

Course
- GEOL4040 & GEOL4040L: Hydrology Theory & Field Methods and Lab

Actual Credits 4

Course
- Social Science/Humanities/Fine & Creative Arts Requirements

Actual Credits 3

Course
- ENVE4090 - Senior Design Thesis I

Actual Credits 1

Year	Semester	Actual Credits
Year 4	Spring	11

Course
- ENVS4012 - Geographic Information Systems

Actual Credits 3

Course
- ENVE4092 - Senior Design Thesis II

Actual Credits 2

Course
- ENVE 5010 (Generic)

Actual Credits 3

Course
- Humanities/Social Science

Actual Credits 3

MS-CEE - M.S. in Civil & Environmental Engineering

[Program Overview]

Program Title
Master of Science in Civil and Environmental Engineering

Department(s)
CEE Dept/ Civil Engineering, CEE Dept/ Environmental Engineering

Degree & Program Code
MS-CEE

Required Specialization/Concentration(s)
w spec. in Civil Engineering, w spec. in Environmental Eng

Program Description
The Civil and Environmental Engineering graduate program at New Mexico Tech provides a unique educational and research experience in the engineering and science of the natural and the built environment and environmental protection. The plan of study and research is suited to each individual, drawing upon the strengths of the student, taking advantage of program capabilities, and complementing research activities within and outside New Mexico. A thesis or independent study project is required to complete the degree. General requirements common to all Master of Science degree curricula also apply.

Program Information & Policies
Admission to the Master of Science in Civil and Environmental Engineering program requires competence in mathematics, chemistry, physics, and engineering science comparable to the Bachelor of Science in Civil or Environmental Engineering. The department chair, or an advisory committee, will evaluate the scholastic record of every entering student to determine whether any deficiencies exist in their educational background. For example, students entering the program without an engineering degree may be required to take additional course work in such areas as fluid mechanics, heat and mass transfer, and differential equations before being granted a M.S. in Civil and Environmental Engineering. It is up to the student and his or her graduate committee to

determine the specific plan of study for the student after the first semester of graduate work. Transfer credit for courses taken at another institution will be evaluated on an individual basis.

Simple Requisites

Program Requirements

Thesis Option
Type
Completion Requirement

Additional Comments:
A total of 30 credit hours are required for a M.S. in Civil and Environmental Engineering, which must include a minimum of 18 credit hours of Civil and Environmental Engineering coursework, and 6 credit hours of CEE 5091 (thesis). All students must take a minimum of 12 credit hours of 5000-level Civil and Environmental Engineering courses.

Independent Study Option
Type
Completion Requirement

Additional Comments:
A student may petition the department with the approval of the Department Chair to pursue a Master of Science degree with an independent study option. Candidates for the non-thesis Master of Science option must complete a minimum of 30 credit hours, of which 3 credit hours must be independent study (CEE 5090). All students must take a minimum of 12 credit hours of 5000-level Civil and Environmental Engineering courses, and an additional 6 credits of 4000- or 5000-level Civil and Environmental Engineering courses (18 credits total). The student's course of study must be approved by the student's advisory committee, and it must fulfill the other requirements of the M.S. in Civil and Environmental Engineering degree program with the exception of 6 credit hours of thesis (CEE 5091).

Institute General Requirements
See the Master of Science information found in the Graduate section of the catalog at Master of Science Degree.

No Requirement Level

[Specializations/Dissertation Concentration Options]

Specialization/Dissertation Options

Specialization/Dissertation Title
Specialization in Environmental Engineering

Specialization/Dissertation Requirements
The Area of Specialization in Environmental Engineering requires a minimum of 4 courses be taken from the following list of CEE courses:

CEE 5001, Physicochemical and Biological Processes

CEE 5003, Environmental Risk Assessment

CEE 5010, Advanced Water Chemistry

CEE 5011, Water Quality Management and Control

CEE 5012, Industrial Water and Wastewater Treatment

CEE 5013, Air Resources Engineering

CEE 5014, Energy & Environment

CEE 5020, Hazardous Waste Site Remediation

CEE 5021, Green Engineering

CEE 5022, Geotechnical Waste Containment

CEE 5023, Open Channel Hydraulics

CEE 5071, Special Topics

Specialization/Dissertation Options

Specialization/Dissertation Title
Specialization in Civil Engineering

Specialization/Dissertation Requirements
The Area of Specialization in Civil Engineering requires a minimum of 4 courses be taken from the following list of CEE courses:

CEE 5001, Finite Element Analysis for Civil Engineers

CEE 5002, Introduction to Transportation Engineering

CEE 5006, Design of Steel Structures

CEE 5007, Design of Concrete Structures

CEE 5004, Reinforced Masonry and Timber Design

CEE 5005, Infrastructure

CEE 5018 Structural Dynamics

CEE 5041, Minimum Design Loads for Buildings

CEE 5043, Foundation Design and Analysis

CEE 5008, Advanced Design of Steel Structures

CEE 5009, Advanced Design of Concrete Structures

CEE 5023, Open Channel Hydraulics

CEE 5071, Special Topics

[Learning Outcomes]

Outcome
1. Graduates of the Civil and Environmental Engineering MS Program will be able to: Assess various infrastructure issues associated with planning and development of the urban and natural environment and their accompanying social impacts

Outcome
2. Synthesize technical knowledge of engineering analysis and design to identify, formulate, and solve traditional or emerging problems of professional interest and importance by selecting and applying appropriate tools and techniques

Outcome
3. Specify or design an experiment to meet a need, conduct the experiment, and analyze and explain the resulting data

Outcome
4. Demonstrate the technical and communication skills needed to be successful in their professional practice, both in writing and through oral presentations

Courses

ENVE101 - Environmental Engineering Seminar

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Seminars by faculty, and guest speakers from industry, consulting, and government provide a brief overview of environmental engineering topics, including air pollution, water quality, and solid and hazardous waste.

Equivalent Courses: Previous & Current Courses
ENVE1001

No Requirements

ENVE201 - Introduction to Environmental Science & Engineering

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
The fundamentals of physics, chemistry, biology, and geology applied to problem solving in science and engineering. A study of environmental phenomena and strategies to control pollution of water, air, and land. Definition of basics for

Equivalent Courses: Previous & Current Courses
ENVE2001

water treatment, solid and waste management, radioactive waste management, and air pollution. Environmental impact statements and environmental ethics.

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

Prerequisites

Fulfill ALL of the following requirements:

Complete ALL of the following Courses:
- CHEM1225 - g3:General Chemistry II
  AND CHEM1225L - g3:General Chemistry II Lab

AND

Complete ALL of the following Courses:
- BIOL2110 - Pinciples of Biology: Cellular & Molecular
  AND BIOL2110L - Pinciples of Biology: Cellular & Molecular Lab

AND

Complete ALL of the following Courses:
- MATH1520 - g2:Calculus II

Additional Comments:

No Requirement Level

ENVE3001 - Applied Priciples of Environmental Engineering

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Application of chemical and biological principles to the study of the natural environment and engineered systems related to pollution of air, water, and soil. Topics include: atmospheric chemistry, biokinetics, carbonate cycle, corrosion, complexation (coordination chemistry), redox reactions, and precipitation. Principles will be tied to specific environmental engineering applications.

Equivalent Courses: Previous & Current Courses
ENVE301

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- ENVE201 - Introduction to Environmental Science & Engineering
  OR ENVE2001 - Intro to Envir. Science & Engr (Inactive)

Additional Comments:

No Requirement Level

ENVE3002 - Environmental Law & Regulations

General

Credit Hrs

Credit Hrs:
2

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
An overview of the major federal and state environmental statutes and regulations. Statutory/regulatory scheme and its application to current environmental problems. Specific regulations pertaining to air, water, toxic substances and pesticides, and solid and hazardous wastes, as well as related regulatory programs. Historical and philosophical basis of environmental regulation.

Equivalent Courses: Previous & Current Courses
ENVE302

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- ENVE201 - Introduction to Environmental Science & Engineering
  OR ENVE2001 - Intro to Envir. Science & Engr (Inactive)

Additional Comments:

No Requirement Level

ENVE3003 - Water Treatment Process Design

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Physical-chemical processes encountered in the design, analysis, and operation of municipal and industrial water treatment systems. Concepts of mass balance and chemical reactor theory applied to water quality improvements. Specific topics include flocculation/coagulation, softening, sedimentation, filtration, stabilization, disinfection, ion exchange, carbon adsorption, and gas transfer. A team design project will be required as partial fulfillment of course requirements.

Equivalent Courses: Previous & Current Courses
ENVE303

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

Prerequisite

Fulfill ANY of the following requirements:

Complete ALL of the following Courses:

- ENVE201 - Introduction to Environmental Science & Engineering
  OR ENVE2001 - Intro to Envir. Science & Engr (Inactive)

OR

consent of instructor and advisor

Additional Comments:

No Requirement Level

ENVE3004 - Wastewater Treatment Process Design

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Physical-chemical-biological processes encountered in the design, analysis, and operation of municipal and industrial wastewater treatment systems. Microbial kinetics of carbon and nutrient removal. Aerobic and anaerobic biological processes occurring in suspended growth and fixed-film reactors. Processing, management, and disposal of biosolid residuals. Specific topics include collection, pretreatment, sedimentation, trickling filters, activated sludge aerobic and anaerobic digestion. A team design project will be required as partial fulfillment of course requirements.

Equivalent Courses: Previous & Current Courses
ENVE304

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Fulfill ANY of the following requirements:

Complete ALL of the following Courses:
- BIOL3043 - Environmental Microbiology

OR

Complete ALL of the following Courses:
- ES216 - Engineering Fluid Mechanics
  OR ES216D - Engineering Fluid Mechanics (Inactive)

OR

consent of instructor and advisor

Additional Comments:

Corequisite
Type
Corequisite

Corequisite

Enroll in the following Courses:
- ES3050 - Heat & Mass Transfer

Additional Comments:

No Requirement Level

ENVE4006 - Environmental Engineering Unit Operations Lab

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Laboratory and field studies of unit operations and processes in environmental engineering. A student-designed feature will be integrated into all of the studies. Potential topics include reactor mixing and hydraulics, coagulation, flocculation, sedimentation, filtration, carbon adsorption, chemical oxidation, air stripping, etc. Emphasis on planning of studies, preparation of work plans, data collection and analysis, report writing, and technical presentation.

Equivalent Courses: Previous & Current Courses
ENVE406

Simple Requisites

Course Requisite Requirements

Corequisites
Type
Corequisite

Corequisite

Fulfill ANY of the following requirements:

Enroll in the following Courses:
- ENVE3003 - Water Treatment Process Design

OR

Enroll in the following Courses:
- ENVE3004 - Wastewater Treatment Process Design

OR

consent of instructor and advisor

Additional Comments:

No Requirement Level

ENVE4011 - Solid & Hazardous Waste Engineering

General

Credit Hrs
Credit Hrs:
4

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
A study of solid waste management functions: generation, transport, storage, treatment and recovery, and disposal. Emphasis on design of treatment and recovery unit operations and processes for both municipal and industrial wastes. Site selection criteria and engineering considerations for land disposal alternatives. Special consideration of hazardous waste management: treatment, storage, disposal. Uncontrolled hazardous waste sites: risk assessment and remediation design. Projects on waste management will be developed by teams as partial fulfillment of course requirements.

Equivalent Courses: Previous & Current Courses
ENVE411

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

Prerequisites

Fulfill ANY of the following requirements:

Complete ALL of the following Courses:
- ES3050 - Heat & Mass Transfer

OR

consent of instructor and advisor

Additional Comments:

No Requirement Level

ENVE4013 - Air Resources Engineering

General

Credit Hrs
Credit Hrs:
4

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Sources, behavior, and fate of gaseous and particulate air pollutants. Principles of meteorology and atmospheric diffusion in relation to modeling pollutant transport and dispersion. Design of air pollution control equipment for removal of gases and particles from air streams. Unit operations examined include cyclones, electrostatic precipitators, fabric filters, wet scrubbers, incinerators, biofiltration, adsorbers, and absorbers. In the laboratory section, students will develop an air permit, and complete projects using dispersion modeling and air pollution engineering software. Shares lecture with ENVE 513, with additional expectations for graduation credit.

Equivalent Courses: Previous & Current Courses
ENVE413

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

Prerequisites

Fulfill ANY of the following requirements:

Complete ALL of the following Courses:
- ES216 - Engineering Fluid Mechanics
  AND ES3050 - Heat & Mass Transfer

OR

consent of instructor and advisor

Additional Comments:

No Requirement Level

ENVE4014 - Energy & Environment

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course takes an engineering approach to evaluating energy systems and their environmental impacts. Particular attention is focused upon multimedia environmental impacts to land, water, air, and climate -- all energy sources. In the beginning, students review the fundamental principles of energy, heat, work, power and efficiency. The students apply these concepts of physic, chemistry, thermodynamics, heat transfer, and economics in evaluating various energy systems. Student evaluate major energy resources including advanced fossil-fuel, renewables, energy efficiency and conservation techniques, and nuclear power systems. The course also explores the full gamut of energy end uses as well -- electrical, space heating and cooling, transportation, and lighting. The course emphasizes group project work and includes a special project for graduate credit. Shares lecture with ENVE 514, with additional expectations for graduation credit.

Equivalent Courses: Previous & Current Courses
ENVE414

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

Prerequisites

Fulfill ANY of the following requirements:

Complete ALL of the following Courses:
- MATH1520 - g2:Calculus II

OR

Complete ALL of the following Courses:
- PHYS1320 - g3:Calculus-based Physics II

OR

Complete ALL of the following Courses:
- CHEM1225 - g3:General Chemistry II

OR

consent of instructor and advisor

Additional Comments:

No Requirement Level

ENVE4021 - Green Engineering

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Evaluating the full range of environmental effects associated with products and services from raw Materials acquisition and manufacturing to use and disposal. Industrial processes, potential waste minimization procedures, relevant regulations as well as life-cycle analysis. Shares lecture with ENVE 521, with additional expectations for graduate credit.

Equivalent Courses: Previous & Current Courses
ENVE421

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisites
Junior standing

Additional Comments:

No Requirement Level

ENVE4080 - Environmental Engineering Senior Design

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Design of equipment, unit processes, and systems in Environmental Engineering through application of scientific, technological, and economic principles. Emphasis is placed upon problem formulation and the conceptual, analytical, and decision aspects of open-ended design situations. Course integrates knowledge and skills gained in previous and concurrent courses. Students work

Equivalent Courses: Previous & Current Courses
ENVE480

competition. A team project required. Instructors may also require interim reports, an individual final report, and a final presentation.

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisites
Senior standing and consent of instructor

Additional Comments:

No Requirement Level

ENVE4090 - Senior Design Thesis I

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
3

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
An open-ended design of equipment, unit processes, and/or systems in Environmental Engineering through application of scientific, technological, and economic principles. The investigative component of the Senior Design Thesis focuses on identifying feasible design topics of interest to the student. Working with a faculty advisor, a thesis topic will be selected and the thesis scope and objectives defined. A preliminary thesis outline and literature review will be completed in accordance with the semester time-line schedule posted by the department. The investigative component integrates knowledge and skills gained in previous and concurrent courses.

Equivalent Courses: Previous & Current Courses
ENVE490

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisites
Fulfill ANY of the following requirements:

Senior standing

OR

consent of instructor and advisor

Additional Comments:

No Requirement Level

ENVE4091 - Special Topics

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
6

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, Standard Letter

Equivalent Courses: Previous & Current Courses
ENVE491

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Fulfill ANY of the following requirements:

Senior standing

OR

consent of instructor and advisor

Additional Comments:

No Requirement Level

ENVE4092 - Senior Design Thesis II

General

Credit Hrs

Credit Hrs:
2

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
An open-ended design of equipment, unit processes, and/or systems in Environmental Engineering through application of scientific, technological, and economic principles. The design component of the Senior Design Thesis is a continuation in content of the investigative component completed in the previous semester. This course focuses on the design and economic analysis of the selected topic outlined in the deliverable for ENVE 4090. An oral presentation and completed Senior Design Thesis including, but not limited to, introduction, scope, and objectives, literature review, selection criteria, design and technical analysis, and economic analysis shall be completed in accordance with the schedule posted by the department. This capstone design component course integrates knowledge and skills gained in previous and concurrent courses.

Equivalent Courses: Previous & Current Courses
ENVE492

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisites

Passed with a grade of C or higher. This course shall be taken with in ENVE 4090 in sequential semesters.

Complete ALL of the following Courses:

- ENVE4090 - Senior Design Thesis I

Additional Comments:

No Requirement Level

CLASS Department

CONTACT US		
Office: Fitch Hall 103 , 801 Leroy Place		
State & Zip: NM 87801		
Phone: 575-835-5445		
website: https://www.nmt.edu/academics/class/		

- **Professor:** Simpson (Dean of Arts & Sciences)
- **Associate Professors:** ChoGlueck, Dotson, Durao, Elliott (Chair of the Department), Johnson, Kramer-Simpson, Mikhailova, Samuels, Thompson
- **Assistant Professors:** ChoGlueck, Elliott, McCullough, Spruill
- **Assistant Teaching Professors:** Benalil, Clattenburg, Cruz, Lackey, Olson
- **Adjunct Faculty:** Bouchey, de Dios Piñeda Guadarrama, Gabor Da Silva, Garcia Guillen Phillips, Sewell, Pias, Rowe, Smith, Stringer, Thomas, Wilkinson.
- **Emeritus Professors:** Campbell, Corey, Deming, Dezember, D. Dunston, S. Dunston, Etscorn, Holson, Lara-Martínez, Olsen, Wilson, Yee
- **Music Director:** Benalil

Degrees Offered: *B.S and B.A in Interdisciplinary Sciences, B.S and B.A in Psychology, B.S. in Technical Communication, Bachelor of General Studies (BGS), and Associate of General Studies (AGS). Minors Offered: Creative Thinking and Practice, Secondary Education, Hispanic Studies, History, Literature, Music, Philosophy, Psychology, Science Technology and Society, Technical Communication, Graduate Certificates: Scientific & Professional Communication. M.S. in Public Engagement in Science, Design, and Communication.*

The CLASS Department and Psychology and Education recently merged as of Summer 2020.

The multidisciplinary Department of Communication, Liberal Arts, and Social Sciences develops students' ability to learn, reason, and communicate in diverse fields of study and areas of human experience. The CLASS Department's mission is threefold: to help students write well, think critically, and read widely; to provide an intellectual experience that increases students' awareness of human history, human cultures, and human values; and to encourage the lifelong study of human experience.
The Department provides virtually all courses in four of the six areas of the General Education Core Curriculum required by the New Mexico Higher Education Department for the comprehensive education of undergraduates enrolled in New Mexico state institutions of higher education.
These areas are:

- **Area 1**: Communications (English Composition College Writing and Technical Writing)
- **Area 4**: Social Sciences (Political Science, Psychology, Social Science, Women's and Gender Studies);
- **Area 5**: Humanities (Communication, Creative Writing, Hispanic History, History, Languages, Literature, Media Studies, Philosophy, Popular Culture, Public Speaking, Technical Communication, Visual Art);
- **Area 6** : Creative and Fine Arts (Art History, Music, Theater).

The Department offers degrees: an industry-endorsed Bachelor of Science in Technical Communication; both a Bachelor of Arts and Bachelor of Science in Psychology; a Bachelor of Arts and Bachelor of Science in Interdisciplinary Sciences, a Bachelor of General Studies, and Associate of General Studies. It also offers a Graduate Certificate in Scientific and Professional Communication; a Master of Science in Public Engagement in Science, Design, and Communication; and several minors, allowing students to enrich their studies at Tech to become successful professionals and knowledgeable members of society.
The programs in Psychology are designed to provide students with a scientific foundation in the methods and basic data in psychology and neuroscience and to prepare students for further work in all specializations within the field. The B.A. degree program allows more flexibility and breadth whereas the B.S. degree program emphasizes

depth in quantitative skills. Psychology students acquire the fundamentals of learning and memory, perception, attention, reason and problem solving, emotion, thought, language and communication, the development of all these processes and their pathology. In addition, we apply psychology to other fields and teach techniques for measuring and studying psychological variables. Students conduct laboratory experiments on the psychological and physiological bases of behavior. The department has an invertebrate vivarium for laboratory classes and research. There are student opportunities for independent research.

Faculty Interests:
ChoGlueck—Philosophy of Science, Biomedical Ethics, Feminism.
Dotson — Scientific Controversies, Governing Risky Technology, Community Life.
Elliott — Neuroethology, Animal Communication, Psycholinguistics, Music Cognition, Auditory Perception, Educational Assessment.
Johnson—Modern latin American Culture and Literatures.
Kramer -Simpson — Feedback, Transitioning from college to the workforce, Students developing research interests.
McCullough—Storytelling and Culture Linguistics Analysis, Integrative Complexity.
Mikhailova — Medieval History, Gender, Russian History, History of Science.
Samuels — Cognitive Development, Reasoning and Problem Solving, Memory, Brain Injury and Rehabilitation.
Simpson — ESL Writing, Graduate Student Communication, Technical and Scientific Communication.
Thompson — Risk perception in cybersecurity; Regulation of physiology and behavior by light; health effects of exposure to artificial light and eye disease.

Programs

Creative Thinking and Practice (Minor)

[Program Overview]

Program Title | **Department(s)**
Minor in Creative Thinking and Practice | CLASS

Program Description
Minimum of 18 credit hours required to obtain a minor in Creative Thinking and Practice

Program Information & Policies
All elective courses must be approved by the student's minor advisor.

Simple Requisites

Program Requirements

Minimum credit hours required—18

Restriction: If a student takes more than one minor in the CLASS Department, only six (6) credit hours of one minor may be applied towards another minor.

Undergraduate Minor in Creative Thinking and Practice Requirements
Type
Completion Requirement

Creative Thinking Requirement

Complete ALL of the following Courses:
- HUMN2003 - Creative Thinking and Practice (Inactive)

Electives in Creative Thinking Courses

Earn at least 14 credits from the following:
- Area 6: Creative and Fine Arts (BS, BA, or BGS Degree) (3 credits)
- Area 4: Social and Behavioral Science (BS or BGS Degree) (6 credits)
- Area 5: Humanities (BS or BGS Degree) (6 credits)
- Courses in Area 6: Fine and Creative Arts. Courses in Fine Arts and Music Performance (limit of 2 cr. hr.).
- Courses in Area 4: Social Sciences
- Area 5: Humanities in which the student completes a creative project.

Additional Comments:
All elective courses must be approved by the student's minor advisor.

Institute General Requirements

See the NMT Institute Requirements.

No Requirement Level

Hispanic Studies (minor)

[Program Overview]

Program Title | **Department(s)**
Minor in Hispanic Studies | CLASS

Program Description
Minimum of 18 credit hours required to obtain a minor in Hispanic Studies

Simple Requisites

Program Requirements

Minimum credit hours required—18

Restriction: If a student takes more than one minor in the CLASS Department, only six (6) credit hours of one minor may be applied towards another minor.

Minor in Hispanic Studies Requirements
Type
Completion Requirement

Required Spanish courses

Complete ALL of the following Courses:
- SPAN1110 - g5:Spanish I
- SPAN1120 - g5:Spanish II

Additional Electives in Hispanic Studies courses

12 additional credits in Electives of Hispanic Studies
An additional 12 credit hours in any topic relevant to Hispanic Studies with the consent of the minor advisor

Additional Comments:

Institute General Requirements

See the NMT Institute Requirements.

No Requirement Level

History (minor)

[Program Overview]

Program Title
Minor in History

Department(s)
CLASS

Program Description
Minimum of 18 credit hours required to obtain a minor in History

Simple Requisites

Program Requirements

Minimum credit hours required—18

Restriction: If a student takes more than one minor in the CLASS Department, only six (6) credit hours of one minor may be applied towards another minor.

Minor in History Requirements
Type
Completion Requirement

History Courses

The following courses are required:

- A 100-level history course sequence (6)
- Twelve (12) additional credit hours in history courses. (Of these 12 credit hours, six (6) credit hours may be taken in art history or music surveys)

Additional Comments:
Students taking the history minor are strongly encouraged to take the 12 additional credit hours from as wide a variety of topics as possible.

Institute General Requirements

See the NMT Institute Requirements.

No Requirement Level

Literature (minor)

[Program Overview]

Program Title
Minor in Literature

Department(s)
CLASS

Program Description
Minimum of 18 credit hours required to obtain a minor in Literature

Simple Requisites

Program Requirements

Minimum credit hours required—18

Restriction: If a student takes more than one minor in the CLASS Department, only six (6) credit hours of one minor may be applied towards another minor.

Minor in Literature Requirements
Type
Completion Requirement

English Courses

The following courses are required:

18 credit hours in ENGL literature courses

Additional Comments:

Institute General Requirements

See the NMT Institute Requirements.

No Requirement Level

Music (minor)

[Program Overview]

Program Title
Minor in Music

Department(s)
CLASS

Program Description
Minimum of 18 credit hours required to obtain a minor in Music

Simple Requisites

Program Requirements

Minimum credit hours required—18

Restriction: If a student takes more than one minor in the CLASS Department, only six (6) credit hours of one minor may be applied towards another minor.

Minor in Music
Type
Completion Requirement

Theory Courses

Complete ALL of the following Courses:

- MUSC1210 - g6:Fundamentals of Music for non-majors
- MUSC3000 - i6:Music Theory
  AND MUSC3000L - i6:Music Theory Lab
- MUSC3001 - i6:Composition

Fundamentals of Music or Successful audition,

Music Theory or Successful audition.

Elective Courses

Complete ANY of the following Courses:

- MUSC1110 - g6:Music Appreciation: Jazz
- MUSC2420 - g6:Comprehensive Musicianship
- MUSC3009 - i6:Song and Society
  OR HUMN3009 - i5:Song and Society
- MUSC3011 - i6:Opera
- HUMN3011 - i6:Shakespeare & Music
- PSYC3042 - Music and the Brain
- GRMNELECT - German Elective
- FRENELECT - French Elective

Can also take a course from MUSC, HUMN, or THEA courses.

Performance credits

4 credits in Music Performance classes
At least 4 credits should be taken from any of the music performance courses (including special topics music performance courses).

Additional Comments:
Successful Auditions

If a student auditions out of MUS 1210 or MUS 3000 (MUSC Theory), they should replace them with credits from the "Elective" or "Performance" categories. Up to 4 of these additional credits can be satisfied by performance classes.

Music minors are required to complete a Senior Recital before graduating.

Institute General Requirements

See the **NMT Institute General Education Core Requirements.**

No Requirement Level

Philosophy (minor)

[Program Overview]

Program Title
Minor in Philosophy

Department(s)
CLASS

Program Description
Minimum of 18 credit hours required to obtain a minor in Philosophy

Simple Requisites

Program Requirements

Minimum credit hours required—18

Restriction: If a student takes more than one minor in the CLASS Department, only six (6) credit hours of one minor may be applied towards another minor.

Minor in Philosophy
Type
Completion Requirement

Lower Level Philosophy Course Requirements

Earn at least 3 credits from the following:

- 1000 & 2000 - Level Philosophy Courses

Upper Level Philosophy Course Requirements

Earn at least 6 credits from the following:

- 3000 & 4000 - Level Philosophy Courses

Philosophy Electives

Earn at least 9 credits from the following:

- Philosophy Courses 1000 & Above
- AND/OR similar humanities and social science courses approved by the student's minor advisor.

Additional Comments:

Institute General Requirements

See the NMT Institute Requirements.

No Requirement Level

Psychology (minor)

[Program Overview]

Program Title
Minor in Psychology

Department(s)
CLASS

Program Description
Minimum of 18 credit hours required to obtain a minor in Psychology

Simple Requisites

Program Requirements

Minimum credit hours required—20

Restriction: If a student takes more than one minor in the CLASS Department, only six (6) credit hours of one minor may be applied towards another minor.

Minor in Psychology
Type
Completion Requirement

Psychology Courses

Complete ALL of the following Courses:

- PSYC1110 - g4:Introduction to Psychology
- PSYC2285 - g4:Experimental Psychology

AND PSYC2285L - g4:Experimental Psychology Lab
- PSYC3001 - Sensation & Perception
  AND PSYC3001L - Sensation & Perception Lab
- PSYC3005 - Cognitive Psychology
  AND PSYC3005L - Cognitive Psychology Lab
- PSYC3009 - Behavioral Neuroscience
  AND PSYC3009L - Behavioral Neuroscience Lab

Electives in Psychology Courses

Earn at least 9 credits from the following:
- Psychology Electives

Additional Comments:
Students may also do an option in Cognitive Neuroscience as part of the Biomedical Sciences Program.

Institute General Requirements

See the NMT Institute Requirements.

No Requirement Level

Science, Technology, and Society (minor)

[Program Overview]

Program Title
Minor in Science, Technology, and Society

Department(s)
CLASS

Program Description
Minimum of 18 credit hours required to obtain a minor in Science, Technology, and Society

Simple Requisites

Program Requirements

Minimum credit hours required—18

Restriction: If a student takes more than one minor in the CLASS Department, only six (6) credit hours of one minor may be applied towards another minor.

Minor in Science, Technology, and Society
Type
Completion Requirement

Ethics in Science and Engineering

Complete ANY of the following Courses:
- SOSC1110 - g4:Introduction to Science and Technology Studies
- SOSC1220 - Full Steam Ahead Part 2 (Inactive)

Advanced Science, Medicine, or Technology Course

Earn at least 3 credits from the following:
- 3000-Level & above: Science, Medicine, & Technology courses
- OR science, medicine, or technology related PHIL, SOSC, HIST, PSYC, or POLS coursework at the 3000- level or higher.

Science, Medicine, or Technology Electives

Earn at least 12 credits from the following:
- Science, Medicine, Technology Electives
- OR additional credits of science, medicine, or technology related humanities studies and social science courses approved by the student's minor advisor.

Additional Comments:

Institute General Requirements

See the **NMT Institute General Education Core Requirements.**

No Requirement Level

Technical Communication (minor)

[Program Overview]

Program Title
Minor in Technical Communication

Department(s)
CLASS , CLASS Dept/ Technical Communication (program)

Program Description
Minimum of 18 credit hours required to obtain a minor in Technical Communication

Simple Requisites

Program Requirements

Minimum credit hours required—18

Restriction: If a student takes more than one minor in the CLASS Department, only six (6) credit hours of one minor may be applied towards another minor.

Minor in Technical Communication
Type
Completion Requirement

Technical Communication Courses Required

Complete ALL of the following Courses:
- TCOM1130 - i5:Visual Communication & Graphic Design
- TCOM2110 - g5:Technical Editing
- TCOM2120 - g5:Branding and Social Media

Electives in Technical Communication Courses

Earn at least 9 credits from the following:
- Technical Communication Electives

Additional Comments:

Institute General Requirements

See the NMT Institute Requirements.

No Requirement Level

AGS - Associate of General Studies

[Program Overview]

Program Title
Associate in General Studies

Department(s)
CLASS , CLASS Dept/ General Studies (program)

Degree & Program Code
AGS

Program Description
A two-year degree, Associate of General Studies, may be awarded after completion of 60 credit hours of course work approved by the CLASS department chair and the student's AGS academic advisor with a grade-point average of 2.0 or above

Program Information & Policies
Minimum credit hours required—60

Fulfillment of the Institution's residence requirement (30 credit hours) must also be met.

To be admitted into the program for this degree, the candidate must meet with the CLASS department chair and the AGS academic advisor, who will be assigned by the CLASS department chair, to create a AGS Academic Career Plan that will be on file with the Registrar.

Any changes to the AGS Academic Career Plan must be approved by the CLASS department chair and the student's AGS academic advisor. These changes will be on file with the Registrar. The certificate will be awarded only after completion of the above requirements and completion of the AGS academic Career Plan and after petition to the Vice President for Academic Affairs. The plan can be found at https://www.nmt.edu/academics/class/generalstudies.php

Simple Requisites

Program Requirements

In addition to the General Education Requirements listed below under "Institute General Education Requirement".

- Elective credits in excess of the General Education Core requirements to meet 60 degree credits.

Institute General Requirements

Associate of General Studies General Education Requirements
Type
Completion Requirement

Area 1: Communication Requirements for the Associate of General Studies

Earn at least 9 credits from the following:

- Area 1: Communications (AGS or BGS Degree) (9 crs)

ENGL 1110 is waived for students who scored 27 or higher on the ACT English Test or 610 or higher on the SAT Critical Reading Test. These students must take ENGL 1120, COMM 1130, and ENGL 3041 to fulfill the 9 credit hours in this area.

Area 2: Mathematics Requirements for the Associate of General Studies

Earn at least 3 credits from the following:

- Area 2: Mathematics (AGS or BGS Degree) (3 crs)

Area 3: Science Requirements for the Associate of General Studies

Earn at least 8 credits from the following:

- Area 3: Science (AGS or BGS Degree) (8 crs)

Generally, any two courses in Science or Engineering (with associated labs) that are a minimum of 3 credits each.

Area 4: Social Science Requirements for the Associate of General Studies

Earn at least 6 credits from the following:

- Area 5: Humanities (BS or BGS Degree) (6 credits)

Area 5: Humanities Requirements for the Associate of General Studies

Earn at least 6 credits from the following:

- Area 5: Humanities (BS or BGS Degree) (6 credits)

Area 6: Fine and Creative Art Requirement for the Associate of General Studies

Earn at least 3 credits from the following:

- Area 6: Creative and Fine Arts (BS, BA, or BGS Degree) (3 credits)

Area 7: Additional Humanities/Social Science Requirement for the Associate of General Studies

Earn at least 3 credits from the following:

- Area 7: Additional Courses from Areas 4, 5, 6 (BS, BA, or BGS Degree) (3 credits)

Additional Comments:

No Requirement Level

BA-ISCI - B.A. in Interdisciplinary Sciences

[Program Overview]

Program Title
Bachelor of Arts in Interdisciplinary Sciences

Department(s)
CLASS , CLASS Dept/ Interdisciplinary Sciences (program)

Degree & Program Code
BA-ISCI

Program Description
The degree in Interdisciplinary Sciences is intended for the student who desires a science-focused Bachelor's degree but wishes more latitude in the selection of courses than is available otherwise. The BS is more suited to those who want a quantitative focus and the BA more suited to those who want to focus on social and life sciences or wish to have more exposure to non-STEM subjects (e.g., the humanities and arts). Both degrees pair well with the Undergraduate Minor in Secondary Education (UMSE), and students with this minor would discuss with their advisor which degree (BA or BS) is best suited for disciplines they wish to teach.

Program Information & Policies
To qualify for the Bachelor of Arts degree in Interdisciplinary Sciences, a student must satisfy the general education core curriculum requirements for the Bachelor of Arts.

For students who do choose to pursue teaching as an additional area, proper selection of courses and enrollment in the Undergraduate Minor in Secondary Education (UMSE) is necessary for eventual state teaching licensure. Students in the optional UMSE should check State requirements with their Education Minor Advisor to ensure they meet criteria for certification and endorsement, because State requirements can change. Typically USME students must complete 5 Education classes along with three field experiences and one semester of student teaching in local secondary schools. These 27 credits necessary to teach on the secondary level are accredited by the New Mexico Public Education Department (NMPED). In addition, UMSE Students seeking a particular endorsement from the NMPED (e.g., Science, Math, Psychology, Computer Science) should work with their advisor on a suitable course sequence. For instance, the math requirement is a minimum of 24 credits in mathematics courses with 12 of those credits at the 3000-level or above.

Simple Requisites

Program Requirements

Bachelor of Arts in Interdisciplinary Sciences (120 credits)
Type
Completion Requirement

Science, Engineering, or Mathematics

At least 65 must be in science, engineering, or mathematics.

- These can include biology, chemistry, computer science, earth and environmental science, mathematics, engineering, physics, and psychology.
- These credits can also be used to satisfy general education requirements for the degree.

Science, Engineering, or Mathematics: Course level 2000 or above

At least 30 credit hours in course numbered 2000 or above.

- These can include biology, chemistry, computer science, earth and environmental science, mathematics, engineering, physics, and psychology.
- These credits can also be used to satisfy general education requirements for the degree.
- Of the 30 credits hours at least nine credit hours in each of two fields. Closely related disciplines may count together with appropriate course substitution approvals.

Elective Courses 3000 or above.

- Enough credits to meet the 120 credit hour degree minimum requirement.
- At least 42 credits must be in courses numbered 3000 or above, of the total degree credit hours required.

Additional Comments:

Additionally, the Secondary Education compliments this degree. Other minors and their information may be found in their respective departments.

Institute General Requirements

Here you can find the NMT Institute Requirements.

Bachelor of Arts General Education Requirements
Type
Completion Requirement

Area 1: Communication Requirements for Bachelor of Arts

Earn at least 9 credits from the following:

- Area 1: Communications (BA Degree) (9 credits)

Area 2: Math Requirements for Bachelor of Arts

Earn at least 6 credits from the following:

- Area 2: Mathematics (BA Degree) (6 credits)

Note: At least 3 credits must be in Math.

Area 3: Science Requirements for a Bachelor of Arts

Earn at least 12 credits from the following:

- Area 3: Science (BA Degree) (12 credits)

A course and associated lab (of at least 3 total credit hours) from each discipline listed below:

- Biology
- Chemistry
- Earth Sciences
- Physics

Area 4: Social Science Requirements for a Bachelor of Arts

Earn at least 9 credits from the following:

- Area 4a: Social Sciences: Policy and Technology (BA Degree) (3 credits)
- Area 4b: Other Social Sciences (BA Degree) (6 credits)

Note: at least one course must be a “policy and technology” class (POLS; SOSC)

Area 5: Humanities Course Requirements for a Bachelor of Arts

Earn at least 9 credits from the following:

- Area 5a: Humanities: Ethics and Technology (BA Degree) (3 credits)
- Area 5b: Other Humanities (BA Degree) (6 credits)
- At least one of “ethics and technology” classes (PHIL, or other specified classes)

Area 6: Fine & Creative Art Course Requirement for a Bachelor of Arts

Earn at least 3 credits from the following:

- Area 6: Creative and Fine Arts (BS, BA, or BGS Degree) (3 credits)

Area 7: Additional Humanities/Social Science Requirement for a Bachelor of Arts

Earn at least 3 credits from the following:

- Area 7: Additional Courses from Areas 4, 5, 6 (BS, BA, or BGS Degree) (3 credits)

Additional Comments:

No Requirement Level

[Learning Outcomes]

Name	Outcome
Program Outcomes	Students will learn the fundamentals of scientific inquiry in a breadth of disciplines.

Outcome
Students will develop critical thinking and quantitative skills for competence in scientific reasoning.

Outcome
Students will communicate with different audiences using multiple formats.

Outcome
Students will apply professional values and ethics to their role as a member of a culturally diverse society.

Outcome
Students will explore connections between non-STEM disciplines (e.g., the humanities and arts) and the sciences, including commonalities of inquiry.

Outcome
Students will understand at least one discipline in enough depth to teach others.

[Sample 4-Year Curriculum Plan(s)]

Degree Map Name
Sample Curriculum for the Bachelor of Arts in Interdisciplinary Sciences with UMSE
Total Degree Map Credits
112 - 120
Degree Map Effective Catalog Year
2025 -
Degree Map Description
This sample is prepared for a hypothetical student seeking a *psychology* endorsement from NMPED, with additional interest in gaining depth in geology and biology. This sample sequence would qualify for a Minor in Secondary Education and a Minor in Psychology if completed as shown.

Year	Semester	Actual Credits
Year 1, Semester 1	Fall	15

Course
- PSYC1110 - g4:Introduction to Psychology

Actual Credits 3

Course
- ENGL1110 - g1:Composition I

Actual Credits 3

Course
- MATH1510 & MATH1510L: g:Calculus I & Lab

Actual Credits 4

Course
- CHEM1215 & CHEM1215L: g:General Chemistry I and Lab

Actual Credits 4

Course
- Elective (Generic)

Actual Credits 1

Year	Semester	Actual Credits
Year 1, Semester 2	Spring	15

Course
- PSYC2285 & PSYC2285L: Experimental Psychology and Lab

Actual Credits 4

Course
- ENGL1120 - g1:Composition II

Actual Credits 3

Course
- MATH1520 - g2:Calculus II

Actual Credits 4

Course
- CHEM1225 & CHEM1225L: g: General Chemistry II and Lab

Actual Credits 4

Year	Semester	Actual Credits
Year 2, Semester 3	Fall	15

Course
- MATH2420 - Applied Linear Algebra

Actual Credits 3

Course
- EDUC3040 - Concepts in Education

Actual Credits 3

Course
- GEOL1110 & GEOL1110L: Physical Geology and Lab

Actual Credits 4

Course
- PHYS1310 & PHYS1310L: g:Calculus-Physics I and Lab

Actual Credits 5

Year	Semester	Actual Credits
Year 2, Semester 4	Spring	15

Course
- EDUC3041 - Matching Teacher Strategy to Student Learning

Actual Credits 3

Course
- EDUC4001 - Effective Reading for Diverse Learners

Actual Credits 3

Course
- MATH2532 - Calculus III

Actual Credits 4

Course
- PHYS1320 & PHYS1320L: g:Calculus-Based Physics II and Lab

Actual Credits 5

Year	Semester	Actual Credits
Year 3, Semester 5	Fall	15

Course
- EDUC4003 - Methods & Practices

Actual Credits 3

Course
- BIOL2110 & BIOL2110L: Principles of Biology I and Lab

Actual Credits 4

Course
- PSYC3023 - Child & Adolescent Development

Actual Credits 3

Course
- MATH3035 - Ordinary Differential Equation

Actual Credits 3

Course
-

Actual Credits 2

Year	Semester	Actual Credits
Year 3, Semester 6	Spring	15

Course
- EDUC4005 - Assessments & Measurements

Actual Credits 3

Course
- BIOL2610 & BIOL2610L: Principles of Biology II and Lab

Actual Credits 4

Course
- MATH3052 - Basic Concepts of Mathematics

Actual Credits 3

Course
- PSYC3005 & PSYC3005L: Cognitive Psychology and Lab

Actual Credits 4

Course
-

Actual Credits 1

Year	Semester	Actual Credits
Year 4, Semester 7	Fall	15

Course
- ENGL3041 - i1:Technical Writing

Actual Credits 3

Course
- ARTH2110 - g6:History of Art I

Actual Credits 3

Course
- MATH3082 - Probability and Statistics

Actual Credits 3

Course
- PHIL3000 - Philosophy of Science

Actual Credits 3

Course
- HUMN1220 - g5:Film Genres

Actual Credits 3

Year	Semester	Actual Credits
Year 4, Semester 8	Spring	7 - 15

Course
- EDUC4014 - Student Teaching Seminar

Actual Credits 3

Course
- EDUC4013 - Student Teaching (Secondary)

Actual Credits 1 - 9

Course
- MATH3036 - Introduction to Partial Differential Equations

Actual Credits 3

BA-PSY - B.A. in Psychology

[Program Overview]

Program Title
Bachelor of Arts in Psychology

Department(s)
CLASS , CLASS Dept/ Psychology (program)

Degree & Program Code
BA-PSY

Program Description
The program in psychology is designed to provide students with a scientific foundation in the methods and basic data in psychology and neuroscience and to prepare students for further work in all specializations within the field. The B.A. degree program allows more flexibility and breadth whereas the B.S. degree program emphasizes depth in quantitative skills. Psychology students acquire the fundamentals of learning and memory, perception, attention, reason and problem solving, emotion, thought, language and communication, the development of all these processes and their pathology. In addition, we apply psychology to other fields and teach techniques for measuring and studying psychological variables. Students conduct laboratory experiments on the psychological and physiological bases of behavior. The department has an invertebrate vivarium for laboratory classes and research. There are student opportunities for independent research.

Simple Requisites

Program Requirements
Minimum credit hours required—120

In addition to the General Education and Institute Core Curriculum the following courses are required:

Required Courses
Type
Completion Requirement

Required Psychology

Complete ALL of the following Courses:
- PSYC1110 - g4:Introduction to Psychology
- PSYC2285 - g4:Experimental Psychology
  AND PSYC2285L - g4:Experimental Psychology Lab
- PSYC4072 - Senior Seminar

Two courses (with associated labs) chosen from among

Complete at least 2 of the following courses:
- PSYC3001L - Sensation & Perception Lab
  AND PSYC3001 - Sensation & Perception
- PSYC3005 - Cognitive Psychology
  AND PSYC3005L - Cognitive Psychology Lab
- PSYC3009 - Behavioral Neuroscience
  AND PSYC3009L - Behavioral Neuroscience Lab
- PSYC3062 - Animal Behavior
  AND PSYC3062L - Animal Behavior Lab

15 additional credit hours in Psychology

Earn at least 15 credits from the following:
- PSYC1180 - g4:Science & Pseudoscience
- PSYC1190 - i4:Human Factors in Science & Engineering
- PSYC2110 - i4:Social Psychology
- PSYC2310 - g4:Drugs & Behavior
- PSYC2331 - Psychobiology of Sex
- PSYC3020 - Psychology of Language
- PSYC3042 - Music and the Brain
- PSYC3091 - Directed Study
- PSYC4009 - Cell and Molecular Neuroscience
- PSYC4010 - Neurology

Required Biology

Complete ALL of the following Courses:
- BIOL2110 - Pinciples of Biology: Cellular & Molecular
  AND BIOL2110L - Pinciples of Biology: Cellular & Molecular Lab
- BIOL2610 - Principles of Biology: Biodiversity, Ecology, and Evolution
  AND BIOL2610L - Principles of Biology: Biodiversity, Ecology, and Evolution Lab

Upper Division Biology Requirements exclusive of BIOL 4071 or 4081

Earn at least 6 credits from the following:
- BIOL3001 - Genetic Engineering: At the Bench (Inactive)
  OR BIOL3011 - Genetics
  OR BIOL3031 - Cell Biology
  OR BIOL3041 - Microbiology
  OR BIOL3043 - Environmental Microbiology
  OR BIOL3044 - Ecology
  OR BIOL3045 - Evolutionary Biology
  OR BIOL3050 - Psychobiology of Sex
  OR BIOL3051 - Anatomy & Physiology
  OR BIOL3052 - Anatomy and Physiology II
  OR BIOL3062 - Animal Behavior
  OR BIOL4002 - Ecosystem Biology
  OR BIOL4009 - Cell and Molecular Neuroscience
  OR BIOL4010 - Neurology
  OR BIOL4011 - Advanced Genetics
  OR BIOL4019 - Ecotoxicology
  OR BIOL4031 - Virology
  OR BIOL4035 - Bioinformatics
  OR BIOL4037 - Infection and Immunity
  OR BIOL4043 - Molecular Biology
  OR BIOL4045 - Evolutionary Biomechanics (Inactive)
  OR BIOL4049 - Astrobiology
  OR BIOL4055 - Molecular Ecology
  OR BIOL4070 - Biology CURE
  OR BIOL4089 - Special Topics in Biology

Additional credits

At least three (3) additional credit hours beyond the General Education Core Curriculum and the Psychology requirements above at the 3000 level or above

Electives

Electives to complete 120 credit hours. Earning a minor in another field is strongly encouraged

Additional Comments:

Institute General Requirements

General Education Requirements for Bachelor of Arts
Type
Completion Requirement

Area 1: Communications

Complete ALL of the following Course Sets:
- Area 1: Communications (BA Degree) (9 credits)

Area 2: Mathematics and Quantitative Reasoning

Complete ALL of the following Course Sets:
- Area 2: Mathematics (BA Degree) (6 credits)

Area 3: Science

Complete ALL of the following Course Sets:
- Area 3: Science (BA Degree) (12 credits)

Area 4a: Policy and Technology for Bachelor of arts

Earn at least 3 credits from the following:
- Area 4a: Social Sciences: Policy and Technology (BA Degree) (3 credits)

Area 4b: Other Social Sciences for Bachelor of Arts

Earn at least 6 credits from the following:
- Area 4b: Other Social Sciences (BA Degree) (6 credits)

Area 5a: Ethics and Technology for Bachelor of Arts

Earn at least 3 credits from the following:
- Area 5a: Humanities: Ethics and Technology (BA Degree) (3 credits)

Area 5b: Other Humanities

Earn at least 6 credits from the following:
- Area 5b: Other Humanities (BA Degree) (6 credits)

Area 6: Creative and Fine Arts

Earn at least 3 credits from the following:
- Area 6: Creative and Fine Arts (BS, BA, or BGS Degree) (3 credits)

Area 7: Additional Humanities/Social Science Requirement for Bachelor of Arts

Earn at least 3 credits from the following:
- Area 7: Additional Courses from Areas 4, 5, 6 (BS, BA, or BGS Degree) (3 credits)

Additional Comments:

No Requirement Level

[Learning Outcomes]

Outcome
1. Knowledge base in Psychology

Outcome
2. Scientific inquiry and critical thinking

Outcome
3. Ethical and social responsibility in a diverse world

Outcome
4. Communication

Outcome
5. Professional development

[Sample 4-Year Curriculum Plan(s)]

Degree Map Name
Sample Curriculum for the Bachelor of Science in Psychology
Total Degree Map Credits
121
Degree Map Effective Catalog Year
2025 -

Year	Semester	Actual Credits
Year 1	Fall	16

Course
- PSYC1110 - g4:Introduction to Psychology

Actual Credits 3

Course
- ENGL1110 - g1:Composition I

Actual Credits 3

Course
- MATH1430 - Application to Calculus 1

Actual Credits 3

Course
- CHEM1120 or CHEM1215 & CHEM1215L: Basic General Chemistry

Actual Credits 4

Course
- Ethics of Science or Technology (Generic)

Actual Credits 3

Year	Semester	Actual Credits
Year 1	Spring	15

Course
- PSYC2285 & PSYC2285L: Experimental Psychology and Lab

Actual Credits 4

Course
- ENGL1120 - g1:Composition II

Actual Credits 3

Course
- MATH2350 & MATH2350L: Statistical Methods and Lab

Actual Credits 3

Course
- BIOL2110 & BIOL2110L: Principles of Biology I and Lab

Actual Credits 4

Course
- Elective (Generic)

Actual Credits 1

Year	Semester	Actual Credits
Year 2	Fall	15

Course
- PSYC2310 - g4:Drugs & Behavior

Actual Credits 3

Course
- PSYC3023 - Child & Adolescent Development

Actual Credits 3

Course
- Physics (introduction to Physics) no course set (Generic)

Actual Credits 3

Course
- Humanities

Actual Credits 3

Course
- Science, Technology, & Society or Policy (Generic)

Actual Credits 3

Year	Semester	Actual Credits
Year 2	Spring	15

Course
- PSYC2110 - i4:Social Psychology

Actual Credits 3

Course
- PSYC3001 & PSYC3001L: Sensation & Perception and Lab

Actual Credits 4

Course
- Humanities

Actual Credits 3

Course
- BIOL2610 & BIOL2610L: Principles of Biology II and Lab

Actual Credits 4

Course
- Elective (Generic)

Actual Credits 1

Year	Semester	Actual Credits
Year 3	Fall	15

Course
- GEOL1110 & GEOL1110L: Physical Geology and Lab

Actual Credits 4

Course
- PSYC3005 & PSYC3005L: Cognitive Psychology and Lab

Actual Credits 4

Course
- BIOL3031 - Cell Biology

Actual Credits 3

Course
- CSE1115 - Introduction to Data Science (Inactive)

Actual Credits 3

Course
- Elctive (Generic)

Actual Credits 1

Year	Semester	Actual Credits
Year 3	Spring	15

Course
- BIOL3051 & BIOL3051: Anatomy & Physiology and Lab

Actual Credits 4

Course
- Social Science/Humanities/Fine & Creative Arts Requirements

Actual Credits 3

Course
- ENGL3041 - i1:Technical Writing

Actual Credits 3

Course
- PSYC3030 - Clinical Psychology

Actual Credits 3

Course
- Elective (Generic)

Actual Credits 2

Year	Semester	Actual Credits
Year 4	Fall	15

Course
- PSYC3009 & PSYC3009L: Behavioral Neuroscience and Lab

Actual Credits 4

Course
- BIOL3011 & BIOL3011L: Genetics and Lab

Actual Credits 4

Course
- Electives (Generic)

Actual Credits 7

Year	Semester	Actual Credits
Year 4	Spring	15

Course
- PSYC4072 - Senior Seminar

Actual Credits 1

Course
- PSYC3062 & PSYC3062L: Animal Behavior and Lab

Actual Credits 4

Course
- Electives (Generic)

Actual Credits 10

BGS - Bachelor of General Studies

[Program Overview]

Program Title
Bachelor of General Studies

Department(s)
CLASS , CLASS Dept/ General Studies (program)

Degree & Program Code
BGS

Program Description
This degree allows a student to plan a program of courses according to individual educational goals and career plans.

Program Information & Policies
The Bachelor of General Studies degree will be awarded after completion of 120 credit hours with a grade-point average of 2.0 or more. Other requirements for this degree include the following:

- Completion of the General Education Core & Degree Curriculum listed below.
- Completion of 42 credit hours in courses numbered 3000 or above.
- Completion of the BGS Academic Career Plan with a stated Emphasis area or areas.
- Fulfillment of the Institution's residence credit requirement (30 credit hours).

To be admitted into the program for this degree, the candidate must meet with the CLASS department chair and the BGS academic advisor, who will be assigned by the CLASS department chair, to create a BGS Academic Career Plan that will be on file with the Registrar. Any changes to the BGS Academic Career Plan must be approved by the CLASS department chair and the student's BGS academic advisor. These changes will be on file with the Registrar and must be met, along with the above-stated requirements, before the degree will be awarded. The plan can be downloaded from https://www.nmt.edu/academics/class/generalstudies.php

Note: Minors cannot be earned under a Bachelor of General Studies Degree. Students who plan to pursue a career or graduate studies that require a Bachelor of Science degree are advised to pursue another degree program at New Mexico Tech.

Simple Requisites

Program Requirements
The Bachelor of General Studies Degree requires completion of the Institute General Education Core Requirements; See the Requirements listed below under "Institute General Education Requirements."

Bachelor of General Studies Requirements in addition to the General Education Requirements
Type
Completion Requirement

Courses 3000 or above

Earn at least 42 credits from the following:
- Courses 3000 or above (BGS Degree)

Academic Career Plan

Completion of the BGS Academic Career Plan with a stated Emphasis area or areas.
The Academic Career Plan can be downloaded from https://www.nmt.edu/academics/class/generalstudies.php

Additional Comments:

General Electives to meet 120 degree credit hours.

Institute General Requirements

Bachelor of General Studies General Education Requirements
Type
Completion Requirement

Area 1: Communication Requirements for Bachelor of General Studies

Earn at least 9 credits from the following:

- Area 1: Communications (AGS or BGS Degree) (9 crs)

ENGL 1110 is waived for students who scored 27 or higher on the ACT English Test or 610 or higher on the SAT Critical Reading Test. These students must take ENGL 1120, COMM 1130, and ENGL 3041 to fulfill the 9 credit hours in this area.

Area 2: Mathematics Requirements for Bachelor of General Studies

Earn at least 3 credits from the following:

- Area 2: Mathematics (AGS or BGS Degree) (3 crs)

Area 3: Science or Engineering Requirements for Bachelor of General Studies

Earn at least 8 credits from the following:

- Area 3: Science (AGS or BGS Degree) (8 crs)

any two courses at a minimum of 3 credits each in Science or Engineering (with associated labs)

Area 4: Social Science Requirements for a Bachelor of General Studies

Earn at least 6 credits from the following:

- Area 4: Social and Behavioral Science (BS or BGS Degree) (6 credits)

Area 5: Social Sciences Requirements for a Bachelor of General Studies

Earn at least 6 credits from the following:

- Area 5: Humanities (BS or BGS Degree) (6 credits)

Area 6: Fine & Creative Art Course Requirement for a Bachelor of General Studies

Earn at least 3 credits from the following:

- Area 6: Creative and Fine Arts (BS, BA, or BGS Degree) (3 credits)

Area 7: Additional Humanities/Social Science Requirement for a Bachelor of General Studies

Earn at least 3 credits from the following:

- Area 7: Additional Courses from Areas 4, 5, 6 (BS, BA, or BGS Degree) (3 credits)

Additional Comments:

No Requirement Level

BS-ISCI - B.S. in Interdisciplinary Sciences

[Program Overview]

Program Title
Bachelor of Science in Interdisciplinary Sciences

Department(s)
CLASS , CLASS Dept/ Interdisciplinary Sciences (program)

Degree & Program Code
BS-ISCI

Program Description
The degree in Interdisciplinary Sciences is intended for the student who desires a science-focused Bachelor's degree but wishes more latitude in the selection of courses than is available otherwise. The BS is more suited to those who want a quantitative focus and the BA more suited to those who want to focus on social and life sciences or wish to have more exposure to non-STEM subjects (e.g., the humanities and arts). Both degrees pair well with the Undergraduate Minor in Secondary Education (UMSE), and students with this minor would discuss with their advisor which degree (BA or BS) is best suited for disciplines they wish to teach.

Program Information & Policies
Students pursuing the Bachelor of Science degree will have a primary and secondary advisor (or minor advisor if pursuing a minor) in different disciplines to ensure interdisciplinary input. Students will discuss an Academic Career Plan with both advisors. Such an academic career plan proposes a sequence of courses that will emphasize chosen areas of depth by selecting related upper-level courses, in a way that is relevant to professional discernment or future pursuit of employment.

For students who choose to pursue teaching as an additional area, proper selection of courses and enrollment in the Undergraduate Minor in Secondary Education (UMSE) is necessary for eventual state teaching licensure. In this case the Education minor advisor is needed as primary or secondary advisor to ensure that the student's course selection meets the requirements for both the BS degree and the minor. In addition, students in the optional UMSE should check state requirements with their Education minor advisor to ensure they meet criteria for certification and endorsement, because State requirements can change. Typically USME students must complete five education classes along with three field experiences and one semester of student teaching in local secondary schools. These 27 credits necessary to teach on the secondary level are accredited by the New Mexico Public Education Department (NMPED). In addition, UMSE students seeking a particular endorsement from the NMPED (e.g., Science, Math, Psychology, Computer Science) should work with their advisor on a suitable course sequence. For instance, the math requirement is a minimum of 24 credits in mathematics courses with 12 of those credits at the 3000-level or above.

Simple Requisites

Program Requirements
To qualify for the Bachelor of Science degree in Interdisciplinary-Sciences, a student must satisfy the general education core curriculum requirements for the Bachelor of Science.

Bachelor of Science in Interdisciplinary Sciences
Type
Completion Requirement

General Requirements

- Of the minimum 120 credit hours required for this degree, at least 65 must be in science, engineering, or mathematics. These can include biology, chemistry, computer science, earth and environmental science, mathematics, engineering, physics, and psychology. These credits can also be used to satisfy general education requirements for the degree.

- At least 30 credit hours in science, engineering, or mathematics must be in courses numbered 2000 or above.
- In order that a reasonable depth of study is attained in at least two disciplines, the 30 credit hours at 2000 or above must include at least nine credit hours in each of two fields. Closely related disciplines may count together with appropriate course substitution approvals.
- Of the total credit hours required, at least 42 must be in courses numbered 3000 or above.

Additional Comments:

Institute General Requirements

Bachelor of Science General Education Requirements (53 credits)
Type
Completion Requirement

Area 1: English Requirements for Bachelor of Science

Earn at least 9 credits from the following:
- Area 1: Communications (BS Degree) (9 credits)

Area 2: Math Requirements for Bachelor of Science

Earn at least 8 credits from the following:
- Area 2: Mathematics (BS Degree) (8 credits)

Area 3: Science Requirements for a Bachelor of Science

Earn at least 18 credits from the following:
- Area 3: Science (BS Degree) (18 credits)

Area 4: Social Science Requirements for a Bachelor of Science

Earn at least 6 credits from the following:
- Area 4: Social and Behavioral Science (BS or BGS Degree) (6 credits)

Area 5: Humanities Course Requirements for a Bachelor of Science

Earn at least 6 credits from the following:
- Area 5: Humanities (BS or BGS Degree) (6 credits)

Area 6: Fine & Creative Art Course Requirement for a Bachelor of Science

Earn at least 3 credits from the following:
- Area 6: Creative and Fine Arts (BS, BA, or BGS Degree) (3 credits)

Area 7: Additional Humanities/Social Science Requirement for a Bachelor of Science

Earn at least 3 credits from the following:
- Area 7: Additional Courses from Areas 4, 5, 6 (BS, BA, or BGS Degree) (3 credits)

Additional Comments:

No Requirement Level

[Learning Outcomes]

Name Program Outcomes	**Outcome** 1. Students will learn the fundamentals of scientific inquiry in a breadth of disciplines.

Outcome
2. Students will develop analytical and quantitative skills for competence in science and mathematics.

Outcome
3. Students will communicate with different audiences using multiple formats.

Outcome
4. Students will apply professional values and ethics to their role as a member of a culturally diverse society.

Outcome
5. Students will explore common areas of inquiry among the disciplines.

Outcome
6. Students will understand at least one discipline in enough depth to teach others.

[Sample 4-Year Curriculum Plan(s)]

Degree Map Name
Sample Curriculum for a Bachelor of Science in Interdisciplinary Sciences with UMSE
Total Degree Map Credits
120
Degree Map Effective Catalog Year
2025 -
Degree Map Description
This sample is prepared for a hypothetical student seeking a *mathematics* teaching endorsement from NMPED and interested in the psychology of learning for the secondary depth requirement towards the major degree. This sample sequence would qualify for a Minor in Secondary Education and a Minor in Mathematics if completed as shown.

Year	Semester	Actual Credits
Year 1	Fall	15

Course
- PSYC1110 - g4:Introduction to Psychology

Actual Credits 3

Course
- ENGL1110 - g1:Composition I

Actual Credits 3

Course
- MATH1510 & MATH1510L: g:Calculus I & Lab

Actual Credits 4

Course
- CHEM1215 & CHEM1215L: g:General Chemistry I and Lab

Actual Credits 4

Course
- Extra-curricular Electives

Actual Credits 1

Year	Semester	Actual Credits
Year 1	Spring	15

Course
- PSYC2285 & PSYC2285L: Experimental Psychology and Lab

Actual Credits 4

Course
- ENGL1120 - g1:Composition II

Actual Credits 3

Course
- MATH1520 - g2:Calculus II

Actual Credits 4

Course
- CHEM1225 & CHEM1225L: g: General Chemistry II and Lab

Actual Credits 4

Year	Semester	Actual Credits
Year 2	Fall	15

Course
- MATH2420 - Applied Linear Algebra

Actual Credits 3

Course
- EDUC3040 - Concepts in Education

Actual Credits 3

Course
- PHYS1310 & PHYS1310L: g:Calculus-Physics I and Lab

Actual Credits 5

Course
- GEOL1110 - Physical Geology

Actual Credits 3

Course
- Extra-curricular Electives

Actual Credits 1

Year	Semester	Actual Credits
Year 2	Spring	15

Course
- EDUC3041 - Matching Teacher Strategy to Student Learning

Actual Credits 3

Course
- EDUC4001 - Effective Reading for Diverse Learners

Actual Credits 3

Course
- MATH2532 - Calculus III

Actual Credits 4

Course
- PHYS1320 & PHYS1320L: g:Calculus-Based Physics II and Lab

Actual Credits 5

Year	Semester	Actual Credits
Year 3	Fall	15

Course
- EDUC4003 - Methods & Practices

Actual Credits 3

Course
- BIOL2110 & BIOL2110L: Principles of Biology I and Lab

Actual Credits 4

Course
- PSYC3023 - Child & Adolescent Development

Actual Credits 3

Course
- MATH3035 - Ordinary Differential Equation

Actual Credits 3

Course
- Extra-curricular Electives

Actual Credits 2

Year	Semester	Actual Credits
Year 3	Spring	15

Course
- EDUC4005 - Assessments & Measurements

Actual Credits 3

Course
- BIOL2610 & BIOL2610L: Principles of Biology II and Lab

Actual Credits 4

Course
- MATH3052 - Basic Concepts of Mathematics

Actual Credits 3

Course
- PSYC3005 & PSYC3005L: Cognitive Psychology and Lab

Actual Credits 4

Course
- Extra-curricular Electives

Actual Credits 1

Year	Semester	Actual Credits
Year 4	Fall	15

Course
- ENGL3041 - i1:Technical Writing

Actual Credits 3

Course
- ARTH2110 - g6:History of Art I

Actual Credits 3

Course
- MATH3082 - Probability and Statistics

Actual Credits 3

Course
- PHIL3000 - Philosophy of Science

Actual Credits 3

Course
- HUMN1220 - g5:Film Genres

Actual Credits 3

Year	Semester	Actual Credits
Year 4	Spring	15

Course
- EDUC4014 - Student Teaching Seminar

Actual Credits 3

Course
- EDUC4013 - Student Teaching (Secondary)

Actual Credits 9

Course
- MATH3036 - Introduction to Partial Differential Equations

Actual Credits 3

BS-PSY - B.S. in Psychology

[Program Overview]

Program Title
Bachelor of Science in Psychology

Department(s)
CLASS , CLASS Dept/ Psychology (program)

Degree & Program Code
BS-PSY

Program Description
The program in psychology is designed to provide students with a scientific foundation in the methods and basic data in psychology and neuroscience and to prepare students for further work in all specializations within the field. The B.A. degree program allows more flexibility and breadth whereas the B.S. degree program emphasizes depth in quantitative skills. Psychology students acquire the fundamentals of learning and memory, perception, attention, reason and problem solving, emotion, thought, language and communication, the development of all these processes and their pathology. In addition, we apply psychology to other fields and teach techniques for measuring and studying psychological variables. Students conduct laboratory experiments on the psychological and physiological bases of behavior. The department has an invertebrate vivarium for laboratory classes and research. There are student opportunities for independent research.

Program Information & Policies
- *Minimum credit hours required—120*

Students intending to major in psychology should complete PSYC1110 g4:Introduction to Psychology and PSYC2285 g4:Experimental Psychology by the end of their sophomore year. They are advised to complete the biology and mathematics requirements as early as possible since material from these courses will be used in upper-division courses.

Simple Requisites

Program Requirements

BS in Psychology
Type
Completion Requirement

Psychology Courses

Complete ALL of the following Courses:
- PSYC1110 - g4:Introduction to Psychology
- PSYC2285 - g4:Experimental Psychology
  AND PSYC2285L - g4:Experimental Psychology Lab

- PSYC4072 - Senior Seminar

Two Psychology Courses & Labs

Complete at least 2 courses in the following course sets:

- PSYC3001 & PSYC3001L: Sensation & Perception and Lab
- PSYC3005 & PSYC3005L: Cognitive Psychology and Lab
- PSYC3009 & PSYC3009L: Behavioral Neuroscience and Lab
- PSYC3062 & PSYC3062L: Animal Behavior and Lab

Additional Psychology Credits (minimum of 15)

Earn at least 15 credits from the following:

- Psychology Electives

Biology Courses

Complete ALL of the following Course Sets:

- BIOL2110 & BIOL2110L: Principles of Biology I and Lab
- BIOL2610 & BIOL2610L: Principles of Biology II and Lab

Biology Electives

Earn at least 6 credits from the following:

- 3000 & 4000 Level Biology Courses

at least six (6) upper-division credits in Biology, exclusive of BIOL4071 Life Sciences Seminar or BIOL 4081

Math Courses

Complete ALL of the following Courses:

- MATH2350 - Statistical Methods
  OR MATH4083 - Mathematical Statistics

Science Requirement

Earn at least 4 credits
At least four (4) additional credit hours beyond the General Education Core Curriculum and above the Psychology requirements selected from among Biology, Computer Science, Chemistry, Mathematics and Physics

Additional Comments:

General Electives
Type
Completion Requirement

Elective Courses to meet 120 Degree hours

General Electives courses to complete 120 credit hours.

Additional Comments:

Students intending to major in psychology should complete PSYC 1110 and 2285 by the end of their sophomore year. They are advised to complete the biology and mathematics requirements as early as possible since material from these courses will be used in upper-division courses.

Institute General Requirements

General Education Requirements for Bachelor of Science in Psychology
Type
Completion Requirement

Area 1: Communications Requirement for Bachelor of Science

Complete ALL of the following Course Sets:

- Area 1: Communications (BS Degree) (9 credits)

Area 2: Mathematics and Quantitative Reasoning Requirements for Bachelor of Science

Complete ALL of the following Course Sets:

- Area 2: Mathematics (BS Degree) (8 credits)

Area 3: Science Requirements for a Bachelor of Science

Complete ALL of the following Course Sets:

- Area 3: Science (BS Degree) (18 credits)

Area 4: Social and Behavioral Science Requirements for a Bachelor of Science

Earn at least 6 credits from the following:

- Area 4: Social and Behavioral Science (BS or BGS Degree) (6 credits)

Area 5: Humanities Course Requirements for a Bachelor of Science

Earn at least 6 credits from the following:

- Area 5: Humanities (BS or BGS Degree) (6 credits)

Area 6: Creative & Fine Art Requirement for a Bachelor of Science

Earn at least 3 credits from the following:

- Area 6: Creative and Fine Arts (BS, BA, or BGS Degree) (3 credits)

Area 7: Additional Humanities/Social Science Requirement for a Bachelor of Science

Earn at least 3 credits from the following:

- Area 7: Additional Courses from Areas 4, 5, 6 (BS, BA, or BGS Degree) (3 credits)

Additional Comments:

No Requirement Level

[Learning Outcomes]

Outcome
1. Knowledge base in Psychology

Outcome
2. Scientific inquiry and critical thinking

Outcome
3. Ethical and social responsibility in a diverse world

Outcome
4. Communication

Outcome
5. Professional development

[Sample 4-Year Curriculum Plan(s)]

Degree Map Name
Bachelor of Science in Psychology Sample Curriculum
Total Degree Map Credits
119
Degree Map Effective Catalog Year
2026 -

Year	Semester	Actual Credits
Year 1	Fall	15

Course
- PSYC1110 - g4:Introduction to Psychology

Actual Credits 3

Course
- ENGL1110 - g1:Composition I

Actual Credits 3

Course
- MATH1510 & MATH1510L: g:Calculus I & Lab

Actual Credits 4

Course
- CHEM1215 & CHEM1215L: g:General Chemistry I and Lab

Actual Credits 4

Course
- Elective (Generic)

Actual Credits 1

Year	Semester	Actual Credits
Year 1	Spring	11

Course
- Course Set Not Found

Actual Credits -

Course
- ENGL1120 - g1:Composition II

Actual Credits 3

Course
- MATH1520 - g2:Calculus II

Actual Credits 4

Course
- CHEM1225 & CHEM1225L: g: General Chemistry II and Lab

Actual Credits 4

Year	Semester	Actual Credits
Year 2	Fall	15

Course
- PSYC2310 - g4:Drugs & Behavior

Actual Credits 3

Course
- PSYC3023 - Child & Adolescent Development

Actual Credits 3

Course
- PHYS1310 & PHYS1310L: g:Calculus-Physics I and Lab

Actual Credits 5

Course
- BIOL2110 & BIOL2110L: Principles of Biology I and Lab

Actual Credits 4

Year	Semester	Actual Credits
Year 2	Spring	15

Course
- PSYC2110 - i4:Social Psychology

Actual Credits 3

Course
- MATH2350 - Statistical Methods

Actual Credits 3

Course
- PHYS1320 & PHYS1320L: g:Calculus-Based Physics II and Lab

Actual Credits 5

Course
- BIOL2610 & BIOL2610L: Principles of Biology II and Lab

Actual Credits 4

Year	Semester	Actual Credits
Year 3	Fall	18

Course
- PSYC3001 & PSYC3001L: Sensation & Perception and Lab

Actual Credits 4

Course
- HIST1130 - i5:World History I

Actual Credits 3

Course
- BIOL3031 - Cell Biology

Actual Credits 3

Course
- PHIL1146 - g5:Ethics & Values in STEM

Actual Credits 3

Course
- Electives (Generic)

Actual Credits 5

Year	Semester	Actual Credits
Year 3	Spring	15

Course
- PSYC3005 & PSYC3005L: Cognitive Psychology and Lab

Actual Credits 4

Course
- HIST1140 - i5:World History II

Actual Credits 3

Course
- BIOL3051 & BIOL3051: Anatomy & Physiology and Lab

Actual Credits 4

Course
- ENGL3041 - i1:Technical Writing

Actual Credits 3

Course
- Elective (Generic)

Actual Credits 1

Year	Semester	Actual Credits
Year 4	Fall	15

Course
- PSYC3009 & PSYC3009L: Behavioral Neuroscience and Lab

Actual Credits 4

Course
- PSYC3030 - Clinical Psychology

Actual Credits 3

Course
- BIOL3011 & BIOL3011L: Genetics and Lab

Actual Credits 4

Course
- Electives (Generic)

Actual Credits 4

Year	Semester	Actual Credits
Year 4	Spring	15

Course
- PSYC4072 - Senior Seminar

Actual Credits 1

Course
- PSYC3062 & PSYC3062L: Animal Behavior and Lab

Actual Credits 4

Course
- Electives/ Fine & Creative Arts (Generic)

Actual Credits 10

BS-TC - B.S. in Technical Communication

[Program Overview]

Program Title
Bachelor of Science in Technical Communication

Department(s)
CLASS , CLASS Dept/ Technical Communication (program)

Degree & Program Code
BS-TC

Program Description
The Technical Communication curriculum combines courses from three fields of study to prepare students for technical communication positions upon graduation:

Program Information & Policies
- The TCOM courses introduce students to document design, graphics, and computer documentation, created online and for multimedia. The TCOM courses also develop students' writing, speaking, and editing abilities.
- The humanities and social science courses improve students' understanding and appreciation of history, literature, philosophy, psychology, and the arts.
- The science and technology courses provide students a background in one specific science or engineering discipline.

Simple Requisites

Program Requirements
Minimum credit hours required—120

In addition to the General Education and Institute Core Curriculum , the following courses are required:

Course Requirements
Type
Completion Requirement

Technical Communication Course Requirements

Earn at least 35 credits from the following:

- TCOM1110 - Community Service
- TCOM1120 - g:Orientation to Technical Communication
- TCOM1130 - i5:Visual Communication & Graphic Design
- TCOM2110 - g5:Technical Editing
- TCOM2120 - g5:Branding and Social Media
- TCOM3021 - Internship
- TCOM4011 - Persuasive Communication & Grant Writing
- TCOM4020 - Senior Seminar
- TCOM4021 - Documents & Client Project Management
- TCOM4022 - Senior Thesis

and nine credit hours of technical communication electives. MGT 330 is an approved TCOM elective. All technical communication courses must be completed with grade C or better. Students may use these TCOM courses to fulfill Area 5 of the General Education Core Curriculum Requirements with the exception of TCOM 3021, TCOM 4021, and TCOM 4022.

Humanities Course Requirements

12 credit hours in excess of the General Education Core Curriculum Requirements and excluding TCOM courses.

Foreign Language Requirements

Six credit hours of one language

Science or Engineering Requirements

12 credit hours in a single discipline in excess of general degree requirements

Additional Comments:
Electives to complete 120 hours

Institute General Requirements

Here you can find the NMT Institute Requirements .

Bachelor of Science General Education Degree Requirements
Type
Completion Requirement

Area 1: English Requirements for Bachelor of Science

Complete ALL of the following Courses:

- ENGL1110 - g1:Composition I
- ENGL1120 - g1:Composition II
- ENGL3041 - i1:Technical Writing

9 credits in Communications

Area 2: Math Requirements for Bachelor of Science

Complete ALL of the following Courses:

- MATH1510 - g2:Calculus I
  AND MATH1510L - g2:Calculus I Lab
- MATH1520 - g2:Calculus II

8 Credits in Mathematics

Area 3: Science Requirements for a Bachelor of Science

Complete ALL of the following Courses:

- CHEM1215 - g3:General Chemistry I
  AND CHEM1215L - g3:General Chemistry I Lab
- CHEM1225 - g3:General Chemistry II
  AND CHEM1225L - g3:General Chemistry II Lab
- PHYS1310 - g3:Calculus-based Physics I
  AND PHYS1310L - g3:Calculus-based Physics I Lab
- PHYS1320 - g3:Calculus-based Physics II
  AND PHYS1320L - g3:Calculus-based Physics II Lab

18 Credits in Sciences

Area 4: Social Science for a Bachelor of Science

Earn at least 6 credits from the following:

- Area 4: Social and Behavioral Science (BS or BGS Degree) (6 credits)

Area 5: Humanities Course Requirements for a Bachelor of Science

Earn at least 6 credits from the following:

- Area 5: Humanities (BS or BGS Degree) (6 credits)

Area 6: Fine & Creative Art Course Requirement for a Bachelor of Science

Earn at least 3 credits from the following:

- Area 6: Creative and Fine Arts (BS, BA, or BGS Degree) (3 credits)

Area 7: Additional Humanites/Social Science Requirement for a Bachelor of Science

Earn at least 3 credits from the following:

- Area 7: Additional Courses from Areas 4, 5, 6 (BS, BA, or BGS Degree) (3 credits)

Additional Comments:

No Requirement Level

[Learning Outcomes]

Outcome
1. Professionalism within the field of Technical Communication in Written Communication and Editing

Outcome
2. Professionalism within the field of Technical Communication in Visual and Design Communication

Outcome
3. Professionalism within the field of Technical Communication in Oral Presentation

Outcome
4. Ability to conduct original research in Technical Communication (measured through senior thesis, SRS, internship, and other class projects)

Outcome
5. Ability to work collaboratively and understand the way Technical Communication projects are products of negotiated interaction

Outcome
6. Ability to produce multimedia content for different purposes, audiences, and places

[Sample 4-Year Curriculum Plan(s)]

Degree Map Name
Sample Curriculum for the Bachelor of Science in Technical Communication
Total Degree Map Credits
120
Degree Map Effective Catalog Year
2025 -

Year	Semester	Actual Credits
Year 1	Fall	15

Course
- TCOM1120 - g:Orientation to Technical Communication

Actual Credits 1

Course
- ENGL1110 - g1:Composition I

Actual Credits 3

Course
- MATH1510 & MATH1510L: g:Calculus I & Lab

Actual Credits 4

Course
- TCOM1130 - i5:Visual Communication & Graphic Design

Actual Credits 3

Course
- Foreign Language

Actual Credits 3

Course
- Elective (Generic)

Actual Credits 1

Year	Semester	Actual Credits
Year 1	Spring	15

Course
- ENGL1120 - g1:Composition II

Actual Credits 3

Course
- MATH1520 - g2:Calculus II

Actual Credits 4

Course
- TCOM1110 - Community Service

Actual Credits 1

Course
- Foreign Language

Actual Credits 3

Course
- Elective (Generic)

Actual Credits 4

Year	Semester	Actual Credits
Year 2	Fall	15

Course
- TCOM2110 - g5:Technical Editing

Actual Credits 3

Course
- CHEM1215 & CHEM1215L: g:General Chemistry I and Lab

Actual Credits 4

Course
- Area 5: Humanities (BS or BGS Degree) (6 credits)

Actual Credits 3

Course
- Area 4: Social and Behavioral Science (BS or BGS Degree) (6 credits)

Actual Credits 3

Course
- Elective (Generic)

Actual Credits 2

Year	Semester	Actual Credits
Year 2	Spring	16

Course
- TCOM2120 - g5:Branding and Social Media

Actual Credits 3

Course
- CHEM1225 & CHEM1225L: g: General Chemistry II and Lab

Actual Credits 4

Course
- Area 5: Humanities (BS or BGS Degree) (6 credits)

Actual Credits 3

Course
- Area 4: Social and Behavioral Science (BS or BGS Degree) (6 credits)

Actual Credits 3

Course
- TC: Science or Engineering Electives

Actual Credits 3

Year	Semester	Actual Credits
Year 3	Fall	15

Course
- PHYS1310 & PHYS1310L: g:Calculus-Physics I and Lab

Actual Credits 5

Course
- TCOM4011 - Persuasive Communication & Grant Writing

Actual Credits 3

Course
- Technical Communication Electives

Actual Credits 3

Course
- TC: Science or Engineering Electives

Actual Credits 3

Course
- Elective (Generic)

Actual Credits 1

Year	Semester	Actual Credits
Year 3	Spring	15

Course
- ENGL3041 - i1:Technical Writing

Actual Credits 3

Course
- Technical Communication Electives

Actual Credits 3

Course
- PHYS1320 & PHYS1320L: g:Calculus-Based Physics II and Lab

Actual Credits 5

Course
- TC: Science or Engineering Electives

Actual Credits 3

Course
- Elective (Generic)

Actual Credits 1

Year	Semester	Actual Credits
Year 4	Fall	15

Course
- TCOM3021 - Internship

Actual Credits 3

Course
- TCOM4020 - Senior Seminar

Actual Credits 3

Course
- Technical Communication Electives

Actual Credits 3

Course
- Area 6: Creative and Fine Arts (BS, BA, or BGS Degree) (3 credits)

Actual Credits 3

Course
- TC: Science or Engineering Electives

Actual Credits 3

Year	Semester	Actual Credits
Year 4	Spring	14

Course
- Humanities Electives (TC Degree)

Actual Credits 3

Course
- TCOM4022 - Senior Thesis

Actual Credits 3

Course
- TCOM4021 - Documents & Client Project Management

Actual Credits 3

Course
- Elective (Generic)

Actual Credits 5

GC-SPC - G.C. in Scientific & Professional Communication

[Program Overview]

Program Title
Graduate Certificate in Scientific and Professional Communication

Department(s)
CLASS

Degree & Program Code
GC-SPC

Program Description
Minimum credit hours required—14

The Scientific and Professional Communication Graduate Certificate offers graduate students and post- baccalaureate and industry and public sector professionals an opportunity to build and strengthen their professional communication abilities for professional and academic work. The certificate can be completed live or through distance education

Program Information & Policies
The 14 hours of coursework required for the Certificate provides general foundation of communication to the public and to academic audiences (COMM5075 Communication in the Sciences or TCOM5005 Science Writing and TCOM5011 Persuasive Comm & Grant Wrtng), while elective courses are available to students with specific interests; for example professionals who work in Spanish-speaking settings might benefit from SPAN5020 Adv Spanish Reading & Comp; students in industry or in one of New Mexico's national labs might choose courses such as TCOM5016 International Prof Communicati International Professional Communication or TCOM5005 Science Writing Science Writing; and students interested in public policy and public engagement might consider POLS5071 Science & Technology Policy Science and Technology Policy or POLS5070 Policy Science Policy Sciences. The certificate concludes with a capstone project that allows students to work on a project related to their work or partner with a community organization.

We also provide the option for a concentration in Policy Sciences and Communication. Students may select from the electives above and opt to substitute a third policy-related course in place of TCOM5001 Experiential Learning Project.

Simple Requisites

Program Requirements

Scientific & Professional Communication Requirements
Type
Completion Requirement

Required Communication Courses

Complete ALL of the following Courses:
- TCOM5011 - Persuasive Comm & Grant Wrtng
- TCOM5005 - Science Writing
  OR COMM5075 - Communication in the Sciences

Elective Communication Courses

Earn at least 6 credits from the following:
- COMM5075 - Communication in the Sciences
  OR TCOM5005 - Science Writing
- TCOM5021 - Document & Client Project Management
- TCOM5016 - International Professional Communication
- POLS5070 - Policy Science
- POLS5071 - Science & Technology Policy
- SPAN5020 - Advanced Spanish Reading & Composition
- and 5000-level special topics courses in TCOM or POLS.

COMM5075 Communication in the Sciences or TCOM5005 Science Writing can only be used as an elective if not complete for the Communication Requirements above.

Additional Comments:
We also provide the option for a concentration in Policy Sciences and Communication. Students may select from the electives above and opt to substitute a third policy-related course in place of TCOM5001 Experiential Learning Project.

Students must be concurrently enrolled in a graduate degree program at NMT or meet the admissions criteria to enroll in a graduate degree program (including as non-degree-seeking graduate students).

Institute General Requirements

Master of Science Degree

General requirements common to all Masters of Science degree curricula in the sciences and engineering fields are listed below. Additional requirements for specific curricula are listed under the appropriate department.

General Requirements

It is required that a student preparing to complete the M.S. degree:

1. have a minimum of six credit hours of approved out of program upper-division or graduate course work,
2. declare a major with at least 12 credit hours of coursework above the 5000-level, exclusive of research credits,
3. complete a research project culminating in a thesis or independent study paper, and
4. theses must be checked with iThenticate by the academic advisor before they will be accepted.

Note: Students pursuing an Master's. degree in a different discipline than their Bachelor's degree may request a waiver for the out of program requirement. Waivers must be approved by the student's advisor, committee, department chair, and the Dean of Graduate Studies.

These general requirements do not apply to students in the Master of Science for Teachers (MST) program.

Approvals

1. The appropriate department grants admission to its graduate program.
2. The appropriate department and the Dean of Graduate Studies must approve the composition of each graduate student's advisory committee.
3. The graduate student's advisory committee must approve the student's thesis or independent study research project. The MS degree will not be awarded until the thesis or independent study paper has been approved by the advisory committee.
4. Coursework to be applied toward the degree must meet the associated degree requirements and be approved by the graduate student's advisory committee and the Dean of Graduate Studies.

Research Options

There are two research options, M.S. with Independent Study and M.S. with Thesis. Each option requires a minimum of 30 credit hours. Some departments do not recognize the Independent Study option.

M.S. with Independent Study Requirements:

1. Completion of at least 27 credit hours of approved course work, with at least 15 credit hours of 5000-level courses, exclusive of research credits;
2. Completion of at least three credit hours of independent study;
3. Submission of a formal paper describing the results of the research to the candidate's advisor and advisory committee; and
4. Submission of a digital abstract of the independent study to the Center for Graduate Studies.

M.S. with Thesis Requirements:

1. Completion of at least 24 credit hours of approved course work, with at least 12 credit hours of 5000-level courses, exclusive of research credits;
2. Completion of at least six credit hours of thesis work;
3. Satisfactory oral defense of the thesis research; and
4. Submission of the digital thesis to the Center for Graduate Studies via ProQuest.

Most Master Degrees at NMT require some out of department course electives, see the Graduate Office or an Academic Advisor for clarification or for additional information.

No Requirement Level

MS-PCOM - M.S. in Public Engagement in Science, Design, & Communication

[Program Overview]

Program Title
Master of Public Engagement in Science, Design and Communication

Department(s)
CLASS , CLASS Dept/ Public Engagement (program)

Degree & Program Code
MS-PCOM

Program Description
This 30-credit hour graduate program trains students through real-world projects to research, critically analyze and communicate information and technology to diverse communities. Students in this proposed program may follow four pathways through the program, or may construct a path that meets their own career objectives: 1) Communication, branding, and project management for nonprofits and small businesses, 2) Science Communication, policy, and public outreach, 3) User experience (UX/UI) research and design, and 4) STEM Career promotion and advancement. These pathways are built upon the core courses for the master's program in conjunction with electives from both within and outside the CLASS Department.

Simple Requisites

Program Requirements
There are two options for completing the MS in Public Engagement: Thesis or Independent Study. Both require public defense of a written report/portfolio and the same set of core courses. The independent study option is composed of 27 credit hours of coursework and 3 credit hours of independent study, while the thesis option is composed of 24 credit hours of coursework and 6 credit hours of thesis research under the direct supervision of a faculty member. The independent study option is intended for working professionals, whose independent study project may be related to their job, while the thesis option is best suited to students considering continuing on to a doctoral program. Partnerships with local Socorro and New Mexico state organizations provide STEM-based education with an industry and nonprofit twist that will help students enter the workforce upon graduation.

12 (for thesis option)-15 (for independent study option) credits of elective coursework within or outside the CLASS Department that reflect the interdisciplinary and multidisciplinary potential of Public Engagement as an area of research and production.

Master of Science on Public Engagement
Type
Completion Requirement

Course Requirements

Complete ALL of the following Courses:

- PCOM5003 - Applied Research Methods
- PCOM5004 - Media, Communication, & Public Engagement
- PCOM5005 - Ethical and Social Issues in Public Engagement
- PCOM5006 - Communication, Product, and Experience Design

Thesis Option

6 credit hours of faculty guided research

Earn at least 6 credits from the following:

- PCOM5091 - Thesis

Independent Study Option

This may be part of workplace based study or on campus research, both with an NMT faculty advisor.

Earn at least 3 credits from the following:

- PCOM5090 - Independent Study

Additional Comments:

Institute General Requirements

Master of Science Degree

General requirements common to all Masters of Science degree curricula in the sciences and engineering fields are listed below. Additional requirements for specific curricula are listed under the appropriate department.

Most Master Degrees at NMT require some out of department course electives, see the Graduate Office or an Academic Advisor for clarification or for additional information.

No Requirement Level

[Learning Outcomes]

Outcome
1. Engage responsibly and effectively with diverse public stakeholders to promote inclusive and respectful collaborations.

Outcome
2. Develop and manage research projects with stakeholders of varying backgrounds and multidimensional identities.

Outcome
3. Design and employ strategies of internal/external communication across various media, platforms, and channels in an effective, responsible manner.

Outcome
4. Critically analyze and interpret new advancements, technologies, and policies, identifying potential impacts and risks for different audiences, stakeholders, and policymakers.

Outcome
5. Employ interdisciplinary approaches to analysis and design, including quantitative and qualitative research methods from the humanities, social sciences, and STEM fields, to thoughtfully consider the implications of STEM research, design, and technology.

Courses

ARTH2110 - g6:History of Art I

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This survey course explores the art and architecture of ancient prehistoric cultures through the end of the fourteenth century. While focused primarily on the art of the Western civilizations, this course will also provide insights into the works of other major cultures in order to provide alternate views of art and history. Emphasis will be placed on the relationship of artworks to political, social, spiritual, intellectual, and cultural movements that affect and are affected by their creation and development.

No Requirements

ARTH2120 - g6: History of Art II

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This survey course will explore the architecture, sculpture, ceramics, paintings, drawings, and glass objects from the 14th century to the modern era. While focused primarily on the art of the Western civilizations, this course will also provide insights into the works of other major cultures in order to provide alternate views of art and history. Emphasis will be placed on the relationship of artworks to political, social, spiritual, intellectual, and cultural movements that affect and are affected by their creation and development.

No Requirements

ARTH3072 - i6:Issues in Art History

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Issues, topics, or specific periods in the visual arts. May incorporate an interdisciplinary approach. Topics may include, among others, Visual and Other Arts; Modern Art; Art and Science; Atomic Art; Literature inspired by Art; Modern Art, Sci Fi, and Film. May be repeated for credit when topic or issue changes. Assignments include creative options.

Simple Requisites

Course Requisite Requirements

Prerequisite Requirement

Type
Prerequisite

Prerequisite

Prerequisite: ENGL 1120 or consent of instructor and advisor

Complete ALL of the following Courses:

- ENGL1120 - g1:Composition II

Additional Comments:
or consent of instructor and advisor

No Requirement Level

ARTS1123L - Book Arts

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
The study and exploration of a variety of book structures, including pamphlets, accordion and multiple-signature books. Japanese side-sewn, paper decoration, and altered books are also introduced. Development of technical skill, craftsmanship and knowledge of book history are emphasized.

No Requirements

ARTS1610 - Drawing I

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course introduces the basic principles, materials, and skills of observational drawing. Emphasis is placed on rendering a 3-D subject on a 2-D surface with visual accuracy. Other topics include historical and contemporary references as well as an investigation of linear perspective, line, value, shape, space & composition

No Requirements

ARTS1710 - Introduction to Printmaking

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course provides direct experience of exploring basic printmaking processes, including relief, intaglio, and monoprint processes, as well as the investigation of materials/media, tools, techniques, history, and concepts of printmaking. Emphasis is given to solving problems through thematic development while producing a portfolio of prints.

No Requirements

ARTS2127 - Digital Interface Design

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Good interface design is visually compelling, intuitive, and efficient while prioritizing user expectations and experience. In this course, students will design and develop digital interface wireframes and interactive prototypes while gaining the foundational knowledge needed to research and strategize screen-based experiences. In this course, students will work through the concept, iteration, wireframing, and prototyping stages used in the design and development of digital interfaces. They will research, develop, and apply graphic design, interactive, and usability processes, completing the semester with a fully realized, working digital product. Along with creative practice, students will be introduced to the fields of user interface/user experience design (UI/UX design), to which digital interface design is associated. This course, along with others in the program will serve to continue their growth in technical proficiency.

No Requirements

COMM1130 - g5: Public Speaking

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course introduces the theory and fundamental principles of public speaking, emphasizing audience analysis, reasoning, the use of evidence, and effective delivery. Students will study principles of communication theory and rhetoric and apply them in the analysis, preparation and presentation of speeches, including informative, persuasive, and impromptu speeches.

Equivalent Courses: Previous & Current Courses
COMM242

No Requirements

COMM3060 - g5:Advanced Public Speaking

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisites: COMM 1130 or consent of instructor and advisor. Theory and practice of ethical and professional speech communication. Researching, writing and presenting professional presentations. Designing and using effective visuals, including posters and electronic presentation aids. Conducting group presentations and discussions about ethical and cross-curriculum issues in historical, cultural and workplace context.

Equivalent Courses: Previous & Current Courses
COMM360

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

Prerequisites: COMM 1130 or consent of instructor and advisor

Complete ALL of the following Courses:

- COMM1130 - g5: Public Speaking

or consent of instructor and advisor

Additional Comments:

No Requirement Level

COMM5060 - Professional Public Speaking

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisites: Consent of Instructor. Theory and practice of ethical and professional speech communication. Research, writing and presenting professional presentations. Designing and using effective visuals, including posters and electronic presentation aids. Conducting group presentations and discussions about ethical and cross-curriculum issues in historical, cultural and workplace context. Design, schedule and present a formal research colloquium. Shares lecture with (400-level version) with additional expectations and assignments for graduate credit.

Equivalent Courses: Previous & Current Courses
COMM560

Simple Requisites

Course Requisite Requirements

Prerequisites: Consent of instructor

No Requirement Level

COMM5070 - Communication in Engineering

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisites: Graduate Enrollment in Engineering. Advanced communication/ writing courses linked to engineering disciplines, focusing on graduate and professional genres (e.g., conference abstracts, journal articles, and conference presentations). Emphasis on communicating technical information to a variety of audiences. Shares lecture with (400-level version) with additional expectations and assignments for graduate credit.

Equivalent Courses: Previous & Current Courses
COMM570

Simple Requisites

Course Requisite Requirements

No Requirement Level

Prerequisites: Graduate Enrollment in Engineering

COMM5075 - Communication in the Sciences

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisites: Graduate Standing. Advanced communication/writing course focusing on graduate and scientific and engineering genres (e.g.,conference abstracts, journal articles, and conference presentations). Emphasis on communicating technical information to a variety of audiences. Shares lecture with (400-level version) with additional expectations and assignments for graduate credit.

Equivalent Courses: Previous & Current Courses
COMM575

Simple Requisites

Course Requisite Requirements

Prerequisites: Graduate Standing

No Requirement Level

COMM5080 - Thesis & Dissertation Boot Camp

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Boot Camp is a weeklong, intensive course on thesis-writing. Students receive short workshops on time-management and project planning, strategies for overcoming writer's block, peer review, and graduate school thesis requirements (e.g., formatting, copyright, etc.). Additionally, students spend 5-6 hours a day in aree writing environment and have opportunities for feedback from the Instructor or available writing consultants.

Equivalent Courses: Previous & Current Courses
COMM580

No Requirements

EDUC3023 - Child/Adolescent Growth & Development

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: PSYC 1110. The development of human behavior from conception to adolescence. Includes cognitive, social, behavioral, and physical development. (Cross-listed as PSYC 3023.)

Equivalent Courses: Previous & Current Courses
EDUC323, PSYC3023

Simple Requisites

Course Requisite Requirements

Prerequisite Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- PSYC1110 - g4:Introduction to Psychology

Additional Comments:

No Requirement Level

EDUC3040 - Concepts in Education

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
The course is designed to generate a student's general understanding of education theory. In this course, students will focus on understanding learner development, differences and how those impact student learning and achievement. Students will research different styles and modalities of learning, as well as instructional practice and strategies that support differing types of learning. During this time, students will also examine the impact the learning environment plays in overall student achievement.

Equivalent Courses: Previous & Current Courses
EDUC340

No Requirements

EDUC3041 - Matching Teacher Strategy to Student Learning

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisites/Co-requisites: EDUC 340 or departmental waiver. This course contains the professional body of knowledge necessary for the effective teaching of diverse learners for student success. This course focuses on understanding theories and strategies that address the needs of a diverse population that compose today's classrooms in the public school systems. Included in this course will be diversity issues, planning techniques,effective teaching strategies, differentiated instructional and assessment strategies, motivational concepts, and informal and formal assessment practices. Field observations in local classrooms is a key component of this course where students will reflect on student learning and classroom environment in their discipline.

Equivalent Courses: Previous & Current Courses
EDUC341, EDUC342

Simple Requisites

Course Requisite Requirements

Prerequisites/Co-requisites
Type
Completion Requirement

Prerequisite or Co-requisite

Fulfill ANY of the following requirements:

Prerequisite

Complete ALL of the following Courses:
- EDUC3040 - Concepts in Education

OR

Co-requisite

Enroll in the following Courses:
- EDUC3040 - Concepts in Education

Additional Comments:
or departmental waiver

No Requirement Level

EDUC3042 - Matching Teaching Strategies to Student Learning

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisites/Co-requisites: EDUC 340 or departmental waiver. This course contains the professional body of knowledge necessary for the effective teaching of diverse learners for student success. This course focuses on understanding theories and strategies that address the needs of a diverse population that compose today's classrooms in the public school systems. Included in this course will be diversity issues, planning techniques,effective teaching strategies, differentiated instructional and assessment strategies, motivational concepts, and informal and formal assessment practices. Field observations in local classrooms is a key component of this course where students will reflect on student learning and classroom environment in their discipline.

Equivalent Courses: Previous & Current Courses
EDUC341, EDUC342

Simple Requisites

Course Requisite Requirements

Prerequisites/Co-requisites
Type
Completion Requirement

Prerequisite or Corequisite

Fulfill ANY of the following requirements:

Prerequisites

Complete ALL of the following Courses:
- EDUC3040 - Concepts in Education

OR

Co-requisites

Enroll in the following Courses:
- EDUC3040 - Concepts in Education

Additional Comments:
or departmental waiver

No Requirement Level

EDUC3099 - MATCH Mentoring and Leadership

General

Credit Hrs

Credit Hrs:
0

Credit Hours Max:
2

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Pre/co-req: "Instructor permission required." This course prepares students to work in leadership positions on and off campus. Learning experiences may address individual growth and development, learning theory, social change theory, educational planning, supplemental instruction, intentionally structured groups, critical thinking, learning styles, success skills, diversity, effective communication and group dynamics. This course can be repeated for credit.

Simple Requisites

Course Requisite Requirements

Pre/Co-requisite:

instructor permission required

No Requirement Level

EDUC4001 - Effective Reading for Diverse Learners

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisites/Co-requisites: EDUC 340 or departmental waiver. This course teaches key strategies to differentiate instruction in reading as a response to the needs of all learners including those differing in experience, readiness, interests, educational experiences, ability, language, culture, gender, and mode of learning. Course competencies reflect the national and state standards for secondary literacy instruction. Explicit reading instruction using research-based methods will provide guidance for education students to practice different instructional techniques for learning experiences that are accessible for the diverse needs of learners which include a Response Through Intervention (RTI), Students with Disabilities (SWD, and English Language Learners (ELL). The emphasis for differentiation will be reading in the secondary classroom in various content areas. Field observations in local classrooms is a key component of this course where students will reflect on student learning and classroom environment in their discipline.

Equivalent Courses: Previous & Current Courses
EDUC401, EDUC5001, EDUC501

Simple Requisites

Course Requisite Requirements

Prerequisites/Co-requisites
Type
Completion Requirement

Prerequisites/Co-requisites: EDUC 3040 and EDUC 3041 or departmental waiver

Complete ALL of the following Courses:
- EDUC3040 - Concepts in Education
- EDUC3041 - Matching Teacher Strategy to Student Learning

Additional Comments:
or departmental waiver

No Requirement Level

EDUC4002 - Effective Reading for Diverse Learners

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisites/Co-requisites: EDUC 340 and EDUC 342 or departmental waiver. This course teaches key strategies to differentiate instruction in reading as a response to the needs of all learners including those differing in experience, readiness, interests, educational experiences, ability, language, culture, gender, and mode of learning. Course competencies reflect the national and state standards for secondary literacy instruction. Explicit reading instruction using research-based methods will provide guidance for education students to practice different instructional techniques for learning experiences that are accessible for the diverse needs of learners which include a Response Through Intervention (RTI), Students with Disabilities (SWD, and English Language Learners (ELL). The emphasis for differentiation will be reading in the secondary classroom in various content areas. Field observations in local classrooms is a key component of this course where students will reflect on student learning and classroom environment in their discipline.

Equivalent Courses: Previous & Current Courses
EDUC402, EDUC5002, EDUC502

Simple Requisites

Course Requisite Requirements

Prerequisites/Co-requisites
Type
Completion Requirement

Prerequisites/Co-requisites: EDUC 3040 and EDUC 3042 or departmental waiver

Complete ALL of the following Courses:
- EDUC3040 - Concepts in Education
- EDUC3042 - Matching Teaching Strategies to Student Learning

Additional Comments:

No Requirement Level

EDUC4003 - Methods & Practices

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisites/Co-requisites: EDUC 3040 and EDUC 3041 or departmental waiver. The course is designed to build on student's general understanding of education theory from EDUC 340 as well as the foundations of curriculum design and teaching from EDUC341. In this course, students will focus on using what they have learned towards planning and developing effective instruction in their particular discipline/content focus. Students will practice different instructional techniques to create learning experiences that are accessible to the diverse needs of learners. Field observation in local classrooms is a key component of this course where students will reflect on the practice of instruction in their discipline. Field observations in local classrooms is a key component of this course where students will reflect on student learning and classroom environment in their discipline.

Equivalent Courses: Previous & Current Courses
EDUC403, EDUC5003, EDUC503

Simple Requisites

Course Requisite Requirements

Prerequisites/Co-requisites
Type
Completion Requirement

Prerequisites/Co-requisites: EDUC 3040 and EDUC 3041 or departmental waiver

Complete ALL of the following Courses:
- EDUC3040 - Concepts in Education
- EDUC3041 - Matching Teacher Strategy to Student Learning

or departmental waiver

Additional Comments:

No Requirement Level

EDUC4004 - Methods & Practices of Teaching

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisites/Co-requisites: EDUC 3040 and EDUC 3042 or departmental waiver. The course is designed to build on student's general understanding of education theory from EDUC 340 as well as the foundations of curriculum design and teaching from EDUC341. In this course, students will focus on using what they have learned towards planning and developing effective instruction in their particular discipline/content focus. Students will practice different instructional techniques to create learning experiences that are accessible to the diverse needs of learners. Field observation in local classrooms is a key component of this course where students will reflect on the practice of instruction in their discipline. Field observations in local classrooms is a key component of this course where students will reflect on student learning and classroom environment in their discipline.

Equivalent Courses: Previous & Current Courses
EDUC404, EDUC5004, EDUC504

Simple Requisites

Course Requisite Requirements

Prerequisites/Co-requisites
Type
Completion Requirement

Prerequisites/Co-requisites: EDUC 340 and EDUC 342 or departmental waiver

Complete ALL of the following Courses:
- EDUC3040 - Concepts in Education
- EDUC3042 - Matching Teaching Strategies to Student Learning

or departmental waiver

Additional Comments:

No Requirement Level

EDUC4005 - Assessments & Measurements

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisites/Co-requisites: PSYC 1110 or EDUC 340 or departmental waiver. Evaluation and data-driven curriculum revision. Educational and psychological tests and measurement. Classroom management as it relates to differentiated instruction. Field observation assignments that takestudents to local district classrooms. (Cross-listed as PSYC 405.)

Equivalent Courses: Previous & Current Courses
EDUC405, EDUC5005, EDUC505, PSYC4005, PSYC405

Simple Requisites

Course Requisite Requirements

Prerequisite/Co-Requisites
Type
Completion Requirement

Prerequisite/Co-Requisites

Prerequisites/Co-requisites: PSYC 1110 or EDUC 3040 or departmental waiver

Complete ALL of the following Courses:

- PSYC1110 - g4:Introduction to Psychology
  OR EDUC3040 - Concepts in Education

or departmental waiver

Additional Comments:

No Requirement Level

EDUC4013 - Student Teaching (Secondary)

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
9

Credit Hours Operator:
TO

Grade Modes
Standard Letter

Course Description
Prerequisites/Co-requisites: EDUC 4001 and EDUC 4003 or departmental waiver. Senior or graduate standing, consent of a public school principal and permission from program coordinator or department chair. This course will apply the theories from all previous coursework to practice teaching in a local public school. Students will experience all aspects of teaching via supervised field experience. Students are required to meet In TASC/NM teacher competencies through a minimum of 16 weeks of structured student teaching in an approved educational setting (grades 7-12). Theymust also assume all required teacher duties as appropriate including; lesson planning, assessment, individualized instruction, parent-teacher conferences, IEP/grade-level/department meetings, professional development, etc.

Equivalent Courses: Previous & Current Courses
EDUC413

Simple Requisites

Course Requisite Requirements

Prerequisites/Co-requisites
Type
Completion Requirement

Prerequisites/Co-requisites: EDUC 401 and EDUC 403 or departmental waiver. Senior or graduate standing, consent of a public school principal and permission from program coordinator or department chair

Complete ALL of the following Courses:

- EDUC4001 - Effective Reading for Diverse Learners
- EDUC4003 - Methods & Practices

or departmental waiver. Senior or graduate standing, consent of a public school principal and permission from program coordinator or department chair.

Additional Comments:

No Requirement Level

EDUC4014 - Student Teaching Seminar

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Standard Letter

Course Description
Co-requisites: EDUC 413. The student teaching seminar provides opportunities for student teachers to strengthen professional growth. Areasof study include: design of instructional material, behavioral management, assessment and professional tools for exploring the job market. Emphasis is placed on guiding students from theory to the world of the professional practitioner.

Equivalent Courses: Previous & Current Courses
EDUC414

Simple Requisites

Course Requisite Requirements

Co-requisite
Type
Corequisite

Co-requisites: EDUC 4013

Complete ALL of the following Courses:

- EDUC4013 - Student Teaching (Secondary)

Additional Comments:

No Requirement Level

EDUC5001 - Effective Reading for Diverse Learners

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisites/Co-requisites: EDUC 340 or departmental waiver. This course teaches key strategies to differentiate instruction in reading as a response to the needs of all learners including those differing in experience, readiness, interests, educational experiences, ability, language, culture, gender, and mode of learning. Course competencies reflect the national and state standards for secondary literacy instruction. Explicit reading instruction using research-based methods will provide guidance for education students to practice different instructional techniques for learning experiences that are accessible for the diverse needs of learners which include a Response Through Intervention (RTI), Students with Disabilities (SWD, and English Language Learners (ELL). The emphasis for differentiation will be reading in the secondary classroom in various content areas. Field observations in local classrooms is a key component of this course where students will reflect on student learning and classroom environment in their discipline.

Equivalent Courses: Previous & Current Courses
EDUC4001, EDUC401, EDUC501

No Requirements

EDUC5002 - Effective Reading for Diverse Learners

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisites/Co-requisites: EDUC 340 and EDUC 342 or departmental waiver. This course teaches key strategies to differentiate instruction in reading as a response to the needs of all learners including those differing in experience, readiness, interests, educational experiences, ability, language, culture, gender, and mode of learning. Course competencies reflect the national and state standards for secondary literacy instruction. Explicit reading instruction using research-based methods will provide guidance for education students to practice different instructional techniques for learning experiences that are accessible for the diverse needs of learners which include a Response Through Intervention (RTI), Students with Disabilities (SWD, and English Language Learners (ELL). The emphasis for differentiation will be reading in the secondary classroom in various content areas. Field observations in local classrooms is a key component of this course where students will reflect on student learning and classroom environment in their discipline.

Equivalent Courses: Previous & Current Courses
EDUC502

No Requirements

EDUC5003 - Methods & Practices of Teaching (Secondary)

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisites/Co-requisites: EDUC 3040 and EDUC 3041 or departmental waiver. The course is designed to build on student's general understanding of education theory from EDUC 340 as well as the foundations of curriculum design and teaching from EDUC341. In this course, students will focus on using what they have learned towards planning and developing effective instruction in their particular discipline/content focus. Students will practice different instructional techniques to create learning experiences that are accessible to the diverse needs of learners. Fieldobservation in local classrooms is a key component of this course where students will reflect on the practice of instruction in their discipline. Field observations in local classrooms is a key component of this course where students will reflect on student learning and classroom environment in their discipline.

Equivalent Courses: Previous & Current Courses
EDUC4003, EDUC403, EDUC503

Simple Requisites

Course Requisite Requirements

Prerequisites/Co-requisites

Type
Completion Requirement

Prerequisites/Co-requisites: EDUC 3040 and EDUC 3041 or departmental waiver

Complete ALL of the following Courses:

- EDUC3040 - Concepts in Education
- EDUC3041 - Matching Teacher Strategy to Student Learning

or departmental waiver

Additional Comments:

No Requirement Level

EDUC5004 - Methods & Practices of Teaching (Elementary)

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisites/Co-requisites: EDUC 3040 and EDUC 3042 or departmental waiver. The course is designed to build on student's general understanding of education theory from EDUC 340 as well as the foundations of curriculum design and teaching from EDUC341. In this course, students will focus on using what they have learned towards planning and developing effective instruction in their particular discipline/content focus. Students will practice different instructional techniques to create learning experiences that are accessible to the diverse needs of learners. Fieldobservation in local classrooms is a key component of this course where students will reflect on the practice of instruction in their discipline. Field observations in local classrooms is a key component of this course where students will reflect on student learning and classroom environment in their discipline.

Equivalent Courses: Previous & Current Courses
EDUC4004, EDUC404, EDUC504

No Requirements

EDUC5005 - Assessments and Measurement

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Standard Letter

Course Description
Prerequisites/Co-requisites: PSYC 1110 or EDUC 340 or departmental waiver. Evaluation and data-driven curriculum revision. Educational and psychological tests and measurement. Classroom management as it relates to differentiated instruction. Field observation assignments that takestudents to local district classrooms. (Cross-listed as PSYC 405.)

Equivalent Courses: Previous & Current Courses
EDUC4005, EDUC405, EDUC505, PSYC4005, PSYC405

Simple Requisites

Course Requisite Requirements

Prerequisites/Co-requisites
Type
Completion Requirement

Prerequisites/Co-requisites

Prerequisites/Co-requisites: PSYC 1110 or EDUC 3040 or departmental waiver

Complete ALL of the following Courses:
- PSYC1110 - g4:Introduction to Psychology
- EDUC3040 - Concepts in Education

or departmental waiver

Additional Comments:

No Requirement Level

EDUC5006 - Teaching and Assessing Reading

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Standard Letter

Course Description
Prerequisites/Co-requisites: EDUC 3040 or EDUC 3042 or departmental waiver. This course will provide a research-informed knowledge base for teaching reading and applying it by practicing with sample lessons from the text. Instruction begins with an introduction to both English and Spanish language structure and moves through the stages of reading acquisition beginning with early literacy, decoding and word recognition, and through the essential components that lead to fluency and comprehension in literary and informational texts. The structure of an effective reading assessment system designed for the progression of reading and how to create a diagnostic plan from the results will be an integral part of this course.

Equivalent Courses: Previous & Current Courses
EDUC4006, EDUC406, EDUC506

Simple Requisites

Course Requisite Requirements

Prerequisites/Co-requisites:
Type
Completion Requirement

Prerequisites/Co-requisites: EDUC 3040 and EDUC 3042 or departmental waiver

Complete ALL of the following Courses:
- EDUC3040 - Concepts in Education
- EDUC3042 - Matching Teaching Strategies to Student Learning

or departmental waiver

Additional Comments:

No Requirement Level

EDUC5011 - Supervised Field Experience (Secondary)

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Standard Letter

Course Description
Prerequisites/Co-requisites: EDUC 501 and EDUC 503 or departmental waiver. Consent of a public school principal and permission from program coordinator or department chair. This course will apply the theories from all previous coursework to student teaching/Alternative Licensure (ALP) teaching in a local public school. Students will experience all aspects of teaching via supervised field experience. Students are required to meet In TASC/NM teacher competencies through a minimum of 16 weeks of structured student teaching in an approved educational setting (grades 7-12). They must also assume all required teacher duties as appropriate including; lesson planning, assessment, individualized instruction, parent-teacherconferences, IEP/grade-level/ department meetings, professional development, etc.

Equivalent Courses: Previous & Current Courses
EDUC511

Simple Requisites

Course Requisite Requirements

Prerequisites/Co-requisites
Type
Completion Requirement

Prerequisites/Co-requisites: EDUC 5001 and EDUC 5003 or departmental waiver. Consent of a public school principal and permission from program coordinator or department chair

Complete ALL of the following Courses:
- EDUC5001 - Effective Reading for Diverse Learners
- EDUC5003 - Methods & Practices of Teaching (Secondary)

or departmental waiver. Consent of a public school principal and permission from program coordinator or department chair

Additional Comments:

No Requirement Level

EDUC5012 - Supervised Field Experience (Elementary)

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Standard Letter

Course Description
Prerequisites/Co-requisites: EDUC 502 and EDUC 504 or departmental waiver. Consent of a public school principal and permission from program coordinator or department chair. This course will apply the theories from all previous coursework to student teaching/Alternative Licensure (ALP) teaching in a local public school. Students will experience all aspects of teaching via supervised field experience. Students are required to meet In TASC/NM teacher competencies through a minimum of 16 weeks of structured student teaching in an approved educational setting (grades K-8). They must also assume all required teacher duties as appropriate including; lesson planning, assessment, individualized instruction, parent-teacherconferences, IEP/grade-level/ department meetings professional development, etc.

Equivalent Courses: Previous & Current Courses
EDUC512

Simple Requisites

Course Requisite Requirements

Prerequisites/Co-requisites
Type
Completion Requirement

Prerequisites/Co-requisites: EDUC 5002 and EDUC 5004 or departmental waiver. Consent of a public school principal and permission from program coordinator or department chair

Complete ALL of the following Courses:
- EDUC5002 - Effective Reading for Diverse Learners
- EDUC5004 - Methods & Practices of Teaching (Elementary)

or departmental waiver. Consent of a public school principal and permission from program coordinator or department chair

Additional Comments:

No Requirement Level

ENGL1110 - g1:Composition I

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Composition I. In this course, students will read, write, and think about a variety of issues and texts. They will develop reading and writing skills that will help with the writing required in their fields of study and other personal and professional contexts. Students will learn to analyze rhetorical situations in terms of audience, contexts, purpose, mediums, and technologies and apply this knowledge to their reading and writing. They will also gain an understanding of how writing and other modes of communication work together for rhetorical purposes. Students will learn to analyze the rhetorical context of any writing task and compose with purpose, audience, and genre in mind. Students will reflect on their own writing processes, learn to workshop drafts with other writers, and practice techniques for writing, revising, and editing.

Equivalent Courses: Previous & Current Courses
ENGL111

No Requirements

ENGL1120 - g1:Composition II

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Composition II. In this course, students will explore argument in multiple genres. Research and writing practices emphasize summary, analysis, evaluation, and integration of secondary sources. Students will analyze rhetorical situations in terms of audience, contexts, purpose, mediums, and technologies and apply this knowledge to their reading, writing, and research. Students will sharpen their understanding of how writing and other modes of communication work together for rhetorical purposes. The emphasis of this course will be on research methods.

Equivalent Courses: Previous & Current Courses
ENGL112

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite: ENGL 1110 or equivalent course passed with a C or better

Earn a minimum C of Grade in the following:
- ENGL1110 - g1:Composition I

Additional Comments:

No Requirement Level

ENGL1230 - Introducation to Academic Communication

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
The course introduces students to the general culture of a US university. It provides opportunities to develop their listening, speaking, reading, and writing skills related to their coursework in science, technology, engineering, and mathematics (e.g., understanding lectures, reading academic texts,

communicating with professors and TAs, etc.). Students are also introduced to strategies for drafting and editing academic writing and for preparing and giving academic presentations.

Equivalent Courses: Previous & Current Courses
ENGL105

No Requirements

ENGL1510 - Communication for Multilingual Students

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course allows students to apply the knowledge they have acquired in their field of study to further their development in English language skills. Students work on reading and responding to academic texts in both written and oral formats; crafting and expressing an original argument on an academic topic; and correctly summarizing, paraphrasing, and citing academic texts. Students will write and present on researched topics in their fields of study, provide constructive feedback on each other's work, and practice articulating and answering questions on academic topics.

Equivalent Courses: Previous & Current Courses
ENGL106

No Requirements

ENGL2410 - Autobiography

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course approaches autobiography through both theory and practice. Students will analyze major autobiographies, read critical commentary on the autobiography genre, and finally, produce their own autobiographical work using the course readings as models.

No Requirements

ENGL3011 - i5:Creative Writing

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
The study and writing of one genre or a combination of the following genres: poetry, fiction, creative nonfiction, playwriting and screenwriting. Emphasis on reading and analyzing literature.

Equivalent Courses: Previous & Current Courses
ENGL311, ENGL5011, ENGL511

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisite: ENGL 1120 or consent of instructor and advisor

Complete ALL of the following Courses:
- ENGL1120 - g1:Composition II

or consent of instructor and advisor

Additional Comments:

No Requirement Level

ENGL3012 - i5:Short Fiction

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: ENGL 1120 or consent of Instructor and Advisor. Concentrated study of major works of short fiction written in English and in translation.

Equivalent Courses: Previous & Current Courses
ENGL312

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisite: ENGL 1120 or consent of instructor and advisor

Complete ALL of the following Courses:
- ENGL1120 - g1:Composition II

or consent of instructor and advisor

Additional Comments:

No Requirement Level

ENGL3015 - i1:Communication for Multilingual Students

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: At least junior standing. This course offers a more advanced introduction to language issues in writing for scientific and technicalfields. Students in this class explore language use and academic genres in their fields of study and complete an extended research project on a technical topic. The course culminates in a technical research report and conference-style presentation.

Equivalent Courses: Previous & Current Courses
ENGL315

Simple Requisites

Course Requisite Requirements

Prerequisite: At least junior standing

No Requirement Level

ENGL3025 - g:World Literature

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: ENGL 1120 or consent of Instructor and Advisor. Literature of the West from the Classics through the Renaissance. [NMCCNS ENGL 2613: General Education Area V]

Equivalent Courses: Previous & Current Courses
ENGL325

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisite: ENGL 1120 or consent of instructor and advisor

Complete ALL of the following Courses:
- ENGL1120 - g1:Composition II

or consent of instructor and advisor

Additional Comments:

No Requirement Level

ENGL3026 - World Literature

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: ENGL 1120 or consent of Instructor and Advisor. Literature of the West from Neoclassicism to Contemporary. [NMCCNS ENGL 2623: General Education Area V]

Equivalent Courses: Previous & Current Courses
ENGL326

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisite: ENGL 1120 or consent of instructor and advisor

Complete ALL of the following Courses:
- ENGL1120 - g1:Composition II

or consent of instructor and advisor

Additional Comments:

No Requirement Level

ENGL3031 - British Literature

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: ENGL 1120 or consent of Instructor and Advisor. A survey of British literature from its origin through the Age of Enlightenment. Major authors studied include the Beowulf poet, Chaucer, Shakespeare, and Milton.

Equivalent Courses: Previous & Current Courses
ENGL331

Simple Requisites

Course Requisite Requirements

Prerequisite
Type

Prerequisite

Prerequisite

Prerequisite: ENGL 1120 or consent of instructor and advisor

Complete ALL of the following Courses:

- ENGL1120 - g1:Composition II

or consent of instructor and advisor

Additional Comments:

No Requirement Level

ENGL3032 - British Literature

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: ENGL 1120 or consent of Instructor and Advisor. A continuation of ENGL 331, this course surveys British literature of the nineteenth and twentieth centuries. Emphasis is upon the major literary movements of Romanticism and Realism.

Equivalent Courses: Previous & Current Courses
ENGL332

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisite: ENGL 1120 or consent of instructor and advisor

Complete ALL of the following Courses:

- ENGL1120 - g1:Composition II

or consent of instructor and advisor

Additional Comments:

No Requirement Level

ENGL3041 - i1:Technical Writing

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisites: ENGL 1110 and 1120 or the equivalent passed with a grade C or better and at least junior standing. This course emphasizes clear, accurate, and precise communication and scientific and technical information to a variety of audiences, for a variety of purposes. Students will be taught how to effectively analyze the components of writing situations and appropriately conduct research, write content in a professional, yet accessible style, incorporate visuals, organize and format documents. The course culminates with a substantial technical research report and oral presentation. In addition, students work on writing documents including memos, proposals, short reports, and instructions.

Equivalent Courses: Previous & Current Courses
ENGL341

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Completion Requirement

Prerequisites: ENGL 1110 and 1120 or the equivalent passed with a grade C or better and at least junior standing

Complete ALL of the following Courses:

- ENGL1110 - g1:Composition I
- ENGL1120 - g1:Composition II

or the equivalent passed with a grade C or better and at least junior standing

Additional Comments:

No Requirement Level

ENGL3052 - Contemporary Latin American Novel

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: ENGL 1120 or equivalent. Survey of the 20th century Latin American regional novel. How contemporary writers have portrayed theLatin American continent: social-realism, surrealism, the boom, neo-baroque, magical realism, mestizaje, social-protest, negrismo, etc. Focus on reading classical works such as Arguedas, Asturias, Castellanos, Fuentes, Roa Bastos, Rulfo. (Same as Spanish 352)

Equivalent Courses: Previous & Current Courses
ENGL352

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisite: ENGL 1120 or equivalent

Complete ALL of the following Courses:

- ENGL1120 - g1:Composition II

or equivalent

Additional Comments:

No Requirement Level

ENGL3055 - Latin American Fiction & Art

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
A historical journey of a multi-cultural continent. Politics, economic disparity, military dictatorship, oppression and revolutionary resistance are studiedthrough the lens of arts and literature. The most varied styles—social-realism, surrealism, fantasy, magical-realism, etc.—complement factual history to offer an accurate picture of a cruel social reality. (Same as SPAN 355).

Equivalent Courses: Previous & Current Courses
ENGL355

No Requirements

ENGL3057 - Latin American Literature

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
A review of Latin American literary production with examples of its cultural and artistic diversity. The class examines the most important writers from Mexico, the Caribbean, Central America, the Andean region and the Southern cone, and relates their poetic legacy to the social sciences and philosophy. (Same as SPAN 3057)

Equivalent Courses: Previous & Current Courses
ENGL357

No Requirements

ENGL3066 - Historical Fiction

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisites: ENGL 1120 or consent of Instructor and Advisor. An exploration of historical fiction, examining several historical fiction novels and shorter works with critical analysis of each work for its contributions to an understanding of historical and contemporary issues based on its historical accuracy and literary effectiveness. (Same as HIST 366).

Equivalent Courses: Previous & Current Courses
ENGL366, HIST3066, HIST366

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

Prerequisite

Prerequisites: ENGL 1120 or consent of instructor and advisor

Complete ALL of the following Courses:

- ENGL1120 - g1:Composition II

or consent of instructor and advisor

Additional Comments:

No Requirement Level

ENGL4031 - Literary Genres

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: ENGL 1120 or consent of Instructor and Advisor. The study of a particular type of literature, its origins, characteristics, subtypes, and some of its major writers and works. Possible genres are poetry, drama, short stories, science fiction, novels, and nonfiction writing. May be repeated for credit with different genres.

Equivalent Courses: Previous & Current Courses
ENGL431

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisite: ENGL 1120 or consent of instructor and advisor

Complete ALL of the following Courses:

- ENGL1120 - g1:Composition II

or consent of instructor and advisor

Additional Comments:

No Requirement Level

ENGL4035 - Major Writers

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: ENGL 1120 or consent of Instructor and Advisor. Intensive study of the writing of a major world author or authors, such as Willa Cather, Nathaniel Hawthorne, Herman Melville, William Shakespeare, Mark Twain. May be repeated for credit with different writers.

Equivalent Courses: Previous & Current Courses
ENGL435

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisite: ENGL 1120 or consent of instructor and advisor

Complete ALL of the following Courses:

- ENGL1120 - g1:Composition II

or consent of instructor and advisor

Additional Comments:

No Requirement Level

ENGL4036 - Issues & Themes in Literature

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: ENGL 1120 or consent of Instructor and Advisor. Concentrated study of issues, ideas, and themes as they affect or are embodied in literature. Possible topics include, among others, Environment, Gender, Ethnicity, Travel, and Place. May be repeated for credit with different issues.

Equivalent Courses: Previous & Current Courses
ENGL436

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisite: ENGL 1120 or consent of instructor and advisor

Complete ALL of the following Courses:

- ENGL1120 - g1:Composition II

or consent of instructor and advisor

Additional Comments:

No Requirement Level

ENGL4091 - Directed Studies

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
6

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: ENGL 1120 or consent of Instructor and Advisor.

Equivalent Courses: Previous & Current Courses
ENGL491

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisite: ENGL 1120 or consent of instructor and advisor

Complete ALL of the following Courses:

- ENGL1120 - g1:Composition II

or consent of instructor and advisor

Additional Comments:

No Requirement Level

ENGL5011 - Graduate Creative Writing

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: Consent of Instructor. Professional-level writing in fiction, poetry, creative non-fiction or plays. Focuses on the genre of the student's choice. Students write often, revise frequently, learn and apply methods of Creative Writing instruction. Shares lecture with (400-level version) with additional expectations and assignments for graduate credit.

Equivalent Courses: Previous & Current Courses
ENGL3011, ENGL311, ENGL511

Simple Requisites

Course Requisite Requirements

Prerequisite: Consent of instructor

No Requirement Level

ENGL5024 - Ecotopia: Science & Literature

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: Graduate Standing or consent of Instructor and Advisor. Utopian Literature, whether Paradise myths or novels set on an idyllic island or in the future, chronicles human aspirations for a better society. Ecotopia—a neologism coined in 1968– combines utopian desires for better relationships between humans with more recent desires and need for a better relationship with the environment. The course provides a review of utopian literature throughout history and focuses on contemporary science fiction novels and developments in architecture, technology, science, and alternative social structures. Shares lecture with ENGL 324, with additional expectations for graduate credit. Shares lecture with (400-level version) with additional expectations and assignments for graduate credit.

Equivalent Courses: Previous & Current Courses
ENGL524

Simple Requisites

Course Requisite Requirements

Prerequisite: Graduate Standing or consent of instructor and advisor

No Requirement Level

FDMA1266 - Digital Techniques in Visual Art

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Offered: Spring. Studio course introducing fundamental two-dimensional concepts and principles while focusing on processes and methodologies. Concepts, skills, process activities and methods introduced in this course are applicable across all areas of design. This course will utilize visual problem solving skills to address personal, social, cultural or social justice issues and perspectives. Assignments will enable students to develop critical thinking and the ability to effectively communicate digital art criticism in a collaborative environment.

No Requirements

FDMA2110 - Introduction to Film Studies

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course introduces students to the fundamentals in film history, criticism, and theory. Through viewing and analysis of a variety of narrative, documentary, and experimental films, students will advance their understanding of key issues in filmic representation and aesthetics. A range of approaches will be employed in understanding the aesthetic and cultural significance of the medium, including feminism, post-colonialism, critical race theory, and modernism.

No Requirements

GNDR2040 - Science & Gender

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course introduces students to the complex interplay between science, technology, and gender, with special attention to intersections with sexuality, race, and ethnicity. We analyze the concepts of “sex” and “gender” by critically investigating the nature/nurture debates about sex differences. The course further prompts students to think more broadly about gender in science and technology in discussions over bias, values, and scientific objectivity. Throughout the course, we also survey different critical approaches to biomedicine such as women’s health, LGBTQ health, breast cancer, HIV/AIDS, and reproductive health.

No Requirements

GRMN1110 - g5:German 1

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Intended for students with no previous exposure to German, this course develops basic listening, speaking, reading, and writing skills aiming toward the ACTFL novice-mid level. This is an introductory course designed to teach the student to communicate in German in everyday situations and to develop an understanding of German cultures through the identification of cultural products and practices, of cultural perspectives, and the ability to function at a survival level in an authentic cultural content. This course will also develop the student’s sense of personal and social responsibility through the identification of social issues.

No Requirements

GRMN1120 - g5:German II

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
A continuation of German 1, students will develop a broader foundation in skills gained during the first semester, including understanding, speaking, reading and writing German aiming toward the ACTFL novice-high level. This course is designed to increase student fluency in German as applied to everyday situations. Students will also learn to recognize and understand various German products, practices, and perspectives, identifying common cultural patterns, describing basic cultural viewpoints, and further developing their sense of personal and social responsibility through the investigation of cultural issues.

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisite: GRMN 1110 or equivalent

Complete ALL of the following Courses:
- GRMN1110 - g5:German 1

or equivalent

Additional Comments:

No Requirement Level

HIST1110 - g5:United States History I

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
United States History I. The primary objective of this course is to serve as an introduction to the history of the United States from the pre-colonialperiod to the immediate aftermath of the Civil War. The elements of this course are designed to inform students on themajor events and trends that are essential in the understanding of the development of the United States within the contextof world societies.

Equivalent Courses: Previous & Current Courses
HIST141

No Requirements

HIST1120 - g5:United States History II

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
United States History II. The primary objective of this course is to serve as an introduction to the history of the United States from reconstruction tothe present. The elements of this course are designed to inform students on the major events and trends that are essentialin the understanding of the development of the United States within the context of world societies.

Equivalent Courses: Previous & Current Courses
HIST142, INTR1120

No Requirements

HIST1130 - i5:World History I

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
The primary objective of this course is to serve as an introduction to global history from ancient times to the 16th century. The elements of this course are designed to inform students on the major events and trends that are essential in the understanding of the development of world societies.

Equivalent Courses: Previous & Current Courses
HIST151

No Requirements

HIST1140 - i5:World History II

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
The primary objective of this course is to serve as an introduction to global history from the 16th century to the present. The elements of this course are designed to inform students on the major events and trends that are essential in the understanding of the development of world societies.

Equivalent Courses: Previous & Current Courses
HIST152

No Requirements

HIST1150 - g5:Western Civilization

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Western Civilization I. This course is a chronological treatment of the history of the western world from ancient times to the early modern era. Theelements of this course are designed to inform students on the major events and trends that are essential in the understanding of the development of western civilization within the context of world societies. Selective attention will begiven to "non-western" civilizations which impact and influence the development of "western" civilization.

Equivalent Courses: Previous & Current Courses
HIST131

No Requirements

HIST1160 - g5:Western Civilization II

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course is a chronological treatment of the history of the western world from the early modern era to the present. The elements of this course are designed to inform students on the major events and trends that are essential in the understanding of the development of western civilization within the context of world societies. Selective attention will be given to "non-western" civilizations which impact and influence the development of "western" civilization.

Equivalent Courses: Previous & Current Courses
HIST132

No Requirements

HIST1166 - i5: Technology and Science from the Hand-Ax to the Steam Engine: Full STEAM Ahead

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Standard Letter

Course Description
This course is an introduction to the history of science and technology up to and including the invention of the steam engine.It offers an overview of historical evolution of fundamental scientific concepts and technological developments in variouscultures of the world. This course is paired with an optional hands-on lab component.

Equivalent Courses: Previous & Current Courses
HIST121

Simple Requisites

Course Requisite Requirements

Corequisite: HIST 1166L
Type
Corequisite

Corequisite

Enroll in the following Courses:

- HIST1166L - i5:Full STEAM Ahead Lab (Inactive)

Additional Comments:

No Requirement Level

HIST1194 - i5:Europe in 19 Century 1815 -1914

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
An introduction to the major developments and themes in nineteenth century European history, including major international developments such as the Congress System, the Revolutions of 1848, the advance of modern ideologies and major trends in arts and sciences, and the causes of World War I.

Equivalent Courses: Previous & Current Courses
HIST161

No Requirements

HIST1195 - i5:Europe in the 20th Century, 1914-2000

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
The course examines the great watersheds of the last century in Europe, including the World Wars, the division of the continent during the Cold War, and the fall of communism. Several case-studies and problems will be broached in lectures to help students understand the legacies of the 20th century that we face today.

Equivalent Courses: Previous & Current Courses
HIST162

No Requirements

HIST3045 - g5:Rise & Fall of the Soviet Union

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: ENGL 1120 or consent of Instructor and Advisor. The Bolshevik Revolution, the development of Stalinist totalitarianism, reform under Khrushchev, the “stagnation” era of Brezhnev, and the end of the “great experiment” with Gorbachev.

Equivalent Courses: Previous & Current Courses
HIST345

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisite: ENGL 1120 or consent of instructor and advisor

Complete ALL of the following Courses:
- ENGL1120 - g1:Composition II

or consent of instructor and advisor

Additional Comments:

No Requirement Level

HIST3049 - Crime & Society

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: ENGL 1120 or consent of Instructor and Advisor. This course explores political, socio-economic, and cultural impacts of crime on societies. Through reading, class discussions, and films the students will compare and contrast the impact of crime on the state, its institutions,and its people in America and Europe. The key topics will reveal the role of crime in public life, the methods and integrity of law enforcement agencies, the punishment of criminals, and public perception of justice.

Equivalent Courses: Previous & Current Courses
HIST349

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisite: ENGL 1120 or consent of instructor and advisor

Complete ALL of the following Courses:
- ENGL1120 - g1:Composition II

or consent of instructor and advisor

Additional Comments:

No Requirement Level

HIST3075 - i5:Ancient & Medieval Foundations for Science & Technology

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: ENGL 1120 or consent of Instructor and Advisor. This course discusses the history of science and technology up to the Scientific Revolution. It offers an overview of historical evolution of fundamental scientific concepts and technological developments in Western and non-Western cultures from prehistory to the seventeenth century.

Equivalent Courses: Previous & Current Courses
HIST375

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisite: ENGL 1120 or consent of instructor and advisor

Complete ALL of the following Courses:
- ENGL1120 - g1:Composition II

or consent of instructor and advisor

Additional Comments:

No Requirement Level

HIST3085 - i5:Latin American Cultural History

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: ENGL 1120 or consent of Instructor and Advisor. Overview of the cultural history of the Iberian world on both sides of the Atlantic from the earliest cultural expression to the current Hispanic presence in the United States. Multicultural creations of Hispanic societies. Cultural productions, i.e., fiestas, toreo, music, painting, literature, graffiti—in their political, economic, and historical background. (Same as SPAN 385).

Equivalent Courses: Previous & Current Courses
HIST385, SPAN3085, SPAN385

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisite: ENGL 1120 or consent of instructor and advisor

Complete ALL of the following Courses:
- ENGL1120 - g1:Composition II

or consent of instructor and advisor

Additional Comments:

No Requirement Level

HIST4072 - Special Topics

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Special Topics in History

Equivalent Courses: Previous & Current Courses
HIST472

No Requirements

HIST4091 - Directed Studies

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
6

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: Senior standing or consent of Instructor and Advisor.

Equivalent Courses: Previous & Current Courses
HIST491

Simple Requisites

Course Requisite Requirements

Prerequisite: Senior standing or consent of instructor and advisor

No Requirement Level

HUMN1133 - g5:German Culture Through Film

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course explores German history from the end of the monarchy in 1918 up to the 21st century, using films ranging from the silent era, through Nazi documentaries and “rubble” films, up to modern treatments of reunified Germany. Students will learn film terminology, and analyze the director’s use of various techniques, as well as gain an understanding of important issues in recent European history.

No Requirements

HUMN1220 - g5:Film Genres

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course helps students become more aware of film as a constructed and contextually-bound art form by providing students with the strategies to analyze films and genres. It also helps students see film as both conventional and a socio-cultural-situated artifact. U.S. and foreign films are included. This class helps students develop their aesthetic sensibility, creativity, and collaboration. This will help make them well-rounded individuals valued in the workplace.

Equivalent Courses: Previous & Current Courses
HUMA120, HUMA1220

No Requirements

HUMN1230 - g5:History of Sci-Fi Dystopia

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Standard Letter

Course Description
Offered: Fall. Science fiction is more than pure escapism: science fiction allows us to imagine our future while also interrogating our past and present. This course provides a historical survey of modern advancements in science and technology through the lens of sci-fi narratives, examining the evolution of humanity’s perceptions of, anxieties about, and relationship with technology and science. (no prerequisites or grade requirements).

Equivalent Courses: Previous & Current Courses
HUMA1230

No Requirements

HUMN2170 - Latin American Food and Culture

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Offered: Every other Fall This course studies the relationship between food and culture in Latin America. Students will learn to appreciate Latin American food, and to express your appreciation for this food in conversation and in writing. Students will learn how culinary practices change throughout history, from the agrarian societies of Latin America prior to the Spanish conquest to the urban, industrialized societies of the present. You will also learn to think critically about how the foods people produce and consume relate to other aspects of their lives, including issues related to (but not limited to) social class, gender relations, ethnic identity, and political and religious beliefs.

Equivalent Courses: Previous & Current Courses
HUMA0289, HUMA2170, HUMA289, HUMN0289, HUMN289, SPAN0289, SPAN289

No Requirements

HUMN2180 - Latin American Popular Music

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Offered: Every other fall. This course examines some of the major forms of Latin American music, from early twentieth century genres such as tango and samba to contemporary genres such as cumbia, reggaeton, and funk. Students learn to identify key artists, songs, and albums; to narrate the histories of the different genres; and to recognize and appreciate each genre’s formal qualities, including melodic, harmonic, and rhythmic elements. They also relate songs from each genre to their immediate significant historical, sociopolitical, cultural, and technological contexts. Finally, students develop a general understanding of how Latin American popular music circulates in the globalized societies of the twenty-first century.

Equivalent Courses: Previous & Current Courses
HUMA2180, HUMA389, HUMN389, SPAN389

No Requirements

HUMN3002 - i5:Film Production

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Standard Letter

Course Description
Film Production familiarizes students with the art and technique of filmmaking. Students work together in teams to write, shoot, and edit a short genre or trans-genre film of their choice. They will also help organize a yearly premiere and film festival to publicly screen their films.

Equivalent Courses: Previous & Current Courses
HUMA302

No Requirements

HUMN3009 - i5:Song and Society

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisites: ENGL 1120 or consent of Instructor and Advisor. This course is a dialogue about music, specifically song, and its role in the development of human society. According to a theory proposed by Dr. Daniel Levitin there are 6 categories of song which helped form our human society; Friendship, Joy, Comfort, Knowledge, Religion, and Love. These will serve as the basis for the class. Within the context of these categories there can be many sub-divisions to be explored. Students may suggest new divisions and choose songs within those divisions. The class will include lectures, discussions, and student participation. Each student will make a personal song selection for each category, discuss and defend their choice in class, and in their final essay. (Same as MUSC 309)

Equivalent Courses: Previous & Current Courses
HUMA309

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Completion Requirement

Prerequisites: ENGL 1120 or consent of instructor and advisor.

Complete ALL of the following Courses:
- ENGL1120 - g1:Composition II

or consent of instructor and advisor.

Additional Comments:

No Requirement Level

HUMN3011 - i6:Shakespeare & Music

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
An interdisciplinary study of selected works of Shakespeare through a musical lens. Shakespeare's plays were written to be spoken and heard, and this course explores the parallel issues of choice and constraint in the acts of speaking and hearing Shakespeare's words, applying tools commonly used to facilitate the performance and reception of music.

Equivalent Courses: Previous & Current Courses
HUMA311

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Completion Requirement

Prerequisites: ENGL 1120 or consent of instructor and advisor.

Complete ALL of the following Courses:
- ENGL1120 - g1:Composition II

or consent of instructor and advisor.

Additional Comments:

No Requirement Level

HUMN3020 - 60s History and Culture

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisites: ENGL 1120 . Perhaps the highpoint of the 20th century, the 1960s extended far beyond the decade and raised issues about the relationship of people to each other, to themselves, and to the environment. Moreover, the 1960s launched significant social revolutions and technological innovations. Using fiction and documentary films and music, 60s History and Culture will immerse students in the 1960s.

Equivalent Courses: Previous & Current Courses
HUMA3020, HUMA320, HUMN320

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Completion Requirement

Prerequisites: ENGL 1120

Complete ALL of the following Courses:
- ENGL1120 - g1:Composition II

Additional Comments:

No Requirement Level

MUS3041 - Jazz Ensemble

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Standard Letter

No Requirements

MUS3051 - Chamber Orchestra

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Standard Letter

No Requirements

MUSC1110 - g6:Music Appreciation: Jazz

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, No Report, Standard Letter

Course Description
This course explores the ideas of music in society and its cultural relevance and is designed to increase the students' appreciations of music as well as to enhance their listening skills. Students are introduced to various periods, styles, and composer of music and become acquainted with knowledge and appreciation of Jazz from various cultures and times.

No Requirements

MUSC1130 - g6:Music Appreciation: Western Music

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course explores the ideas of the music in society and its cultural relevance and is designed to increase the students' appreciation of music as well as to enhance their listening skills. Students are introduced to various periods, styles, and composers of music and become acquainted with knowledge and appreciation of Western Classical Music from various cultures and times.

Equivalent Courses: Previous & Current Courses
MUS110

No Requirements

MUSC1140 - g6:Music Appreciation: World Music

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course explores the ideas of music in society and its cultural relevance and is designed to increase the students' appreciation of music as well as to enhance their listening skills. Students are introduced to various periods, styles, and composers of music and become acquainted with knowledge and appreciation of Western Classical Music from various cultures and times.

Equivalent Courses: Previous & Current Courses
HUMA0189, HUMA189, HUMN0189, INTR0189, INTR189, MUSC0189, MUSC189

No Requirements

MUSC1210 - g6:Fundamentals of Music for non-majors

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Fundamentals of Music for non-majors. A beginning course in the fundamentals of music, this course includes notation, scales, key signatures and intervals. Aural comprehension is introduced through singing intervals, scales and triads and dictating simple rhythmic and melodic patternsand students explore the basic components of music.

Equivalent Courses: Previous & Current Courses
MUS105

No Requirements

MUSC2420 - g6:Comprehensive Musicianship

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course will help you develop practical skills that will serve you well as a musician. Although some of the course material is conceptual, most of it is experiential, and the exercises and drills we will work through during class meetings form the essential core of the course.

Equivalent Courses: Previous & Current Courses
MUS201

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

Prerequisites

Prerequisite: MUS 1210 or consent of instructor and advisor

Complete ALL of the following Courses:

- MUSC1210 - g6:Fundamentals of Music for non-majors

or consent of instructor and advisor

Additional Comments:

No Requirement Level

MUSC3000 - i6:Music Theory

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisites: MUSC 1210, or successful audition. This course will explore Western music language in depth, from music notation throughout Western music history; scales in all its modes, including the Gregorian Mode, Tetrachord, Chord Function, Augmented 6 Chords, Neapolitan, the Seventh Chord formations, Cadenza; and introduction to 5 Species Counterpoint, Bach Chorale Harmonization. Practical Solfeggio metrical, and Lied Form. Final project will be presented in Recital Format.

Equivalent Courses: Previous & Current Courses
MUS300, MUSC300

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

Prerequisites

Prerequisites: MUSC 1210 or successful audition

Complete ALL of the following Courses:

- MUSC1210 - g6:Fundamentals of Music for non-majors

or successful audition

Additional Comments:

No Requirement Level

MUSC3000L - i6:Music Theory Lab

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisites: MUSC 1210, or successful audition. This course will explore Western music language in depth, from music notation throughout Western music history; scales in all its modes, including the Gregorian Mode, Tetrachord, Chord Function, Augmented Chords, Neapolitan, the Seventh Chord formations, Cadenza; and introduction to 5 Species Counterpoint, Bach Chorale Harmonization. Practical Solfeggiometrical, and Lied Form. Final project will be presented in Recital Format.

Equivalent Courses: Previous & Current Courses
MUS300L, MUSC300L

No Requirements

MUSC3001 - i6:Composition

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: MUSC 3000 Music Theory, or successful audition. This course explores applied Western music theory, including compositional techniques from the medieval period, the Neapolitan school of music, and through the Romantic period and the modern period. Midterm project will be presented in recital format. The final project will be composed in sonata form: orchestral, chamber music. Presented in concerto format.

Equivalent Courses: Previous & Current Courses
MUS301, MUSC301

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisite: MUSC3000 Music Theory, or successful audition

Complete ALL of the following Courses:

- MUSC3000 - i6:Music Theory

or successful audition

Additional Comments:

No Requirement Level

MUSC3009 - i6:Song and Society

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisites: ENGL 1120 or consent of Instructor and Advisor. This course is a dialogue about music, specifically song, and its role in the development of human society. According to a theory proposed by Dr. Daniel Levitin there are 6 categories of song which helped form our human society; Friendship, Joy, Comfort, Knowledge, Religion, and Love. These will serve as the basis for the class. Within the context of these categories there can be many sub-divisions to be explored. Students may suggest new divisions and choose songs within those divisions. The class will include lectures, discussions, and student participation. Each student will make a personal song selection for each category, discuss and defend their choice in class, and in their final essay. (Same as HUMA 309)

Equivalent Courses: Previous & Current Courses
MUS309, MUSC309

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

Prerequisites

Prerequisites: ENGL 1120 or consent of instructor and advisor.

Complete ALL of the following Courses:

- ENGL1120 - g1:Composition II

or consent of instructor and advisor.

Additional Comments:

No Requirement Level

MUSC3011 - i6:Opera

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
A musical and socio-historical exploration opera literature and the opera genre, including operetta.

Equivalent Courses: Previous & Current Courses
MUS311, MUSC311

No Requirements

MUSV1071 - Beginning Group Voice

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
2

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Group voice is open to students and community with no auditions. Can be taken for 0 or 1 credit. Course can be repeated.

Equivalent Courses: Previous & Current Courses
MUS171

No Requirements

MUSV3031 - Chamber Choir

General

Credit Hrs

Credit Hrs:
0

Credit Hours Max:
1

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Chamber Choir is open to students and community with no auditions. Can be taken for 0 or 1 credit. Course can be repeated.

Equivalent Courses: Previous & Current Courses
MUS331

No Requirements

MUSV3033 - Concert Chorus

General

Credit Hrs

Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
The Concert Chorus performs large-scale choral works independently and together with the Chamber Orchestra. Interested students without prior singing experience are encouraged to participate.

Equivalent Courses: Previous & Current Courses
MUS333

No Requirements

MUSV3036 - Opera Study and Performance

General

Credit Hrs

Credit Hrs:
2

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This class focuses on staged performance and on building an interpretation of an operatic personage. Students learn how to research and build a strong knowledge of an operatic personage, as well as the history of the opera genre and public performance.

Equivalent Courses: Previous & Current Courses
MUS336

No Requirements

MUSV3041 - Jazz Ensemble

General

Credit Hrs

Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Jazz Ensemble is open to students and community with no auditions. Can be taken for 0 or 1 credit. Course can be repeated.

Equivalent Courses: Previous & Current Courses
MUS341

No Requirements

MUSV3042 - Jazz Ensemble

General

Credit Hrs

Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

No Requirements

MUSV3051 - Chamber Orchestra

General

Credit Hrs

Credit Hrs:
0

Credit Hours Max:
1

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Chamber Orchestra is open to students and community with no auditions. Can be taken for 0 or 1 credit. Course can be repeated.

Equivalent Courses: Previous & Current Courses
MUS351

No Requirements

MUSV3052 - Chamber Orchestra

General

Credit Hrs

Credit Hrs:
0

Credit Hours Max:
1

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Chamber Orchestra is open to students and community with no auditions. Can be taken for 0 or 1 credit. Course can be repeated.

No Requirements

MUSV3061 - Chamber Music

General

Credit Hrs

Credit Hrs:
0

Credit Hours Max:
1

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, Standard Letter

Equivalent Courses: Previous & Current Courses
MUS361

Simple Requisites

Course Requisite Requirements

Prerequisite: Consent of instructor

No Requirement Level

MUSV3077 - Vocal Performance

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
2

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: MUSV 2730, or consent of Instructor and Advisor. Practical and theoretical aspects of solo vocal performance.

Equivalent Courses: Previous & Current Courses
MUS377

No Requirements

PCOM4091 - Directed Study

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
3

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Approved Student Independent Study, taught on an individual basis.

No Requirements

PCOM5003 - Applied Research Methods

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This practice-based seminar gives students a thorough background in Humanities research methods including quantitative, qualitative, mixed methods, and user experience research. Students will create and perform pilot studies and will become familiar with the Institutional Review Board (IRB) submission and approval process for performing university-sanctioned research. Students will understand how to apply research methods and how to design and interpret studies that collect relevant, accurate, and useful data.

No Requirements

PCOM5004 - Media, Communication, & Public Engagement

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Normally offered: Fall semesters. This practice-based course trains students to communicate and engage with the public effectively in a variety of print and online genres and media. Students will learn: how to communicate concepts from STEM fields to stakeholders such as policymakers and diverse publics; the basics of content strategy and content auditing; to revise and reuse content for different channels such as websites and social media; and how to listen to diverse Audiences online and offline, developing skills in branding and audience analysis.

Simple Requisites

Course Requisite Requirements

Prerequisites: Graduate standing or consent of instructor

No Requirement Level

PCOM5005 - Ethical and Social Issues in Public Engagement

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Pre-req: Graduate standing or consent of Instructor. This seminar examines how values influence STEM research as well as the ethics and politics of STEM communication and policy. Students will gain practical skills in ethics relevant to their professional work, analyzing how research, design, communication, and policy decisions may incorporate, or fail to incorporate, diverse stakeholders' interests. The course explores barriers and power relationships that can prevent certain groups from enjoying the full benefits of scientific and technological change. Assignments will challenge students to operate as public-responsible researchers or communicators and ask them to consider how products and policies can challenge inequality and promote the common good. Shares lectures with PHIL 4042, but has additional expectations for graduate credit.

Equivalent Courses: Previous & Current Courses
PHIL4042

Simple Requisites

Course Requisite Requirements

Pre-req: Graduate standing or consent of instructor.

No Requirement Level

PCOM5006 - Communication, Product, and Experience Design

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course teaches students the principles and practices of experience and information design. Students examine design case studies. They develop and test research-based multidisciplinary, iterative design projects. Through these projects, students learn how to synthesize the principles of design thinking, functionality, aesthetics, usability, and accessibility to meet the needs of users and organizations

Simple Requisites

Course Requisite Requirements

Prerequisite: Graduate standing or consent of instructor

No Requirement Level

PCOM5081 - Directed Study

General

Credit Hrs

Credit Hrs:
0

Credit Hours Max:
12

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, No Report, Standard Letter

No Requirements

PCOM5090 - Independent Study

General

Credit Hrs

Credit Hrs:
0

Credit Hours Max:
12

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, Standard Letter

No Requirements

PCOM5091 - Thesis

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
12

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, No Report

No Requirements

PHIL1115 - Introduction to Philosophy

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
An exploration of major issues and approaches in the history and practice of philosophy, including questions of value, knowledge, reality, and problems that arise in social and political philosophy. A fundamental aim of the course is to improve skills in critical thinking, problem-solving, and evaluating.

Equivalent Courses: Previous & Current Courses
PHIL120

No Requirements

PHIL1146 - g5:Ethics & Values in STEM

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
In this course, students learn about professional research ethics and the social responsibilities of scientists and engineers. They also examine the diverse roles for values throughout research and development in STEM, including judgments about funding, methodology, communication, and public engagement. The course introduces students to pressing questions about justice, equality, and democracy related to the responsibilities for technological development by surveying issues in areas such as computer science, environmental justice, global ethics, health equity, and military ethics.

Equivalent Courses: Previous & Current Courses
PHIL130

No Requirements

PHIL2040 - Science and Gender

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Pre-requisites: none. This course introduces students to the complex interplay between science, technology, and gender, with special attention to intersections with sexuality, race, and ethnicity. We analyze the concepts of “sex” and “gender” by critically investigating the nature/nurture debates about sex differences. The course further prompts students to think more broadly about gender in science and technology in discussions over bias, values, and scientific objectivity. Throughout the course, we also survey different critical approaches to biomedicine such as women’s health, LGBTQ health, breast cancer, HIV/AIDS, and reproductive health. (cross-listed with GNDR 2040)

Equivalent Courses: Previous & Current Courses
PHIL251

No Requirements

PHIL3000 - Philosophy of Science

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: ENGL 1120 or consent of instructor and advisor. An introduction to the philosophical bases and problems of the formal and empirical sciences. Includes the nature of scientific methods, problems and paradoxes of induction, logic of explanation, concepts of causality, determinism and probability, measurement theory, and special philosophical issues in physical, biological, and behavioral sciences.

Equivalent Courses: Previous & Current Courses
PHIL300

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisite: ENGL 1120 or consent of instructor and advisor

Complete ALL of the following Courses:
- ENGL1120 - g1:Composition II

or consent of instructor and advisor

Additional Comments:

No Requirement Level

PHIL3042 - g5:Philosophy of Bioethics

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: ENGL 1120 or consent of Instructor and Advisor. Exploration of ethical issues embedded in medicine and related activities; focuses on broad areas including: the physician/patient relationship, the media’s influence on medicine, the role of the pharmaceutical industry, gene therapy, cloning and stem cell research, organ transplantation, human and animal research, reproductive technologies, and the global allocation of resources.

Equivalent Courses: Previous & Current Courses
PHIL342

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisite: ENGL 1120 or consent of instructor and advisor

Complete ALL of the following Courses:
- ENGL1120 - g1:Composition II

or consent of instructor and advisor

Additional Comments:

No Requirement Level

PHIL3082 - g5:Ethics in Computing and IT

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: ENGL 1120 or consent of the Instructor and Advisor. In this class, students will examine ethical and social questions regarding computing and information technologies. The course challenges students to think about connections among digital technologies, the responsibilities of information technology professionals, and social justice as they study topics such as social media, military applications of digital media, gendered technologies, and access to information technologies. In addition to learning the basics of research ethics and social responsibility, students will examine real-world debates regarding subjects like big data, computer code, and digital networks, and they will analyze

the legal, political, and social stakes of information technologies. (Same as CSE 382 and IT 382.) This course may be used to satisfy 3 credit hours of the General Education Area 5 requirements.

Equivalent Courses: Previous & Current Courses
CSE3082, CSE382, IT3082, IT382, PHIL382

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisite: ENGL 1120 or consent of the instructor and advisor.

Complete ALL of the following Courses:
- ENGL1120 - g1:Composition II

or consent of the instructor and advisor.

Additional Comments:

No Requirement Level

PHIL4021 - Periods or Figures in Philosophy

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: ENGL 1120 or consent of instructor and advisor. Study of a single philosopher's work or a philosophical school.

Equivalent Courses: Previous & Current Courses
PHIL421

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisite: ENGL 1120 or consent of instructor and advisor

Complete ALL of the following Courses:
- ENGL1120 - g1:Composition II

or consent of instructor and advisor

Additional Comments:

No Requirement Level

PHIL4042 - Ethical and Social Issues in Public Engagement

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Pre-req: ENGL 1120 or consent of Instructor. Offered: every other year. This seminar examines how values influence STEM research as well as the ethics and politics of STEM communication and policy. Students will gain practical skills in ethics relevant to their professional work, analyzing how research, design, communication, and policy decisions may incorporate, or fail to incorporate, diverse stakeholders' interests. The course explores barriers and power relationships that can prevent certain groups from enjoying the full benefits of scientific and technological change. Assignments will challenge students to operate as public-responsible researchers or communicators and ask them to consider how products and policies can challenge inequality and promote the common good.

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

Pre-req: ENGL 1120 or consent of instructor.

Complete ALL of the following Courses:
- ENGL1120 - g1:Composition II

or Consent of Instructor

Additional Comments:

No Requirement Level

PHIL4051 - American Philosophy

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: ENGL 1120 or consent of instructor and advisor. Survey of American philosophy, including pragmatism from its roots in American Romantic writers such as Emerson to contemporary figures such as Richard Rorty and Stanley Fish, nature philosophers such as Thoreau and Ed Abbey, feminist philosophy, and Native-American philosophy.

Equivalent Courses: Previous & Current Courses
PHIL451

Simple Requisites

Course Requisite Requirements

Prerequisite Type
Prerequisite

Prerequisite

Prerequisite: ENGL 1120 or consent of instructor and advisor

Complete ALL of the following Courses:
- ENGL1120 - g1:Composition II

or consent of instructor and advisor

Additional Comments:

No Requirement Level

PHIL4082 - i5:Cybersecurity Ethics and Law

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Offered: Spring. Prerequisite: ENGL 1120, or PHIL 3082, or consent of Instructor and Advisor. A cybersecurity ethics and law course in which students learn standards of professional, ethical behavior in cybersecurity fields by examining case studies, ethical questions, and legal debates from the history of computing and cybersecurity. Shares lectures with CYBS 5002.

Equivalent Courses: Previous & Current Courses
PHIL3021, PHIL321

No Requirements

PHIL4091 - Directed Study

General

Credit Hrs
Credit Hrs:
1

Credit Hours Max:
3

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, Standard Letter

No Requirements

PHIL5021 - g:Professional Ethics

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Introduce students to the concepts, theory, and practice of ethics and effective written and oral communications. Study cases and apply classical moral theory to decisions encountered in professional careers. Shares lecture with (400-level version) with additional expectations and assignments for graduate credit.

Equivalent Courses: Previous & Current Courses
CYBS5002, CYBS502

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

Prerequisite: ENGL 1120, or PHIL 3082, or consent of instructor and advisor.

Complete ALL of the following Courses:
- ENGL1120 - g1:Composition II
  OR PHIL3082 - g5:Ethics in Computing and IT

or PHIL 3082, or consent of instructor and advisor.

Additional Comments:

No Requirement Level

POLS3001 - Sensation & Perception

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

No Requirements

POLS3070 - i4:Public Policymaking

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
An analytical examination of the policymaking process within the American political system, with special attention to who is involved in the process, how decisions are made, and what the consequences are of alternative policy choices.

Equivalent Courses: Previous & Current Courses
POLS370, PS370

No Requirements

POLS4070 - i4:Policy Science

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisites: ENGL 1120 or consent of Instructor. It reviews a worldwide policy movement emerging in response to the increasingly complex problems of the decision in the modern era. In the United States, the movement takes various institutional forms, including think tanks, offices of planning and evaluation, and university-based programs in public policy. This program integrates several fields of knowledge to improve policy decisions: integrate knowledge about policy decision and decision process from any discipline or other sources into the understanding of the policysciences, and become professional in the sense of one who has acquired knowledge and skills critical to society and accepts responsibility to use them in the common interest.

Equivalent Courses: Previous & Current Courses
POLS470, PS470

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisites: ENGL 1120 or consent of instructor

Complete ALL of the following Courses:
- ENGL1120 - g1:Composition II

or consent of instructor

Additional Comments:

No Requirement Level

POLS4071 - i4:Science & Technology Policy

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisites: ENGL 1120 or consent of Instructor (for graduate level, Graduate Standing or consent of Instructor). This seminar-based course provides an overview of selected topics in science and technology policy. Students will gain an understanding of the challenges, tensions, and problems within science and technology policy issues and be introduced to crafting policy-relevant documents such as op-eds, policy briefs, and longer research reports. Themes may include the proper role of experts in policy-crafting policy-relevant documents such as op-eds, policy briefs, and longer research reports. Themes may include the proper role of experts in policy-making, the regulation of risky technologies, comparisons of democratic and expert-led decision-making, resilient environmental policy, generative justice, sustainability, forecasting and managing technological change, public and private steering of R&D funding, strategies for stimulating innovation and technological transitions, intellectual property, science and technology-based entrepreneurship, and regional and national innovation systems.

Equivalent Courses: Previous & Current Courses
POLS471, PS471

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

Prerequisite

Prerequisites: ENGL 1120 or consent of instructor (for graduate level, Graduate Standing or consent of Instructor)

Complete ALL of the following Courses:
- ENGL1120 - g1:Composition II

or consent of instructor (for graduate level, Graduate Standing or consent of Instructor)

Additional Comments:

No Requirement Level

POLS5070 - Policy Science

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisites: Graduate Standing or consent of Instructor. It reviews a worldwide policy movement emerging in response to the increasingly complex problems of the decision in the modern era. In the United States, the movement takes various institutional forms, including think tanks, offices of planning and evaluation, and university-based programs in public policy. This program integrates several fields of knowledge to improve policy decisions: integrate knowledge about policy decision and decision process from any discipline or other sources into the understanding of the policysciences, and become professional in the sense of one who has acquired knowledge and skills critical to society and accepts responsibility to use them in the common interest.

Equivalent Courses: Previous & Current Courses
POLS570, POLS570D, PS570

Simple Requisites

Course Requisite Requirements

Prerequisites: Graduate Standing or consent of Instructor

No Requirement Level

POLS5071 - Science & Technology Policy

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisites: ENGL 1120 or consent of instructor. This seminar-based course provides an overview of selected topics in science and technology policy. Students will gain an understanding of the challenges, tensions, and problems within science and technology policy issues and be introduced to crafting policy-relevant documents such as op-eds, policy briefs, and longer research reports. Themes may include the proper role of experts in policy-making, the regulation of risky technologies, comparisons of democratic and expert-led decision-making, resilient environmental policy, generative justice, sustainability, forecasting and managing technological change, public and private steering of R&D funding, strategies for stimulating innovation and technological transitions, intellectual property, science and technology-based entrepreneurship, and regional and national innovation systems.

Equivalent Courses: Previous & Current Courses
POLS571, POLS571D

Simple Requisites

Course Requisite Requirements

Prerequisite Type
Prerequisite

Prerequisite

Prerequisites: ENGL 1120 or consent of instructor

Complete ALL of the following Courses:

- ENGL1120 - g1:Composition II

or consent of instructor

Additional Comments:

No Requirement Level

PORT1110 - g5: Elementary Portuguese I

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Standard Letter

Course Description
Portuguese I. Designed for students with no previous exposure to Portuguese, this course develops basic listening, speaking, reading, and writing skills. This is an introductory course aimed at teaching the student to communicate in Portuguese in everyday situations

No Requirements

PSYC1110 - g4:Introduction to Psychology

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course will introduce students to the concepts, theories, significant findings, methodologies, and terminology that apply to the field of psychology.[NMCCNS PSYC 1110: General Education Area IV]

Equivalent Courses: Previous & Current Courses
PSY121

No Requirements

PSYC1180 - g4:Science & Pseudoscience

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course examines methods for determining whether given claims are science or pseudoscience. Several controversial topics will be explored, with emphasis on coming to objective decisions about such claims. Topics include logical fallacies, the scientific method, creationism, global warming and climate change, hidden codes in the Bible, relativity theory, 9/11 truth conspiracy claims, dark matter, UFO sightings, perpetual motion devices, quantum mechanics, quack medical claims, and more. SLOs. By the end of this course, students will learn how to tell the difference between science and pseudoscience; to explain how science advances, and what makes science different from pseudoscience; how psychological reasons can explain some acceptance of pseudoscience; the methods pseudoscientists use to fool lots of people; and to understand examples of successful and revolutionary scientific findings , and be able to contrast these with pseudoscience; and finally, to improve communication, writing, investigative and debunking skills.

Equivalent Courses: Previous & Current Courses
PSY131

No Requirements

PSYC1190 - i4:Human Factors in Science & Engineering

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course explores how human capabilities and limitations influence decision making and performance and how scientists and engineers can use knowledge of these factors to design. We will focus on how cognitive processes and biases in perception, attention, memory and problem solving influence performance. Examples of "human error" and ways in which error can be averted will be studied. Comparisons will be made between human and artificial intelligence.

Equivalent Courses: Previous & Current Courses
PSY151

No Requirements

PSYC2110 - i4:Social Psychology

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: PSYC 1110. This course is an introduction to the scientific study of human social influence and interaction, and explores how an individual's actions, emotions, attitudes and thought processes are influenced by society and other individuals.

Equivalent Courses: Previous & Current Courses
PSY209

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:
- PSYC1110 - g4:Introduction to Psychology

Additional Comments:

No Requirement Level

PSYC2285 - g4:Experimental Psychology

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Basic concepts and research methodology in the study of behavior; emphasis on experimental design, control, and laboratory methods.

Equivalent Courses: Previous & Current Courses
PSY205

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Completion Requirement

Prerequisites and Corequisites

Fulfill ALL of the following requirements:

Prerequisite

Complete ALL of the following Courses:
- PSYC1110 - g4:Introduction to Psychology

AND

Corequisite

Enroll in the following Courses:
- PSYC2285L - g4:Experimental Psychology Lab

Additional Comments:

No Requirement Level

PSYC2285L - g4:Experimental Psychology Lab

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Laboratory methods and experiments investigating behavior, cognitive processes, and neuropsychology. SLOs By the end of this course, you will have a good understanding of the scientific method and how it can be applied to the study of Psychology, as well as science, in general. You will know potential problems with different research methods. You will be able to recognize confounds in experiments and know how to control for them. You will be able to design an experiment and carry it out. You will also be able to write research papers in APA format.

Equivalent Courses: Previous & Current Courses
PSY205L

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Completion Requirement

Prerequisite and Corequisite

Fulfill ALL of the following requirements:

Prerequisite

Complete ALL of the following Courses:

- PSYC1110 - g4:Introduction to Psychology

AND

Corequisite

Enroll in the following Courses:

- PSYC2285 - g4:Experimental Psychology

Additional Comments:

No Requirement Level

PSYC2310 - g4:Drugs & Behavior

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
PSYC 1110. The course provides a general introduction to the effects of alcohol. opiates, and other major classes of psychoactive drugs on the central nervous system, emphasizing the relationship between physiological. psychological, and behavioral effects of drugs.

Equivalent Courses: Previous & Current Courses
PSY212

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- PSYC1110 - g4:Introduction to Psychology

Additional Comments:

No Requirement Level

PSYC2331 - Psychobiology of Sex

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: PSYC 1110 or consent of Instructor. Sexual reproduction in a broad evolutionary context. Topics include sexual and asexual reproduction, sexual selection, the endocrinology of mammalian reproduction, development of the reproductive system and sexually differentiated behaviors, sex differences in the brain, human behavioral sex differences, and the interaction of culture and sexual behavior. Same as BIOL 2331.

Equivalent Courses: Previous & Current Courses
BIOL2331, BIOL350, PSY350

No Requirements

PSYC3001 - Sensation & Perception

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: PSYC 2285 (passed with a C-) or better; Corequisite: PSYC 3001L. An experimental and theoretical study of the special senses (vision, hearing, smell, taste and touch), including the structure, function and disorders of sensory and perceptual systems.

Equivalent Courses: Previous & Current Courses
PSY301, PSYC301

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Completion Requirement

Prerequisite and Corequisite

Prerequisite: PSYC 2285 passed with a C- or better Corequisite: PSY 301L

Fulfill ALL of the following requirements:

Prerequisite

Complete ALL of the following Courses:

- PSYC2285 - g4:Experimental Psychology

AND

Corequisite

Enroll in the following Courses:

- PSYC3001L - Sensation & Perception Lab

Additional Comments:

No Requirement Level

PSYC3001L - Sensation & Perception Lab

General

Credit Hrs

Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: PSYC 2285 (Passed with a C-) or better . Corequisite: PSYC 3001 A lab usage fee is charged Laboratory methods and experiments in Sensation and Perception.

Equivalent Courses: Previous & Current Courses
PSY301L, PSYC301L

Simple Requisites

Course Requisite Requirements

Prerequisites & Corequisites
Type
Completion Requirement

Prerequisite and Corequisite

Fulfill ALL of the following requirements:

Prerequisite

Complete ALL of the following Courses:
- PSYC2285 - g4:Experimental Psychology

AND

Corequisite

Enroll in the following Courses:
- PSYC3001 - Sensation & Perception

Additional Comments:

No Requirement Level

PSYC3005 - Cognitive Psychology

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: PSYC 2285 (passed with a C-) or better, Corequisite: PSYC 3005L. A study of research findings, major issues and theories of mental processes. Topics include attention, learning, memory, imagery, concept formation, language and its development, thinking, problem solving and decision making.

Equivalent Courses: Previous & Current Courses
PSY305, PSYC305

Simple Requisites

Course Requisite Requirements

Prerequisites and Corequisites
Type
Completion Requirement

Prerequisite and Corequisite

Prerequisite: PSYC 2285 passed with a C- or better Corequisite: PSY 305L

Fulfill ALL of the following requirements:

Prerequisite

Complete ALL of the following Courses:
- PSYC2285 - g4:Experimental Psychology

AND

Corequisite

Enroll in the following Courses:
- PSYC3005L - Cognitive Psychology Lab

Additional Comments:

No Requirement Level

PSYC3005L - Cognitive Psychology Lab

General

Credit Hrs

Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: PSYC 2285 (passed with a C-) or better. Corequisite: PSYC 3005 A lab usage fee is charged Laboratory methods and experiments investigating cognitive processes.

Equivalent Courses: Previous & Current Courses
PSY305L, PSYC305L

Simple Requisites

Course Requisite Requirements

Prerequisites and Corequisites
Type
Completion Requirement

Prerequisites and Corequisites

Prerequisite: PSYC 2285 passed with a C- or better

Corequisite: PSY 305

Fulfill ALL of the following requirements:

Prerequisite

Complete ALL of the following Courses:
- PSYC2285 - g4:Experimental Psychology

AND

Corequisite

Enroll in the following Courses:
- PSYC3005 - Cognitive Psychology

Additional Comments:

No Requirement Level

PSYC3009 - Behavioral Neuroscience

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisites: PSYC 2285 (passed with a C-) or better; BIOL 2110, Corequisite: PSY 3009L and BIOL 2610. Study of the neural and other physiological bases of behavior. Functional neuroanatomy of sensory and motor systems, motivation and drives, learning and emotion.

Equivalent Courses: Previous & Current Courses
PSY309, PSYC309

Simple Requisites

Course Requisite Requirements

Prerequisites and Corequisites
Type
Completion Requirement

Prerequisites and Corequisites

Prerequisites: PSYC 2285 passed with a C- or better; BIOL 2110,

Corequisite: PSY 309L and BIOL 2610

Fulfill ALL of the following requirements:

Prerequisites

Complete ALL of the following Courses:
- PSYC2285 - g4:Experimental Psychology
- BIOL2110 - Pinciples of Biology: Cellular & Molecular

AND

Corequisites

Enroll in the following Courses:
- PSYC3009L - Behavioral Neuroscience Lab
- BIOL2610 - Principles of Biology: Biodiversity, Ecology, and Evolution

Additional Comments:

No Requirement Level

PSYC3009L - Behavioral Neuroscience Lab

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisites: PSYC 2285 (passed with a C-) or better; BIOL 2110 Corequisite: PSY 3009, BIOL 2610. A lab usage fee is charged, Laboratory includes neuroanatomy and neurophysiology, either in vivo and/or in computer simulations.

Equivalent Courses: Previous & Current Courses
PSY309L, PSYC309L

Simple Requisites

Course Requisite Requirements

Prerequisites and Corequisites
Type
Completion Requirement

Prerequisites and Corequisites

Prerequisites: PSYC 2285 passed with a C- or better; BIOL 2110

Corequisite: PSY 3009, BIOL 2610

Fulfill ALL of the following requirements:

Prerequisites

Complete ALL of the following Courses:
- PSYC2285 - g4:Experimental Psychology
- BIOL2110 - Pinciples of Biology: Cellular & Molecular

AND

Corequisites

Enroll in the following Courses:
- PSYC3009 - Behavioral Neuroscience
- BIOL2610 - Principles of Biology: Biodiversity, Ecology, and Evolution

Additional Comments:

No Requirement Level

PSYC3020 - Psychology of Language

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisites: PSYC 1110. Language may be the most uniquely human behavior. This class explores the evolutionary origins of language in animal communication abilities; how the brain makes sense of language and plans speech; child development of language understanding and production; and social aspects of human behavior in conversation.

Equivalent Courses: Previous & Current Courses
PSY320, PSYC320

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:
- PSYC1110 - g4:Introduction to Psychology

Additional Comments:

No Requirement Level

PSYC3023 - Child & Adolescent Development

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
The development of human behavior from conception to adolescence. Includes cognitive, social, behavioral, and physical development.

Equivalent Courses: Previous & Current Courses
EDUC3023, EDUC323, PSY323, PSYC323

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:
- PSYC1110 - g4:Introduction to Psychology

Additional Comments:

No Requirement Level

PSYC3023L - g:Pyschology of Child & Adolescent Development Lab

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Corequisite: PSYC 3023 and consent of Instructor. This course is intended to help students understand, through firsthand observation, theories and ideas taught in Child and Adolescent Development (PSYC 3023). The class will focus on the biological, perceptual, cognitive, behavioral, linguistic and social emotional development of preschoolers at the NMT Children's Center.

Equivalent Courses: Previous & Current Courses
PSY323L, PSYC323L

Simple Requisites

Course Requisite Requirements

Corequisites
Type
Corequisite

Corequisite

Corequisite: PSYC 3023 and consent of instructor

Enroll in the following Courses:
- PSYC3023 - Child & Adolescent Development

and consent of instructor

Additional Comments:

Prerequisite
Type
Prerequisite

Complete ALL of the following Courses:
- PSYC1110 - g4:Introduction to Psychology

Additional Comments:

No Requirement Level

PSYC3024 - Adult Development & Aging

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: PSYC 1110. The development of human behavior from early adult-hood to old age. Cognitive, social, behavioral, emotional, and physical development. Life tasks, careers, physical and emotional health, leisure, dying, and death.

Equivalent Courses: Previous & Current Courses
PSY324, PSYC324

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Completion Requirement

Complete ALL of the following Courses:

- PSYC1110 - g4:Introduction to Psychology

Additional Comments:

No Requirement Level

PSYC3030 - Clinical Psychology

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: PSYC 1110. A psychobiological investigation of the cause, presentation, diagnosis, treatment and prognosis of behavioral and mental health issues.

Equivalent Courses: Previous & Current Courses
PSY330, PSYC330

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- PSYC1110 - g4:Introduction to Psychology

Additional Comments:

No Requirement Level

PSYC3042 - Music and the Brain

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisites: PSYC 1110 or MUSC 1210 or MUSC 1130 or permission of Instructor. Normally offered: Every third semester. This course examines widespread musical behavior through both scientific and artistic perspectives. We look to the neuroscience of music perception to help explain the psychological processes that support emotional responses, composition, performance, and all the potential cognitive benefits of engaging in music. Even people who think they are bad at making music have sophisticated skills as listeners. It is a universal birthright that humans can learn the melodic, rhythmic, and harmonic patterns of their own culture's music.

Equivalent Courses: Previous & Current Courses
PSYC342

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

Prerequisites

Prerequisites: PSYC 1110 or MUSC 1210 or MUSC 1130 or permission of instructor

Complete ANY of the following Courses:

- PSYC1110 - g4:Introduction to Psychology
- MUSC1210 - g6:Fundamentals of Music for non-majors
- MUSC1130 - g6:Music Appreciation: Western Music

or permission of instructor

Additional Comments:

No Requirement Level

PSYC3062 - Animal Behavior

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisites: PSYC 1110 or consent of Instructor and Advisor. An overview of the study of animal behavior, focusing on presentation, adaptive advantage and mechanisms of specific behaviors. (Same as BIOL 3062)

Equivalent Courses: Previous & Current Courses
PSY362, PSYC362

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

PSYC 2285 passed with C- or better

Earn a minimum C- of grade in the following:

- PSYC2285 - g4:Experimental Psychology

Additional Comments:

No Requirement Level

PSYC3062L - Animal Behavior Lab

General

Credit Hrs

Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisites: PSYC 2285 passed with a C- or better. Corequisite: PSYC 3062L. Observation and quantification of animal behavior in natural habitat and the laboratory. Methods of investigating behavioral mechanisms. Requires off-campus activities.

Equivalent Courses: Previous & Current Courses
PSY362L, PSYC362L

Simple Requisites

Course Requisite Requirements

Prerequisites and Corequisites
Type
Completion Requirement

Prerequisite and Corequisite

Prerequisites: PSYC 2285 passed with a C- or better and PSYC 2285L passed with a C-

Corequisite: PSYC 3062

Fulfill ALL of the following requirements:

Prerequisite

Complete ALL of the following Courses:

- PSYC2285 - g4:Experimental Psychology
  AND PSYC2285L - g4:Experimental Psychology Lab

AND

Corequisite

Enroll in the following Courses:

- PSYC3062 - Animal Behavior

Additional Comments:

No Requirement Level

PSYC3091 - Directed Study

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
3

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: Upper-division standing in psychology. Supervised individual work in psychology. May be repeated for more than one semester's work.

Equivalent Courses: Previous & Current Courses
PSY391, PSYC391

Simple Requisites

Course Requisite Requirements

Prerequisite: Upper-division standing in psychology

No Requirement Level

PSYC4000 - History of Psychology

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: Nine hours in psychology. This course traces central questions and concepts of psychology from their origins in classical philosophy and medicine to modern times. Interactions between historical developments and psychological research are emphasized.

Equivalent Courses: Previous & Current Courses
PSY400, PSYC400

Simple Requisites

Course Requisite Requirements

Prerequisite: Nine hours in psychology

No Requirement Level

PSYC4005 - Assessments and Measurement

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisites/Co-requisites: PSYC 1110 or EDUC 3040, or permission of Instructor. Educational and psychological tests and measurement. Evaluation and data-driven curriculum revision. Field observation assignments that take students to public school classrooms. (Cross-listed with EDUC 4005/5005)

Equivalent Courses: Previous & Current Courses
PSY405, PSYC405

Simple Requisites

Course Requisite Requirements

Prerequisites/Co-requisites

Type
Completion Requirement

Prerequisites/Co-requisites

Prerequisites/Co-requisites: PSYC 1110 or EDUC 3040, or permission of instructor

Fulfill ANY of the following requirements:

Prerequisite/ Corequisite

Complete ANY of the following Courses:

- PSYC1110 - g4:Introduction to Psychology
  OR EDUC3040 - Concepts in Education
- **or permission of instructor**

Additional Comments:

No Requirement Level

PSYC4009 - Cell and Molecular Neuroscience

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: PSYC 1110 or BIOL 2110. A study of the molecular and cellular basis of the nervous system, covering fundamentals of cell biology, principles of neuronal signaling and neuronal circuits, and cell and molecular approaches to the investigation, diagnosis and treatment of diseases of the nervous system. Shares lecture with BIOL 5009 and BIOT 5009 with additional expectations for graduate credit. (Same as BIOL 4009.)

Equivalent Courses: Previous & Current Courses
BIOL4009, BIOL409, BIOL5009, BIOT5009, BIOT509, PSY409, PSY509, PSYC5009

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

Prerequisites

Complete ANY of the following Courses:

- PSYC1110 - g4:Introduction to Psychology
- BIOL2110 - Pinciples of Biology: Cellular & Molecular

Additional Comments:

No Requirement Level

PSYC4010 - Neurology

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: PSYC 1110 or BIOL 2110. An examination of the non-cognitive functions of the nervous system (e.g., autonomic function, biological rhythms, and sleep), and the etiology, diagnosis and treatment of selected neurological disorders such as epilepsy, migraine and traumatic brain injury.

Equivalent Courses: Previous & Current Courses
BIOL4010, BIOL410, BIOL5010, BIOL510, BIOL589, PSY410, PSY510, PSYC5010

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

Prerequisites

Complete ANY of the following Courses:

- PSYC1110 - g4:Introduction to Psychology
- BIOL2110 - Pinciples of Biology: Cellular & Molecular

Additional Comments:

No Requirement Level

PSYC4014 - Pychotherapeutics

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisites: PSYC 2310, BIOL 2110, 2610. A study of approaches to treatment of disorders of the nervous system, from the function and dysfunction of the nervous system, to in depth explanations of the development and application of pharmacological, gene and cell replacement approaches to treatment of disease

Equivalent Courses: Previous & Current Courses
PSYC414

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

Prerequisites

Complete ALL of the following Courses:

- PSYC2310 - g4:Drugs & Behavior
- BIOL2110 - Pinciples of Biology: Cellular & Molecular
- BIOL2610 - Principles of Biology: Biodiversity, Ecology, and Evolution

Additional Comments:

No Requirement Level

PSYC4072 - Senior Seminar

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: Upper-division standing or consent of Instructor and Advisor. Review and discussion of current research in psychology.

Equivalent Courses: Previous & Current Courses
PSY472, PSYC472

Simple Requisites

Course Requisite Requirements

Prerequisite: Upper-division standing or consent of instructor and advisor

No Requirement Level

PSYC5009 - Cell and Molecular Neuroscience

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Pre-reqs: Consent of the Instructor based on knowledge of the fundamentals of cell biology. A study of neurological systems from neurons and glia to differentiation and development, neural circuits, and how neural systems perform selected tasks: sensing environment, controlling physiology, directing movement. Shares lectures with PSYC 4009 and BIOL 4009, with additional expectations for graduate credit. *Offered: Spring of even years

Equivalent Courses: Previous & Current Courses
BIOL4009, BIOL5009, PSYC4009

No Requirements

PSYC5010 - Neurology

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Pre-reqs: Consent of the Instructor based on knowledge of the fundamentals of neuroscience. An examination of the mechanisms and effects of neuropathology and the different approaches to diagnosis and treatment of neurological diseases and disorders such as pain, epilepsy, and Alzheimer's disease. Shares lectures with PSYC 4010 and BIOL 5010, with additional expectations for graduate credit. *Offered: Spring of odd years.

Equivalent Courses: Previous & Current Courses
BIOL4010, BIOL5010, PSYC4010

No Requirements

SOSC1110 - g4:Introduction to Science and Technology Studies

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
The aim of this course is to challenge commonly accepted beliefs regarding technoscience, including the presumption that the "best" technology always wins and the notion that science is never political. Through an examination of historical and contemporary examples, students will explore the cultural, organizational, economic, and political drivers and consequences of scientific R&D and technological change.

Equivalent Courses: Previous & Current Courses
SS130

No Requirements

SOSC1320 - g4:Creation of the Universe

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
How did we get here? Where did we come from? How were the earth, moon and sun created? From ancient tribes to modern civilization, the human race has tried to answer these questions. This course examines the myths and scientific theories of the origin of the universe. The course first covers ancient myths, progresses to modern religion and culminates with our current understanding of the Big Bang and related scientific theories. Other myths, such as the great flood, which common to many cultures, are examined. The course focuses on how science and culture interact by examining how our concept of creation has evolved.

No Requirements

SOSC2110 - Understanding Techno-scientific Controversy

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This science and technology studies course challenges students to think more carefully and critically about technoscientificenvironmental problems and controversies, such as climate change, vaccine hesitancy, genetic engineering, pharmaceuticaldrugs, and nuclear energy. Students will examine the cognitive, cultural, economic, ethical, political, and communicativeroots of disagreement, learning to recognize that these issues are not solved by presenting a “balanced view” of both sidesor by simply informing “ignorant” opponents. Students will apply these thinking skills in order to develop more productiveand empathic solutions to tenacious and highly polarized public conflicts.

Equivalent Courses: Previous & Current Courses
PHIL2011, PHIL211, SS211

No Requirements

SOSC2120 - Unintended Consequences, Accidents, and Other Disasters

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Unintended Consequences, Accidents, andDisasters. A science and technology studies examination of how different cognitive, organizational, political, and technical factors influence people’s ability to cope with the complexities and uncertainties of tech-nonscientific endeavors. Through a survey of unanticipated consequences, organizational failures, and other human-produced disasters, students will explore how humanity might proceed more thoughtfully, carefully, and fairly with respect to innovation and sociotechnical change.

Equivalent Courses: Previous & Current Courses
SS201

No Requirements

SOSC2123 - Civilizational Collapse and its Prevention

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Pre-requisite: ENGL 1120. The goal of this course is to critically examine the resilience and frailties of human civilization. How have previous societies failed or succeeded to organize themselves within socio-ecological limits? What positive lessons can be drawn from earlier human settlements regarding the political, cultural, economic, and technological factors generative of social instability? In addition to researching potential answers to these questions, students will explore and evaluate contemporary perspectives and proposals regarding how to make human societies more socially, politically, and ecologically resilient.

Equivalent Courses: Previous & Current Courses
SOSC389

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:
- ENGL1120 - g1:Composition II

Additional Comments:

No Requirement Level

SOSC3100 - Contemporary Latin America

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Offered: Every other Spring. This course offers an overview of contemporary life in Latin America. Course readings and lectures focus on the economic, political, and cultural foundations of present-day life in the region, covering topics such as the extraction and protection of its vast natural resources; economic inequality and Latin America’s place in the global economy; liberalism and populism in Latin American politics; and Indigenous, feminist, and LGBTQ+ political movements; and the impact of global economic, political, and public health crises on Latin America. Assignments train students to carry out basic research in the social sciences. Students develop their conceptual vocabularies, formulate research questions, and propose solutions to key issues in contemporary Latin American life.

Equivalent Courses: Previous & Current Courses
HUMN389, SPAN389

No Requirements

SOSC3120 - Biodiversity, Nature, and Society

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Pre-requisite: ENGL 1120. Despite the tendency of media portrayals to present environmental problems as scientifically unquestionable and as already resolved by “the facts,” global environmental crises like biodiversity change are incredibly complex, uncertain, and inevitably political. That is what makes them so difficult

to resolve. This research-based course challenges students to explore the science and culture of the “biodiversity crisis”, honestly engaging with questions about the limits of scientific research, the line between data and scientific storytelling, the proper role of people in nature and science in a democracy, and the potential to better reconcile human societies with the needs of non-human species.

Equivalent Courses: Previous & Current Courses
SOSC389

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

Prerequsite

Complete ALL of the following Courses:

- ENGL1120 - g1:Composition II

Additional Comments:

No Requirement Level

SOSC4000 - i4:User Experience Research

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Pre-requisite: Junior standing or above, or approval of Instructor. This class is a project-based survey of qualitative user research. Students will learn about and apply human subject research methodologies in order to extract insights from users about creating better, more human-centered technologies, which may include apps, user interfaces, devices, architectural spaces, and/or services. Assignments will require that students combine research data and theory in order to analyze designs with regard to their ergonomics, intuitiveness, visceral "feel", attractiveness, and broader user narrative. Students will conduct small-scale qualitative studies, including usability studies, field observation, and interviews, and practice turning the results into concrete deliverables, such as personas, storyboards, paper/digital prototypes, and oral/written reports.

Equivalent Courses: Previous & Current Courses
SOSC389

Simple Requisites

Course Requisite Requirements

Pre-requisite: Junior standing or above, or approval of instructor.

No Requirement Level

SOSC4013 - i4:Video Game Research Methods

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

No Requirements

SPAN1110 - g5:Spanish I

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Designed for students with little exposure to Spanish. This course develops basic listening ,speaking ,reading, and writing skills and basic intercultural competence in interpretive, interpersonal and presentational modes of communication at the Novice Level of proficiency based on ACTFL guidelines. During this course, students preform better and stronger in the Novice-Mid level while some abilities emerge in the Novice High range. This is an introductory course aimed at helping the student to communicate in Spanish in everyday familiar situations via recognition and production of practiced or memorized words, phrases, and simple sentences.

Equivalent Courses: Previous & Current Courses
SPAN113

No Requirements

SPAN1120 - g5:Spanish II

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Designed for students with some degree of exposure to Spanish in high school and/or at home, this course continues to develop basic listening, speaking, reading, and writing skills and basic intercultural competence in interpretive, interpersonal and presentational modes of communication based at the Novice High Level of proficiency based on ACTFLguidelines, although a few abilities may emerge in the Intermediate Low Level. Students in this course communicate in Spanish in familiar topics using a variety of words, phrases, simple sentences and questions that have been highly practiced and memorized.

Equivalent Courses: Previous & Current Courses
SPAN114

No Requirements

SPAN2110 - Intermediate Spanish I

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course is based on the integration of learning outcomes across Interpersonal, Interpretive, and Presentational Modes of Communication at the Intermediate Low Level of proficiency based on ACTFL guidelines. Students accomplish real-world communicative tasks in culturally appropriate ways as they gain familiarity with the target culture(s). This is an intermediate course aimed at helping the student to communicate in Spanish on familiar topics about self, others and everyday life at the same time that they recognize and handle short social interactions in everyday situations by asking and answering a variety of questions.

No Requirements

SPAN2120 - Intermediate Spanish II

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course is based on the integration of learning outcomes across Interpersonal, Interpretive, and Presentational Modes of Communication at the Intermediate High Level of proficiency based on ACTFL guidelines. Students accomplish real-world communicative tasks in culturally appropriate ways as they gain familiarity with the target culture(s). This is an intermediate course aimed at helping the student to communicate in Spanish on familiar topics about self, others and everyday life at the same time that they recognize and handle short social interactions in everyday situations by asking and answering a variety of questions.

No Requirements

SPAN2123 - Conversational Spanish

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This intermediate-level class helps students develop their conversational capacities in Spanish. The emphasis is primarily on speaking and listening, although the course will also include significant reading and writing components. Classroom activities and course assignments will develop students' capacity to use Spanish in real-life scenarios relating to everyday interactions with friends, family members, acquaintances, and strangers. It will also review vocabulary and grammar fromboth elementary and intermediate Spanish courses. At the end of this course, students will be able to carry out a broad range of simple conversations and will feel more comfortable listening to and understanding spoken Spanish.

Equivalent Courses: Previous & Current Courses
SPAN2130

No Requirements

SPAN3052 - Contemporary Latin American Novel

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: SPAN 2110 or equivalent. Survey of the 20th century Latin American regional novel. How contemporary writers have portrayed theLatin American continent: social-realism, surrealism, the boom, neo-baroque, magical realism, mestizaje, social-protest, negrismo, etc. Focus on reading classical works such as Arguedas, Asturias, Castellanos, Fuentes, Roa Bastos, Rulfo. All readings and reports to be in Spanish. (Same as ENGL 352)

Equivalent Courses: Previous & Current Courses
ENGL3052, ENGL352, SPAN352

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

Additional Comments:
Prerequisite: SPAN 2110 or equivalent

No Requirement Level

SPAN3055 - Latin American Fiction & Art

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
A historical journey of a multi-cultural continent. Politics, economic disparity, military dictatorship, oppression and revolutionary resistance are studiedthrough the lens of arts and literature. The most varied styles—social-realism, surrealism, fantasy, magical-realism, etc.—complement factual history to offer an accurate picture of a cruel social reality. (Same as ENGL 355)

Equivalent Courses: Previous & Current Courses
ENGL3055, ENGL355, SPAN355

No Requirements

SPAN3057 - Latin American Literature

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
A review of Latin American literary production with examples of its cultural and artistic diversity. The class examines the most important writers from Mexico, the Caribbean, Central America, the Andean region and the Southern cone, and relates their poetic legacy to the social sciences and philosophy. (Same as ENGL 357)

Equivalent Courses: Previous & Current Courses
ENGL3057, ENGL357, SPAN357

No Requirements

SPAN3085 - g:Latin American Cultural History

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: SPAN 2110 or equivalent. Overview of the cultural history of the Iberian world on both sides of the Atlantic from the earliest culturalexpression to the current Hispanic presence in the United States. Multicultural creations of Hispanic societies. Cultural productions, i.e., fiestas, toreo, music, painting, literature, graffiti—in their political, economic, and historical background. All readings and reports to be in Spanish. (Same as HIST 385)

Equivalent Courses: Previous & Current Courses
HIST3085, HIST385, SPAN385

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

Additional Comments:
Prerequisite: SPAN 2110 or equivalent

No Requirement Level

SPAN3091 - Directed Study

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
3

Credit Hours Operator:
TO

Grade Modes
Standard Letter

No Requirements

SPAN3091 - Directed Study

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
3

Credit Hours Operator:
TO

Grade Modes
Standard Letter

Simple Requisites

Course Requisite Requirements

Prerequisite: Upper-division standing in psychology

No Requirement Level

SPAN4091 - Directed Study

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
3

Credit Hours Operator:
TO

Grade Modes
Standard Letter

No Requirements

SPAN5020 - Advanced Spanish Reading & Composition

General

Credit Hrs

Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Creative writing in Spanish. The class explores the poetic and musical legacy of the Spanish speaking countries, and writes poems, short stories, or a small literary piece in Spanish. Shares lecture with (400-level version) with additional expectations and assignments for graduate credit.

Equivalent Courses: Previous & Current Courses
SPAN520, SPAN520D

No Requirements

TCOM1110 - Community Service

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail

Course Description
Proposing and then reporting in writing on a semester long community service activity with any nonprofit organization. To be graded S/U. May be repeated for credit .

Equivalent Courses: Previous & Current Courses
TC100

No Requirements

TCOM1120 - g:Orientation to Technical Communication

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Guest speakers introduce students to the myriad activities and career paths of technical communicators.

Equivalent Courses: Previous & Current Courses
TC101

No Requirements

TCOM1130 - i5:Visual Communication & Graphic Design

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course supports students' personal and professional development by exploring the principles and practices of visual communication and graphic design. Students learn best practices for creating human-centered, ethical, appealing, and effective visual communication—from presentations and data displays to signage, posters, and tutorials for research, education, and industry. Working individually and in groups, students create various small graphic and communication design projects that aspire to make a difference. By the end of the course, students showcase their work in a professional online portfolio.

Equivalent Courses: Previous & Current Courses
TC151

No Requirements

TCOM2110 - g5:Technical Editing

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Grammar review. Description of types and levels of editing. Responsibilities of editors. Use of editing and proof-reading symbols, usage guides, style guides and style sheets; Production aspect of editing. Practice in online and hard copy of short manuscripts.

Equivalent Courses: Previous & Current Courses
TC202

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- ENGL1120 - g1:Composition II

Additional Comments:

No Requirement Level

TCOM2120 - g5:Branding and Social Media

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course helps students build their brand identity and apply the process to an organization of their choice. It also helps students harness the power of social media to build and consolidate both a personal brand and that of organizations. This class prepares students to make branding and social media an integral part of their day-to-day activities.

Equivalent Courses: Previous & Current Courses
TC211

No Requirements

TCOM3001 - i5:Writing Theory and Practice

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisites: ENGL 1120 or consent of Instructor and Advisor. In this advanced composition course, we explore processes and theories from fields such as rhetoric, composition, and technical communication. Multiple genres of writing are discussed, from reflective to research writing.

Equivalent Courses: Previous & Current Courses
TC301, TCOM301

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

Prerequisite

Prerequisites: ENGL 1120 or consent of instructor and advisor

Complete ALL of the following Courses:
- ENGL1120 - g1:Composition II

or consent of instructor and advisor

Additional Comments:

No Requirement Level

TCOM3021 - Internship

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisites: TCOM 2120 and 2120; ENGL 341; and consent of TCOM faculty. Work during a school term or the summer in a technical communication or media field, such as writing, gathering data, or production work, for an on- or off-campus publications agency. To receive credit,students must have their internships approved in advance by the TCOM faculty. Students produce a report about their internship program.

Equivalent Courses: Previous & Current Courses
TC321, TCOM321

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

Prerequisites

Prerequisites: TCOM 2120; ENGL 341; and consent of TCOM faculty

Complete ALL of the following Courses:
- TCOM2120 - g5:Branding and Social Media
- ENGL3041 - i1:Technical Writing

and consent of TCOM faculty

Additional Comments:

No Requirement Level

TCOM3030 - i5:Risk, Crisis, & Non-Profit Communication

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: ENGL 1120 or consent of instructor and advisor. Environmental, geopolitical, societal, economic, and technological risks and crises can affect corporations, industry, non-profit organizations, governments, science and education, anywhere in the world. While many of these threats cannot be stopped, their likelihood and impacts can be reduced through communication. In this active-learning, problem-based class, students follow and critically analyze situations of risk and crisis in for-profit and non-for-profit organizations. They learn how to develop and implement risk and crisis communication plans. Students apply their knowledge and skills in a risk or crisis communication project for a for-profit or non-for-profit client of their choice, and develop a portfolio of their work.

Simple Requisites

Course Requisite Requirements

No Requirement Level

Course Prerequisite
Type
Prerequisite

ENGL1120 prerequisite

Complete ALL of the following Courses:
- ENGL1120 - g1:Composition II
- or receive consent of instructor and advisor.

Additional Comments:

TCOM3051 - i5:Web Design

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisites: TCOM 1130. This course introduces students to the fundamentals of web design, including principles of usability, aesthetics, and interactivity. Students will learn and apply current web design theories and relevant technology tools to practical course projects.

Equivalent Courses: Previous & Current Courses
TC351, TC351D, TCOM351

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:
- TCOM1130 - i5:Visual Communication & Graphic Design

Additional Comments:

No Requirement Level

TCOM3071 - Publications Management

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisites: TCOM 2120 and 2120 or consent of Instructor and Advisor. Theory and practice of meeting managerial responsibilities. Topics include communication in organizations, management and supervision, project management, technology and professional communication, legal and ethical issues, and contract employment. Includes a collaborative research project using ethnographic methods.

Equivalent Courses: Previous & Current Courses
TC371, TCOM371

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

Prerequisite

Prerequisites: TCOM 2120 and 2120 or consent of instructor and advisor

Complete ALL of the following Courses:
- TCOM2120 - g5:Branding and Social Media

or consent of instructor and advisor

Additional Comments:

No Requirement Level

TCOM4003 - Rhetoric and Video Games

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisites: ENGL 1120 or consent of Instructor. In this reading and discussion-heavy course, students examine video games as important cultural and communicative artifacts through the lens of rhetorical theory. It provides an overview of both classic and modern rhetoric and the opportunity to engage in critical, scholarly analysis. Shares lectures with TCOM 5003.

Equivalent Courses: Previous & Current Courses
TC403, TC503, TCOM403, TCOM5003

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

Prerequisite

Prerequisites: ENGL 1120 or consent of instructor

Complete ALL of the following Courses:
- ENGL1120 - g1:Composition II

or consent of instructor

Additional Comments:

No Requirement Level

TCOM4004 - g:Design Thinking Innovation Lab

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This class hones students' creativity and critical thinking skills to make innovative design solutions to products and services. This course introduces students to the "design thinking mindset", process and tools needed in this approach. The class also addresses user needs and there is an emphasis on working on client-based problems. This hands-on lab class prepares students to more easily guide strategies and actively contribute to decision-making processes in research, education and industry.

Equivalent Courses: Previous & Current Courses
TC404, TC504, TCOM404, TCOM5004, TCOM504

No Requirements

TCOM4005 - i5:Science Writing

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: ENGL 1120 and at least junior standing or consent of Instructor and Advisor. This course provides an overview of science writinggenres designed to reach multiple audiences (e.g., specialists, policymakers, students, the public, etc.), with an emphasis on non-specialist audiences. Course topics include, but are not limited to, the rhetorical history of science communication, popular science writing and science journalism, and public information for research groups and facilities (e.g., press releases, websites, science blogs). This course is ideal for TCOM students interested in working for one of New Mexico's many national labs and research, in the sciences facilities and for students in the sciences interested in improving their scientific communication skills. This course involves a service learning project providing students with opportunities for publication. Shares lecture with TC 505, with additional expectations for graduate credit.

Equivalent Courses: Previous & Current Courses
TC405, TC505, TCOM405, TCOM5005, TCOM505

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

Prerequisite

Prerequisite: ENGL 1120 and at least junior standing or consent of instructor and advisor

Complete ALL of the following Courses:
- ENGL1120 - g1:Composition II

and at least junior standing or consent of instructor and advisor

Additional Comments:

No Requirement Level

TCOM4006 - i5:Big Data, Culture, and Society

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This project-based course provides students with an introduction to the world of big data scholarship within the context of humanities and communication research. It focuses on both the debates and controversies related to big data collection and the practices/techniques of big data analysis. Possible topics of focus may include (but are not limited to) computational textual analysis/ linguistics, digital humanities, machine learning, and data visualization. Shares lectures with TCOM 5006, which has additional expectations for graduate credit.

Equivalent Courses: Previous & Current Courses
TCOM406, TCOM5006, TCOM506

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Completion Requirement

Prerequisites

Complete ALL of the following Courses:
- ENGL1120 - g1:Composition II

Additional Comments:

No Requirement Level

TCOM4007 - Social Justice and Language

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Pre req of ENGL 1120 or consent of Instructor. The goal of this course is to look at existing social structures and environments with a critical eye focused on maintaining equity for all participants. We will discuss oppression, justice and how language and communication often play a role in these issues. We will read from the Technical and Professional Communication literature on Social Justice. We will reflect in writing and through group discussion on our own positionality and biases and privilege. We will take action in the form of research, service (virtual or face to face) and try for advocacy, not just awareness of social issues. Your participation and respect for others are vital components of this course.

Equivalent Courses: Previous & Current Courses
TCOM489

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

Prerequisite

Pre-req of ENGL 1120 or consent of Instructor

Complete ALL of the following Courses:
- ENGL1120 - g1:Composition II

or consent of Instructor

Additional Comments:

No Requirement Level

TCOM4011 - Persuasive Communication & Grant Writing

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisites: English 1120 or Consent of Instructor (for graduate level, Graduate Standing or Consent of Instructor). This course introduces rhetorical theory and persuasive techniques for communication from promotional documents to grants. Students gain practical experience in design, writing, and illustrating promotional texts. A central focus of the class is on preparing and submitting a real-world grant proposal, and introduces writing for both government and small foundation grants.

Equivalent Courses: Previous & Current Courses
TC411, TC511, TCOM411, TCOM511

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

Prerequisite

Prerequisites: English 1120 or Consent of Instructor (for graduate level, Graduate Standing or Consent of Instructor)

Complete ALL of the following Courses:
- ENGL1120 - g1:Composition II

or Consent of Instructor (for graduate level, Graduate Standing or Consent of Instructor)

Additional Comments:

No Requirement Level

TCOM4016 - International Professional Communication

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: ENGL 1120 or Consent of Instructor and Advisor. Producing efficient and effective information for audiences situation in different geographic locations is a major concern of companies and organizations, both large and small. This course develops the knowledge and skills needed to analyze and solve the problems posed by a world that is increasingly diverse, interconnected, and driven by knowledge, technology and the capacity to learn and adapt to new and ever changing contexts and situations. During the course, students will produce artifacts that demonstratedevelopment and accomplishments as an international professional communicator. Shares lecture with TCOM 512, with additional expectations for graduate credit.

Equivalent Courses: Previous & Current Courses
TC416, TC512, TCOM416, TCOM5012, TCOM512

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

Prerequisite

Prerequisite: ENGL 1120 or consent of instructor and advisor

Complete ALL of the following Courses:
- ENGL1120 - g1:Composition II

or consent of instructor and advisor

Additional Comments:

No Requirement Level

TCOM4020 - Senior Seminar

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisites: TCOM 2120 and senior standing in the Technical Communication program. Readings in professional journals and discussion of current issues in technical and professional communication. Taught as a seminar with students presenting papers. Research leading to proposal for TCOM 422, Senior Thesis.

Equivalent Courses: Previous & Current Courses
TC420, TCOM420

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

Prerequisite

Prerequisites: TCOM 2120 and senior standing in the Technical Communication program

Complete ALL of the following Courses:
- TCOM2120 - g5:Branding and Social Media

and senior standing in the Technical Communication program

Additional Comments:

No Requirement Level

TCOM4021 - Documents & Client Project Management

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisites: English 1120 or Consent of Instructor. This course discusses the development and writing processes of professional communication documents, which can include computer/software documentation, websites, videos, policy and procedural manuals and instructions. Students gain practical experience working on an in-depth documentation project with real-world clients and developing Materials for users. Usability testing and individual project management are also a part of this course.

Equivalent Courses: Previous & Current Courses
TC421, TC521, TCOM421, TCOM5021, TCOM521

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

Prerequisite

Prerequisites: English 1120 or Consent of Instructor

Complete ALL of the following Courses:
- ENGL1120 - g1:Composition II

or Consent of Instructor

Additional Comments:

No Requirement Level

TCOM4022 - Senior Thesis

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: TCOM 4020. Initiation, production, and presentation (oral and written) of an original research project in technical communication.

Equivalent Courses: Previous & Current Courses
TC422, TCOM422

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:
- TCOM4020 - Senior Seminar

Additional Comments:

No Requirement Level

TCOM4061 - Storytelling with Data

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: ENGL 1120 or Consent of Instructor and Advisor. Data visualization tells compelling human-centered stories with data. It supports communicating, understanding, and decision-making. In this course, students become acquainted with storytelling and the development, approaches, methods, and techniques of data visualization. Students learn best practices for creating data displays—graphs, charts, illustrations, maps, interactive displays, and other data visuals—for industry, research, education, and the media. They analyze case studies on how data is visualized in these contexts and they are able to follow practitioners in action. By the course's end, students design and build their own data visualization projects

Equivalent Courses: Previous & Current Courses
TC461, TC461D, TC561, TC561D, TCOM461, TCOM461D, TCOM5061, TCOM561, TCOM561D

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

Prerequisite

Prerequisite: ENGL 1120 or consent of instructor and advisor.

Complete ALL of the following Courses:
- ENGL1120 - g1:Composition II

or consent of instructor and advisor.

Additional Comments:

No Requirement Level

TCOM4091 - Directed Study

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
12

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisites: TCOM 2110 and 2120, or Consent of Instructor and Advisor.

Equivalent Courses: Previous & Current Courses
TC491, TCOM491

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

Prerequisites

Prerequisites: TCOM 2110 and 2120, or consent of instructor and advisor

Complete ALL of the following Courses:

- TCOM2110 - g5:Technical Editing
- TCOM2120 - g5:Branding and Social Media

or consent of instructor and advisor

Additional Comments:

No Requirement Level

TCOM5001 - Experiential Learning Project

General

Credit Hrs

Credit Hrs:
2

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
As a capstone project, students in the Graduate Certificate will develop an independent project that results in 40 hours of work. This requirement canassume the form of a TC-related project at the student's work or a community organization (e.g., a documentation project, a promotional video, a grant proposal and/or fundraising project, etc.) Shares lecture with (400-level version) with additional expectations and assignments for graduate credit.

Equivalent Courses: Previous & Current Courses
TC501, TCOM501, TCOM501D

No Requirements

TCOM5003 - Rhetoric and Video Games

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisites: Graduate Standing or Consent of Instructor). In this reading and discussion-heavy course, students examine video games as important cultural and communicative artifacts through the lens of rhetorical theory. It provides an overview of both classic and modern rhetoric and the opportunity to engage in critical, scholarly analysis. Shares lectures with TCOM 4003, with additional expectations for graduate credit.

Equivalent Courses: Previous & Current Courses
TC403, TC503, TCOM4003, TCOM403, TCOM503, TCOM503D

Simple Requisites

Course Requisite Requirements

Prerequisites: Graduate Standing or consent of Instructor

No Requirement Level

TCOM5004 - Design Thinking for Innovation Lab

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This class hones students' creativity and critical thinking skills to make innovative design solutions to products and services. . This course introducesstudents to the "design thinking mindset", process and tools needed in this approach. The class also addresses user needs and there is an emphasis on working on client-based problems. This hands-on lab class prepares students to more easily guide strategies and actively contribute to decision-making processes in research, education and industry.

Equivalent Courses: Previous & Current Courses
TC404, TC504, TC504D, TCOM4004, TCOM404, TCOM504, TCOM504D

No Requirements

TCOM5005 - Science Writing

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisites: Graduate Standing. This course provides an overview of science writing genres designed to reach multiple audiences (e.g., specialists, policymakers, students, the public) with an emphasis on non-specialist audiences. The course is useful both to students pursuing a career as aprofessional science or technical writer and to student in the sciences hoping to improve their communication skills. Course topics include, but are not limited to,

popular science writing (e.g., writing for mainstream magazines an newspapers) and public information (e.g., press releases, websites, science blogs, informational videos). The course involves a service learning project providing students with opportunities for publication. Shares lecture with (400-level version) with additional expectations and assignments for graduate credit.

Equivalent Courses: Previous & Current Courses
TC405, TC505, TC505D, TCOM4005, TCOM405, TCOM505, TCOM505D

Simple Requisites

Course Requisite Requirements

Prerequisites: Graduate Standing

No Requirement Level

TCOM5006 - Big Data, Culture, and Society

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
OFFERED: FALL/SPRING. This project-based course provides students with an introduction to the world of big data scholarship within the context of humanities and communication research. It focuses on both the debates and controversies related to big data collection and the practices/techniques of big data analysis. Possible topics of focus may include (but are not limited to) computational textual analysis/linguistics, digital humanities, machine learning, and data visualization. Shares lectures with TCOM 4006, but has additional expectations for graduate credit.

Equivalent Courses: Previous & Current Courses
TCOM4006, TCOM406, TCOM506

Simple Requisites

Course Requisite Requirements

Prerequisites: Graduate standing or consent of instructor

No Requirement Level

TCOM5011 - Persuasive Comm & Grant Wrtng

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisites: Graduate standing or Consent of instructor. This course introduces rhetorical theory and persuasive techniques for communication from promotional documents to grants. Students gain practical experience in design, writing, and illustrating promotional texts. A central focus of the class is on

Equivalent Courses: Previous & Current Courses
TC411, TC511, TC511D, TCOM4011, TCOM411, TCOM511, TCOM511D

proposal and grant writing and the organization, preparation, and submission of grant proposal, and introduces writing for technical documents and manuals. Shares lecture with (400-level version) with additional expectations and assignments for graduate credit.

Simple Requisites

Course Requisite Requirements

Prerequisites: Graduate standing or Consent of instructor

No Requirement Level

TCOM5016 - International Professional Communication

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisites: Graduate Standing. Producing efficient and effective information for audiences situated in different geographic locations is a major concern of companies and organizations, both large and small. This course develops the knowledge and skills needed to analyze and solve the problems posed by a world that is increasingly diverse, interconnected, and driven by knowledge, technology, and the capacity to learn and adapt to new and ever changing contexts and situations. Students will compile a professional portfolio demonstrating development and accomplishments as an international professional communicator. Shares lecture with TCOM 4016, with additional expectations for graduate credit.

Equivalent Courses: Previous & Current Courses
TC516, TCOM516, TCOM516D

Simple Requisites

Course Requisite Requirements

Prerequisites: Graduate Standing

No Requirement Level

TCOM5021 - Document & Client Project Management

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisites: Graduate Standing or Consent of Instructor. This course discusses the development and writing processes of professional communication documents, which can include computer/software documentation, websites, videos, policy and procedural manuals and instructions. Students gain practical experience working on an in-depth documentation project with real-world clients and developing Materials for users. Usability testing and individual project

Equivalent Courses: Previous & Current Courses
TCOM521, TCOM4021 (400-level version) with additional expectations and assignments for graduate credit.

Simple Requisites

Course Requisite Requirements

Prerequisites: Graduate Standing or consent of instructor

No Requirement Level

TCOM5081 - Directed Study

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
12

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisites: Graduate Standing or Consent of Instructor. This course discusses the development and writing processes of professional communication documents, which can include computer/software documentation, websites, videos, policy and procedural manuals and instructions. Students gain practical experience working on an in-depth documentation project with real-world clients and developing Materials for users. Usability testing and individual project management are also a part of this course. Additional expectations for graduate credit. Shares lecture with (400-level version) with additional expectations and assignments for graduate credit.

No Requirements

THEA1210 - g6:Introduction to Acting

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course gives non-majors experience in the depthand craft of the actor's art. Students will learn variousterms, techniques, and practices of acting and willdemonstrate their learned skills in class. Throughindividual and collaborative exercises andimprovisations as well as partnered scenes, students willbe better able to appreciate the work of others as theylearn techniques of performing.

No Requirements

THEA4091 - Directed Study

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
6

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Directed study, topic and cr to be arranged

No Requirements

THEA5014 - Introduction to Theater

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Theory and practice of analysis of the play as literature, applying basic modes of literary criticism and vocabulary of literary analysis. Coursework includes organizing and leading a discussion on such subjects as literary analysis, directing, scene or costume design, or playwriting. Practical application includes producing a readers' theater performance.

Equivalent Courses: Previous & Current Courses
THEA514

No Requirements

CLASS Dept/ General Studies (program) Department

Photo by Patrick Tomasso on Unsplash

CONTACT US		
Office: Fitch Hall 103 , 801 Leroy Place		
State & Zip: NM 87801		
Phone: 575-835-5445		
website: https://www.nmt.edu/academics/class/		

Description:

This degree allows a student to plan a program of courses according to individual educational goals and career plans. The Bachelor of General Studies degree will be awarded after completion of 120 credit hours with a grade-point average of 2.0 or more.

Programs

AGS - Associate of General Studies

[Program Overview]

Program Title
Associate in General Studies

Department(s)
CLASS , CLASS Dept/ General Studies (program)

Degree & Program Code
AGS

Program Description
A two-year degree, Associate of General Studies, may be awarded after completion of 60 credit hours of course work approved by the CLASS department chair and the student's AGS academic advisor with a grade-point average of 2.0 or above

Program Information & Policies
Minimum credit hours required—60

Fulfillment of the Institution's residence requirement (30 credit hours) must also be met.

To be admitted into the program for this degree, the candidate must meet with the CLASS department chair and the AGS academic advisor, who will be assigned by the CLASS department chair, to create a AGS Academic Career Plan that will be on file with the Registrar.

Any changes to the AGS Academic Career Plan must be approved by the CLASS department chair and the student's AGS academic advisor. These changes will be on file with the Registrar. The certificate will be awarded only after completion of the above requirements and completion of the AGS academic Career Plan and after petition to the Vice President for Academic Affairs. The plan can be found at https://www.nmt.edu/academics/class/generalstudies.php

Simple Requisites

Program Requirements

In addition to the General Education Requirements listed below under "Institute General Education Requirement".

- Elective credits in excess of the General Education Core requirements to meet 60 degree credits.

Institute General Requirements

Associate of General Studies General Education Requirements
Type
Completion Requirement

Area 1: Communication Requirements for the Associate of General Studies

Earn at least 9 credits from the following:

- Area 1: Communications (AGS or BGS Degree) (9 crs)

ENGL 1110 is waived for students who scored 27 or higher on the ACT English Test or 610 or higher on the SAT Critical Reading Test. These students must take ENGL 1120, COMM 1130, and ENGL 3041 to fulfill the 9 credit hours in this area.

Area 2: Mathematics Requirements for the Associate of General Studies

Earn at least 3 credits from the following:

- Area 2: Mathematics (AGS or BGS Degree) (3 crs)

Area 3: Science Requirements for the Associate of General Studies

Earn at least 8 credits from the following:

- Area 3: Science (AGS or BGS Degree) (8 crs)

Generally, any two courses in Science or Engineering (with associated labs) that are a minimum of 3 credits each.

Area 4: Social Science Requirements for the Associate of General Studies

Earn at least 6 credits from the following:

- Area 5: Humanities (BS or BGS Degree) (6 credits)

Area 5: Humanities Requirements for the Associate of General Studies

Earn at least 6 credits from the following:

- Area 5: Humanities (BS or BGS Degree) (6 credits)

Area 6: Fine and Creative Art Requirement for the Associate of General Studies

Earn at least 3 credits from the following:

- Area 6: Creative and Fine Arts (BS, BA, or BGS Degree) (3 credits)

Area 7: Additional Humanities/Social Science Requirement for the Associate of General Studies

Earn at least 3 credits from the following:

- Area 7: Additional Courses from Areas 4, 5, 6 (BS, BA, or BGS Degree) (3 credits)

Additional Comments:

No Requirement Level

BGS - Bachelor of General Studies

[Program Overview]

Program Title
Bachelor of General Studies

Department(s)
CLASS , CLASS Dept/ General Studies (program)

Degree & Program Code
BGS

Program Description
This degree allows a student to plan a program of courses according to individual educational goals and career plans.

Program Information & Policies
The Bachelor of General Studies degree will be awarded after completion of 120 credit hours with a grade-point average of 2.0 or more. Other requirements for this degree include the following:

- Completion of the General Education Core & Degree Curriculum listed below.
- Completion of 42 credit hours in courses numbered 3000 or above.
- Completion of the BGS Academic Career Plan with a stated Emphasis area or areas.
- Fulfillment of the Institution's residence credit requirement (30 credit hours).

To be admitted into the program for this degree, the candidate must meet with the CLASS department chair and the BGS academic advisor, who will be assigned by the CLASS department chair, to create a BGS Academic Career Plan that will be on file with the Registrar. Any changes to the BGS Academic Career Plan must be approved by the CLASS department chair and the student's BGS academic advisor. These changes will be on file with the Registrar and must be met, along with the above-stated requirements, before the degree will be awarded. The plan can be downloaded from https://www.nmt.edu/academics/class/generalstudies.php

Note: Minors cannot be earned under a Bachelor of General Studies Degree. Students who plan to pursue a career or graduate studies that require a Bachelor of Science degree are advised to pursue another degree program at New Mexico Tech.

Simple Requisites

Program Requirements
The Bachelor of General Studies Degree requires completion of the Institute General Education Core Requirements; See the Requirements listed below under "Institute General Education Requirements."

Bachelor of General Studies Requirements in addition to the General Education Requirements
Type
Completion Requirement

Courses 3000 or above

Earn at least 42 credits from the following:

- Courses 3000 or above (BGS Degree)

Academic Career Plan

Completion of the BGS Academic Career Plan with a stated Emphasis area or areas.
The Academic Career Plan can be downloaded from https://www.nmt.edu/academics/class/generalstudies.php

Additional Comments:

General Electives to meet 120 degree credit hours.

Institute General Requirements

Bachelor of General Studies General Education Requirements
Type
Completion Requirement

Area 1: Communication Requirements for Bachelor of General Studies

Earn at least 9 credits from the following:

- Area 1: Communications (AGS or BGS Degree) (9 crs)

ENGL 1110 is waived for students who scored 27 or higher on the ACT English Test or 610 or higher on the SAT Critical Reading Test. These students must take ENGL 1120, COMM 1130, and ENGL 3041 to fulfill the 9 credit hours in this area.

Area 2: Mathematics Requirements for Bachelor of General Studies

Earn at least 3 credits from the following:

- Area 2: Mathematics (AGS or BGS Degree) (3 crs)

Area 3: Science or Engineering Requirements for Bachelor of General Studies

Earn at least 8 credits from the following:

- Area 3: Science (AGS or BGS Degree) (8 crs)

any two courses at a minimum of 3 credits each in Science or Engineering (with associated labs)

Area 4: Social Science Requirements for a Bachelor of General Studies

Earn at least 6 credits from the following:

- Area 4: Social and Behavioral Science (BS or BGS Degree) (6 credits)

Area 5: Social Sciences Requirements for a Bachelor of General Studies

Earn at least 6 credits from the following:

- Area 5: Humanities (BS or BGS Degree) (6 credits)

Area 6: Fine & Creative Art Course Requirement for a Bachelor of General Studies

Earn at least 3 credits from the following:

- Area 6: Creative and Fine Arts (BS, BA, or BGS Degree) (3 credits)

Area 7: Additional Humanities/Social Science Requirement for a Bachelor of General Studies

Earn at least 3 credits from the following:

- Area 7: Additional Courses from Areas 4, 5, 6 (BS, BA, or BGS Degree) (3 credits)

Additional Comments:

No Requirement Level

CLASS Dept/ Interdisciplinary Sciences (program) Department

Photo by Rohan Makhecha on Unsplash

CONTACT US		
Office: Fitch 103, 801 Leroy Place		
State & Zip: NM 87801		
Phone: 575-835-5445		
website: https://www.nmt.edu/academics/class/		

Interdisciplinary Sciences Program

Degrees Offered: B.S. or B.A. in Interdisciplinary Sciences

The degree in Interdisciplinary Sciences is intended for the student who desires a science-focused Bachelor's degree but wishes more latitude in the selection of courses than is available otherwise. The BS is more suited to those who want a quantitative focus and the BA more suited to those who want to focus on social and life sciences or wish to have more exposure to non-STEM subjects (e.g., the humanities and arts). Both degrees pair well with the Undergraduate Minor in Secondary Education (UMSE), and students with this minor would discuss with their advisor which degree (BA or BS) is best suited for disciplines they wish to teach.

Faculty Interests:

Programs

BA-ISCI - B.A. in Interdisciplinary Sciences

[Program Overview]

Program Title
Bachelor of Arts in Interdisciplinary Sciences

Department(s)
CLASS , CLASS Dept/ Interdisciplinary Sciences (program)

Degree & Program Code
BA-ISCI

Program Description
The degree in Interdisciplinary Sciences is intended for the student who desires a science-focused Bachelor's degree but wishes more latitude in the selection of courses than is available otherwise. The BS is more suited to those who want a quantitative focus and the BA more suited to those who want to focus on social and life sciences or wish to have more exposure to non-STEM subjects (e.g., the humanities and arts). Both degrees pair well with the Undergraduate Minor in Secondary Education (UMSE), and students with this minor would discuss with their advisor which degree (BA or BS) is best suited for disciplines they wish to teach.

Program Information & Policies
To qualify for the Bachelor of Arts degree in Interdisciplinary Sciences, a student must satisfy the general education core curriculum requirements for the Bachelor of Arts.

For students who do choose to pursue teaching as an additional area, proper selection of courses and enrollment in the Undergraduate Minor in Secondary Education (UMSE) is necessary for eventual state teaching licensure. Students in the optional UMSE should check State requirements with their Education Minor Advisor to ensure they meet criteria for certification and endorsement, because State requirements can change. Typically USME students must complete 5 Education classes along with three field experiences and one semester of student teaching in local secondary schools. These 27 credits necessary to teach on the secondary level are accredited by the New Mexico Public Education Department (NMPED). In addition, UMSE Students seeking a particular endorsement from the NMPED (e.g., Science, Math, Psychology, Computer Science) should work with their advisor on a suitable course sequence. For instance, the math requirement is a minimum of 24 credits in mathematics courses with 12 of those credits at the 3000-level or above.

Simple Requisites

Program Requirements

Bachelor of Arts in Interdisciplinary Sciences (120 credits)
Type
Completion Requirement

Science, Engineering, or Mathematics

At least 65 must be in science, engineering, or mathematics.

- These can include biology, chemistry, computer science, earth and environmental science, mathematics, engineering, physics, and psychology.
- These credits can also be used to satisfy general education requirements for the degree.

Science, Engineering, or Mathematics: Course level 2000 or above

At least 30 credit hours in course numbered 2000 or above.

- These can include biology, chemistry, computer science, earth and environmental science, mathematics, engineering, physics, and psychology.
- These credits can also be used to satisfy general education requirements for the degree.
- Of the 30 credits hours at least nine credit hours in each of two fields. Closely related disciplines may count together with appropriate course substitution approvals.

Elective Courses 3000 or above.

- Enough credits to meet the 120 credit hour degree minimum requirement.
- At least 42 credits must be in courses numbered 3000 or above, of the total degree credit hours required.

Additional Comments:

Additionally, the Secondary Education compliments this degree. Other minors and their information may be found in their respective departments.

Institute General Requirements

Here you can find the NMT Institute Requirements.

Bachelor of Arts General Education Requirements
Type
Completion Requirement

Area 1: Communication Requirements for Bachelor of Arts

Earn at least 9 credits from the following:

- Area 1: Communications (BA Degree) (9 credits)

Area 2: Math Requirements for Bachelor of Arts

Earn at least 6 credits from the following:

- Area 2: Mathematics (BA Degree) (6 credits)

Note: At least 3 credits must be in Math.

Area 3: Science Requirements for a Bachelor of Arts

Earn at least 12 credits from the following:

- Area 3: Science (BA Degree) (12 credits)

A course and associated lab (of at least 3 total credit hours) from each discipline listed below:

- Biology
- Chemistry
- Earth Sciences
- Physics

Area 4: Social Science Requirements for a Bachelor of Arts

Earn at least 9 credits from the following:

- Area 4a: Social Sciences: Policy and Technology (BA Degree) (3 credits)
- Area 4b: Other Social Sciences (BA Degree) (6 credits)

Note: at least one course must be a "policy and technology" class (POLS; SOSC)

Area 5: Humanities Course Requirements for a Bachelor of Arts

Earn at least 9 credits from the following:

- Area 5a: Humanities: Ethics and Technology (BA Degree) (3 credits)
- Area 5b: Other Humanities (BA Degree) (6 credits)
- At least one of "ethics and technology" classes (PHIL, or other specified classes)

Area 6: Fine & Creative Art Course Requirement for a Bachelor of Arts

Earn at least 3 credits from the following:

- Area 6: Creative and Fine Arts (BS, BA, or BGS Degree) (3 credits)

Area 7: Additional Humanities/Social Science Requirement for a Bachelor of Arts

Earn at least 3 credits from the following:

- Area 7: Additional Courses from Areas 4, 5, 6 (BS, BA, or BGS Degree) (3 credits)

Additional Comments:

No Requirement Level

[Learning Outcomes]

Name Program Outcomes	**Outcome** Students will learn the fundamentals of scientific inquiry in a breadth of disciplines.

Outcome
Students will develop critical thinking and quantitative skills for competence in scientific reasoning.

Outcome
Students will communicate with different audiences using multiple formats.

Outcome
Students will apply professional values and ethics to their role as a member of a culturally diverse society.

Outcome
Students will explore connections between non-STEM disciplines (e.g., the humanities and arts) and the sciences, including commonalities of inquiry.

Outcome
Students will understand at least one discipline in enough depth to teach others.

[Sample 4-Year Curriculum Plan(s)]

Degree Map Name
Sample Curriculum for the Bachelor of Arts in Interdisciplinary Sciences with UMSE
Total Degree Map Credits
112 - 120
Degree Map Effective Catalog Year
2025 -
Degree Map Description
This sample is prepared for a hypothetical student seeking a *psychology* endorsement from NMPED, with additional interest in gaining depth in geology and biology. This sample sequence would qualify for a Minor in Secondary Education and a Minor in Psychology if completed as shown.

Year	Semester	Actual Credits
Year 1, Semester 1	Fall	15

Course
- PSYC1110 - g4:Introduction to Psychology

Actual Credits 3

Course
- ENGL1110 - g1:Composition I

Actual Credits 3

Course
- MATH1510 & MATH1510L: g:Calculus I & Lab

Actual Credits 4

Course
- CHEM1215 & CHEM1215L: g:General Chemistry I and Lab

Actual Credits 4

Course
- Elective (Generic)

Actual Credits 1

Year	Semester	Actual Credits
Year 1, Semester 2	Spring	15

Course
- PSYC2285 & PSYC2285L: Experimental Psychology and Lab

Actual Credits 4

Course
- ENGL1120 - g1:Composition II

Actual Credits 3

Course
- MATH1520 - g2:Calculus II

Actual Credits 4

Course
- CHEM1225 & CHEM1225L: g: General Chemistry II and Lab

Actual Credits 4

Year	Semester	Actual Credits
Year 2, Semester 3	Fall	15

Course
- MATH2420 - Applied Linear Algebra

Actual Credits 3

Course
- EDUC3040 - Concepts in Education

Actual Credits 3

Course
- GEOL1110 & GEOL1110L: Physical Geology and Lab

Actual Credits 4

Course
- PHYS1310 & PHYS1310L: g:Calculus-Physics I and Lab

Actual Credits 5

Year	Semester	Actual Credits
Year 2, Semester 4	Spring	15

Course
- EDUC3041 - Matching Teacher Strategy to Student Learning

Actual Credits 3

Course
- EDUC4001 - Effective Reading for Diverse Learners

Actual Credits 3

Course
- MATH2532 - Calculus III

Actual Credits 4

Course
- PHYS1320 & PHYS1320L: g:Calculus-Based Physics II and Lab

Actual Credits 5

Year	Semester	Actual Credits
Year 3, Semester 5	Fall	15

Course
- EDUC4003 - Methods & Practices

Actual Credits 3

Course
- BIOL2110 & BIOL2110L: Principles of Biology I and Lab

Actual Credits 4

Course
- PSYC3023 - Child & Adolescent Development

Actual Credits 3

Course
- MATH3035 - Ordinary Differential Equation

Actual Credits 3

Course
-

Actual Credits 2

Year	Semester	Actual Credits
Year 3, Semester 6	Spring	15

Course
- EDUC4005 - Assessments & Measurements

Actual Credits 3

Course
- BIOL2610 & BIOL2610L: Principles of Biology II and Lab

Actual Credits 4

Course
- MATH3052 - Basic Concepts of Mathematics

Actual Credits 3

Course
- PSYC3005 & PSYC3005L: Cognitive Psychology and Lab

Actual Credits 4

Course
-

Actual Credits 1

Year	Semester	Actual Credits
Year 4, Semester 7	Fall	15

Course
- ENGL3041 - i1:Technical Writing

Actual Credits 3

Course
- ARTH2110 - g6:History of Art I

Actual Credits 3

Course
- MATH3082 - Probability and Statistics

Actual Credits 3

Course
- PHIL3000 - Philosophy of Science

Actual Credits 3

Course
- HUMN1220 - g5:Film Genres

Actual Credits 3

Year	Semester	Actual Credits
Year 4, Semester 8	Spring	7 - 15

Course
- EDUC4014 - Student Teaching Seminar

Actual Credits 3

Course
- EDUC4013 - Student Teaching (Secondary)

Actual Credits 1 - 9

Course
- MATH3036 - Introduction to Partial Differential Equations

Actual Credits 3

BS-ISCI - B.S. in Interdisciplinary Sciences

[Program Overview]

Program Title
Bachelor of Science in Interdisciplinary Sciences

Department(s)
CLASS , CLASS Dept/ Interdisciplinary Sciences (program)

Degree & Program Code
BS-ISCI

Program Description
The degree in Interdisciplinary Sciences is intended for the student who desires a science-focused Bachelor's degree but wishes more latitude in the selection of courses than is available otherwise. The BS is more suited to those who want a quantitative focus and the BA more suited to those who want to focus on social and life sciences or wish to have more exposure to non-STEM subjects (e.g., the humanities and arts). Both degrees pair well with the Undergraduate Minor in Secondary Education (UMSE), and students with this minor would discuss with their advisor which degree (BA or BS) is best suited for disciplines they wish to teach.

Program Information & Policies
Students pursuing the Bachelor of Science degree will have a primary and secondary advisor (or minor advisor if pursuing a minor) in different disciplines to ensure interdisciplinary input. Students will discuss an Academic Career Plan with both advisors. Such an academic career plan proposes a sequence of courses that will emphasize chosen areas of depth by selecting related upper-level courses, in a way that is relevant to professional discernment or future pursuit of employment.

For students who choose to pursue teaching as an additional area, proper selection of courses and enrollment in the Undergraduate Minor in Secondary Education (UMSE) is necessary for eventual state teaching licensure. In this case the Education minor advisor is needed as primary or secondary advisor to ensure that the student's course selection meets the requirements for both the BS degree and the minor. In addition, students in the optional UMSE should check state requirements with their Education minor advisor to ensure they meet criteria for certification and endorsement, because State requirements can change. Typically USME students must complete five education classes along with three field experiences and one semester of student teaching in local secondary schools. These 27 credits necessary to teach on the secondary level are accredited by the New Mexico Public Education Department (NMPED). In addition, UMSE students seeking a particular endorsement from the NMPED (e.g., Science, Math, Psychology, Computer Science) should work with their advisor on a suitable course sequence. For instance, the math requirement is a minimum of 24 credits in mathematics courses with 12 of those credits at the 3000-level or above.

Simple Requisites

Program Requirements
To qualify for the Bachelor of Science degree in Interdisciplinary-Sciences, a student must satisfy the general education core curriculum requirements for the Bachelor of Science.

Bachelor of Science in Interdisciplinary Sciences
Type
Completion Requirement

General Requirements

- Of the minimum 120 credit hours required for this degree, at least 65 must be in science, engineering, or mathematics. These can include biology, chemistry, computer science, earth and environmental science, mathematics, engineering, physics, and psychology. These credits can also be used to satisfy general education requirements for the degree.
- At least 30 credit hours in science, engineering, or mathematics must be in courses numbered 2000 or above.
- In order that a reasonable depth of study is attained in at least two disciplines, the 30 credit hours at 2000 or above must include at least nine credit hours in each of two fields. Closely related disciplines may count together with appropriate course substitution approvals.
- Of the total credit hours required, at least 42 must be in courses numbered 3000 or above.

Additional Comments:

Institute General Requirements

Bachelor of Science General Education Requirements (53 credits)
Type
Completion Requirement

Area 1: English Requirements for Bachelor of Science

Earn at least 9 credits from the following:

- Area 1: Communications (BS Degree) (9 credits)

Area 2: Math Requirements for Bachelor of Science

Earn at least 8 credits from the following:

- Area 2: Mathematics (BS Degree) (8 credits)

Area 3: Science Requirements for a Bachelor of Science

Earn at least 18 credits from the following:

- Area 3: Science (BS Degree) (18 credits)

Area 4: Social Science Requirements for a Bachelor of Science

Earn at least 6 credits from the following:

- Area 4: Social and Behavioral Science (BS or BGS Degree) (6 credits)

Area 5: Humanities Course Requirements for a Bachelor of Science

Earn at least 6 credits from the following:

- Area 5: Humanities (BS or BGS Degree) (6 credits)

Area 6: Fine & Creative Art Course Requirement for a Bachelor of Science

Earn at least 3 credits from the following:

- Area 6: Creative and Fine Arts (BS, BA, or BGS Degree) (3 credits)

Area 7: Additional Humanities/Social Science Requirement for a Bachelor of Science

Earn at least 3 credits from the following:

- Area 7: Additional Courses from Areas 4, 5, 6 (BS, BA, or BGS Degree) (3 credits)

Additional Comments:

No Requirement Level

[Learning Outcomes]

Name Program Outcomes	**Outcome** 1. Students will learn the fundamentals of scientific inquiry in a breadth of disciplines.

Outcome
2. Students will develop analytical and quantitative skills for competence in science and mathematics.

Outcome
3. Students will communicate with different audiences using multiple formats.

Outcome
4. Students will apply professional values and ethics to their role as a member of a culturally diverse society.

Outcome
5. Students will explore common areas of inquiry among the disciplines.

Outcome
6. Students will understand at least one discipline in enough depth to teach others.

[Sample 4-Year Curriculum Plan(s)]

Degree Map Name
Sample Curriculum for a Bachelor of Science in Interdisciplinary Sciences with UMSE
Total Degree Map Credits
120
Degree Map Effective Catalog Year
2025 -

Degree Map Description
This sample is prepared for a hypothetical student seeking a *mathematics* teaching endorsement from NMPED and interested in the psychology of learning for the secondary depth requirement towards the major degree. This sample sequence would qualify for a Minor in Secondary Education and a Minor in Mathematics if completed as shown.

Year	Semester	Actual Credits
Year 1	Fall	15

Course
- PSYC1110 - g4:Introduction to Psychology

Actual Credits 3

Course
- ENGL1110 - g1:Composition I

Actual Credits 3

Course
- MATH1510 & MATH1510L: g:Calculus I & Lab

Actual Credits 4

Course
- CHEM1215 & CHEM1215L: g:General Chemistry I and Lab

Actual Credits 4

Course
- Extra-curricular Electives

Actual Credits 1

Year	Semester	Actual Credits
Year 1	Spring	15

Course
- PSYC2285 & PSYC2285L: Experimental Psychology and Lab

Actual Credits 4

Course
- ENGL1120 - g1:Composition II

Actual Credits 3

Course
- MATH1520 - g2:Calculus II

Actual Credits 4

Course
- CHEM1225 & CHEM1225L: g: General Chemistry II and Lab

Actual Credits 4

Year	Semester	Actual Credits
Year 2	Fall	15

Course
- MATH2420 - Applied Linear Algebra

Actual Credits 3

Course
- EDUC3040 - Concepts in Education

Actual Credits 3

Course
- PHYS1310 & PHYS1310L: g:Calculus-Physics I and Lab

Actual Credits 5

Course
- GEOL1110 - Physical Geology

Actual Credits 3

Course
- Extra-curricular Electives

Actual Credits 1

Year	Semester	Actual Credits
Year 2	Spring	15

Course
- EDUC3041 - Matching Teacher Strategy to Student Learning

Actual Credits 3

Course
- EDUC4001 - Effective Reading for Diverse Learners

Actual Credits 3

Course
- MATH2532 - Calculus III

Actual Credits 4

Course
- PHYS1320 & PHYS1320L: g:Calculus-Based Physics II and Lab

Actual Credits 5

Year	Semester	Actual Credits
Year 3	Fall	15

Course
- EDUC4003 - Methods & Practices

Actual Credits 3

Course
- BIOL2110 & BIOL2110L: Principles of Biology I and Lab

Actual Credits 4

Course
- PSYC3023 - Child & Adolescent Development

Actual Credits 3

Course
- MATH3035 - Ordinary Differential Equation

Actual Credits 3

Course
- Extra-curricular Electives

Actual Credits 2

Year	Semester	Actual Credits
Year 3	Spring	15

Course
- EDUC4005 - Assessments & Measurements

Actual Credits 3

Course
- BIOL2610 & BIOL2610L: Principles of Biology II and Lab

Actual Credits 4

Course
- MATH3052 - Basic Concepts of Mathematics

Actual Credits 3

Course
- PSYC3005 & PSYC3005L: Cognitive Psychology and Lab

Actual Credits 4

Course
- Extra-curricular Electives

Actual Credits 1

Year	Semester	Actual Credits
Year 4	Fall	15

Course
- ENGL3041 - i1:Technical Writing

Actual Credits 3

Course
- ARTH2110 - g6:History of Art I

Actual Credits 3

Course
- MATH3082 - Probability and Statistics

Actual Credits 3

Course
- PHIL3000 - Philosophy of Science

Actual Credits 3

Course
- HUMN1220 - g5:Film Genres

Actual Credits 3

Year	Semester	Actual Credits
Year 4	Spring	15

Course
- EDUC4014 - Student Teaching Seminar

Actual Credits 3

Course
- EDUC4013 - Student Teaching (Secondary)

Actual Credits 9

Course
- MATH3036 - Introduction to Partial Differential Equations

Actual Credits 3

CLASS Dept/ Psychology (program) Department

Photo by Christina Deravedisian on Unsplash

CONTACT US		
Office: Fitch 103, 801 Leroy Place		
State & Zip: NM 87801		
Phone: 575-835-5445		
website: https://www.nmt.edu/academics/psych-ed/undergrad.php		

Description:

Psychologists study behavior and mental experience. Neuroscientists study how brain activity leads to conscious experience and action. Many professionals in the field of psychology help people when something is going wrong with their mood, perception, behavior, or the nervous system. Psychology is a broad degree that can lead to jobs in diverse fields!

- Develop analytical skills that employers seek, by learning to apply the scientific method to behavior.
- Psychology complements any other kind of learning or work with people.
- Psychology helps you understand yourself and others. It prepares you for professions that improve interactions between people.

Programs

BA-PSY - B.A. in Psychology

[Program Overview]

Program Title
Bachelor of Arts in Psychology

Department(s)
CLASS , CLASS Dept/ Psychology (program)

Degree & Program Code
BA-PSY

Program Description
The program in psychology is designed to provide students with a scientific foundation in the methods and basic data in psychology and neuroscience and to prepare students for further work in all specializations within the field. The B.A. degree program allows more flexibility and breadth whereas the B.S. degree program emphasizes depth in quantitative skills. Psychology students acquire the fundamentals of learning and memory, perception, attention, reason and problem solving, emotion, thought, language and communication, the development of all these processes and their pathology. In addition, we apply psychology to other fields and teach techniques for measuring and studying psychological variables. Students conduct laboratory experiments on the psychological and physiological bases of behavior. The department has an invertebrate vivarium for laboratory classes and research. There are student opportunities for independent research.

Simple Requisites

Program Requirements
Minimum credit hours required—120

In addition to the General Education and Institute Core Curriculum the following courses are required:

Required Courses
Type
Completion Requirement

Required Psychology

Complete ALL of the following Courses:

- PSYC1110 - g4:Introduction to Psychology
- PSYC2285 - g4:Experimental Psychology
  AND PSYC2285L - g4:Experimental Psychology Lab

- PSYC4072 - Senior Seminar

Two courses (with associated labs) chosen from among

Complete at least 2 of the following courses:

- PSYC3001L - Sensation & Perception Lab
  AND PSYC3001 - Sensation & Perception
- PSYC3005 - Cognitive Psychology
  AND PSYC3005L - Cognitive Psychology Lab
- PSYC3009 - Behavioral Neuroscience
  AND PSYC3009L - Behavioral Neuroscience Lab
- PSYC3062 - Animal Behavior
  AND PSYC3062L - Animal Behavior Lab

15 additional credit hours in Psychology

Earn at least 15 credits from the following:

- PSYC1180 - g4:Science & Pseudoscience
- PSYC1190 - i4:Human Factors in Science & Engineering
- PSYC2110 - i4:Social Psychology
- PSYC2310 - g4:Drugs & Behavior
- PSYC2331 - Psychobiology of Sex
- PSYC3020 - Psychology of Language
- PSYC3042 - Music and the Brain
- PSYC3091 - Directed Study
- PSYC4009 - Cell and Molecular Neuroscience
- PSYC4010 - Neurology

Required Biology

Complete ALL of the following Courses:

- BIOL2110 - Pinciples of Biology: Cellular & Molecular
  AND BIOL2110L - Pinciples of Biology: Cellular & Molecular Lab
- BIOL2610 - Principles of Biology: Biodiversity, Ecology, and Evolution
  AND BIOL2610L - Principles of Biology: Biodiversity, Ecology, and Evolution Lab

Upper Division Biology Requirements exclusive of BIOL 4071 or 4081

Earn at least 6 credits from the following:

- BIOL3001 - Genetic Engineering: At the Bench (Inactive)
  OR BIOL3011 - Genetics
  OR BIOL3031 - Cell Biology
  OR BIOL3041 - Microbiology
  OR BIOL3043 - Environmental Microbiology
  OR BIOL3044 - Ecology
  OR BIOL3045 - Evolutionary Biology
  OR BIOL3050 - Psychobiology of Sex
  OR BIOL3051 - Anatomy & Physiology
  OR BIOL3052 - Anatomy and Physiology II
  OR BIOL3062 - Animal Behavior
  OR BIOL4002 - Ecosystem Biology
  OR BIOL4009 - Cell and Molecular Neuroscience
  OR BIOL4010 - Neurology
  OR BIOL4011 - Advanced Genetics
  OR BIOL4019 - Ecotoxicology
  OR BIOL4031 - Virology
  OR BIOL4035 - Bioinformatics
  OR BIOL4037 - Infection and Immunity
  OR BIOL4043 - Molecular Biology
  OR BIOL4045 - Evolutionary Biomechanics (Inactive)
  OR BIOL4049 - Astrobiology
  OR BIOL4055 - Molecular Ecology
  OR BIOL4070 - Biology CURE
  OR BIOL4089 - Special Topics in Biology

Additional credits

At least three (3) additional credit hours beyond the General Education Core Curriculum and the Psychology requirements above at the 3000 level or above

Electives

Electives to complete 120 credit hours. Earning a minor in another field is strongly encouraged

Additional Comments:

Institute General Requirements

General Education Requirements for Bachelor of Arts
Type
Completion Requirement

Area 1: Communications

Complete ALL of the following Course Sets:

- Area 1: Communications (BA Degree) (9 credits)

Area 2: Mathematics and Quantitative Reasoning

Complete ALL of the following Course Sets:

- Area 2: Mathematics (BA Degree) (6 credits)

Area 3: Science

Complete ALL of the following Course Sets:

- Area 3: Science (BA Degree) (12 credits)

Area 4a: Policy and Technology for Bachelor of arts

Earn at least 3 credits from the following:

- Area 4a: Social Sciences: Policy and Technology (BA Degree) (3 credits)

Area 4b: Other Social Sciences for Bachelor of Arts

Earn at least 6 credits from the following:

- Area 4b: Other Social Sciences (BA Degree) (6 credits)

Area 5a: Ethics and Technology for Bachelor of Arts

Earn at least 3 credits from the following:

- Area 5a: Humanities: Ethics and Technology (BA Degree) (3 credits)

Area 5b: Other Humanities

Earn at least 6 credits from the following:

- Area 5b: Other Humanities (BA Degree) (6 credits)

Area 6: Creative and Fine Arts

Earn at least 3 credits from the following:

- Area 6: Creative and Fine Arts (BS, BA, or BGS Degree) (3 credits)

Area 7: Additional Humanities/Social Science Requirement for Bachelor

of Arts

Earn at least 3 credits from the following:

- Area 7: Additional Courses from Areas 4, 5, 6 (BS, BA, or BGS Degree) (3 credits)

Additional Comments:

No Requirement Level

[Learning Outcomes]

Outcome
1. Knowledge base in Psychology

Outcome
2. Scientific inquiry and critical thinking

Outcome
3. Ethical and social responsibility in a diverse world

Outcome
4. Communication

Outcome
5. Professional development

[Sample 4-Year Curriculum Plan(s)]

Degree Map Name
Sample Curriculum for the Bachelor of Science in Psychology
Total Degree Map Credits
121
Degree Map Effective Catalog Year
2025 -

Year	Semester	Actual Credits
Year 1	Fall	16

Course
- PSYC1110 - g4:Introduction to Psychology

Actual Credits 3

Course
- ENGL1110 - g1:Composition I

Actual Credits 3

Course
- MATH1430 - Application to Calculus 1

Actual Credits 3

Course
- CHEM1120 or CHEM1215 & CHEM1215L: Basic General Chemistry

Actual Credits 4

Course
- Ethics of Science or Technology (Generic)

Actual Credits 3

Year	Semester	Actual Credits
Year 1	Spring	15

Course
- PSYC2285 & PSYC2285L: Experimental Psychology and Lab

Actual Credits 4

Course
- ENGL1120 - g1:Composition II

Actual Credits 3

Course
- MATH2350 & MATH2350L: Statistical Methods and Lab

Actual Credits 3

Course
- BIOL2110 & BIOL2110L: Principles of Biology I and Lab

Actual Credits 4

Course
- Elective (Generic)

Actual Credits 1

Year	Semester	Actual Credits
Year 2	Fall	15

Course
- PSYC2310 - g4:Drugs & Behavior

Actual Credits 3

Course
- PSYC3023 - Child & Adolescent Development

Actual Credits 3

Course
- Physics (introduction to Physics) no course set (Generic)

Actual Credits 3

Course
- Humanities

Actual Credits 3

Course
- Science, Technology, & Society or Policy (Generic)

Actual Credits 3

Year	Semester	Actual Credits
Year 2	Spring	15

Course
- PSYC2110 - i4:Social Psychology

Actual Credits 3

Course
- PSYC3001 & PSYC3001L: Sensation & Perception and Lab

Actual Credits 4

Course
- Humanities

Actual Credits 3

Course
- BIOL2610 & BIOL2610L: Principles of Biology II and Lab

Actual Credits 4

Course
- Elective (Generic)

Actual Credits 1

Year	Semester	Actual Credits
Year 3	Fall	15

Course
- GEOL1110 & GEOL1110L: Physical Geology and Lab

Actual Credits 4

Course
- PSYC3005 & PSYC3005L: Cognitive Psychology and Lab

Actual Credits 4

Course
- BIOL3031 - Cell Biology

Actual Credits 3

Course
- CSE1115 - Introduction to Data Science (Inactive)

Actual Credits 3

Course
- Elctive (Generic)

Actual Credits 1

Year	Semester	Actual Credits
Year 3	Spring	15

Course
- BIOL3051 & BIOL3051: Anatomy & Physiology and Lab

Actual Credits 4

Course
- Social Science/Humanities/Fine & Creative Arts Requirements

Actual Credits 3

Course
- ENGL3041 - i1:Technical Writing

Actual Credits 3

Course
- PSYC3030 - Clinical Psychology

Actual Credits 3

Course
- Elective (Generic)

Actual Credits 2

Year	Semester	Actual Credits
Year 4	Fall	15

Course
- PSYC3009 & PSYC3009L: Behavioral Neuroscience and Lab

Actual Credits 4

Course
- BIOL3011 & BIOL3011L: Genetics and Lab

Actual Credits 4

Course
- Electives (Generic)

Actual Credits 7

Year	Semester	Actual Credits
Year 4	Spring	15

Course
- PSYC4072 - Senior Seminar

Actual Credits 1

Course
- PSYC3062 & PSYC3062L: Animal Behavior and Lab

Actual Credits 4

Course
- Electives (Generic)

Actual Credits 10

BS-PSY - B.S. in Psychology

[Program Overview]

Program Title
Bachelor of Science in Psychology

Department(s)
CLASS , CLASS Dept/ Psychology (program)

Degree & Program Code
BS-PSY

Program Description
The program in psychology is designed to provide students with a scientific foundation in the methods and basic data in psychology and neuroscience and to prepare students for further work in all specializations within the field. The B.A. degree program allows more flexibility and breadth whereas the B.S. degree program emphasizes depth in quantitative skills. Psychology students acquire the fundamentals of learning and memory, perception, attention, reason and problem solving, emotion, thought, language and communication, the development of all these processes and their pathology. In addition, we apply psychology to other fields and teach techniques for measuring and studying psychological variables. Students conduct laboratory experiments on the psychological and physiological bases of behavior. The department has an invertebrate vivarium for laboratory classes and research. There are student opportunities for independent research.

Program Information & Policies
- *Minimum credit hours required—120*

Students intending to major in psychology should complete PSYC1110 g4:Introduction to Psychology and PSYC2285 g4:Experimental Psychology by the end of their sophomore year. They are advised to complete the biology and mathematics requirements as early as possible since material from these courses will be used in upper-division courses.

Simple Requisites

Program Requirements

BS in Psychology
Type
Completion Requirement

Psychology Courses

Complete ALL of the following Courses:
- PSYC1110 - g4:Introduction to Psychology
- PSYC2285 - g4:Experimental Psychology
  AND PSYC2285L - g4:Experimental Psychology Lab
- PSYC4072 - Senior Seminar

Two Psychology Courses & Labs

Complete at least 2 courses in the following course sets:
- PSYC3001 & PSYC3001L: Sensation & Perception and Lab
- PSYC3005 & PSYC3005L: Cognitive Psychology and Lab
- PSYC3009 & PSYC3009L: Behavioral Neuroscience and Lab
- PSYC3062 & PSYC3062L: Animal Behavior and Lab

Additional Psychology Credits (minimum of 15)

Earn at least 15 credits from the following:
- Psychology Electives

Biology Courses

Complete ALL of the following Course Sets:
- BIOL2110 & BIOL2110L: Principles of Biology I and Lab
- BIOL2610 & BIOL2610L: Principles of Biology II and Lab

Biology Electives

Earn at least 6 credits from the following:
- 3000 & 4000 Level Biology Courses

at least six (6) upper-division credits in Biology, exclusive of BIOL4071 Life Sciences Seminar or BIOL 4081

Math Courses

Complete ALL of the following Courses:
- MATH2350 - Statistical Methods
  OR MATH4083 - Mathematical Statistics

Science Requirement

Earn at least 4 credits
At least four (4) additional credit hours beyond the General Education Core Curriculum and above the Psychology requirements selected from among Biology, Computer Science, Chemistry, Mathematics and Physics

Additional Comments:

General Electives
Type
Completion Requirement

Elective Courses to meet 120 Degree hours

General Electives courses to complete 120 credit hours.

Additional Comments:

Students intending to major in psychology should complete PSYC 1110 and 2285 by the end of their sophomore year. They are advised to complete the biology and mathematics requirements as early as possible since material from these courses will be used in upper-division courses.

Institute General Requirements

General Education Requirements for Bachelor of Science in Psychology
Type
Completion Requirement

Area 1: Communications Requirement for Bachelor of Science

Complete ALL of the following Course Sets:
- Area 1: Communications (BS Degree) (9 credits)

Area 2: Mathematics and Quantitative Reasoning Requirements for

Bachelor of Science

Complete ALL of the following Course Sets:

- Area 2: Mathematics (BS Degree) (8 credits)

Area 3: Science Requirements for a Bachelor of Science

Complete ALL of the following Course Sets:

- Area 3: Science (BS Degree) (18 credits)

Area 4: Social and Behavioral Science Requirements for a Bachelor of Science

Earn at least 6 credits from the following:

- Area 4: Social and Behavioral Science (BS or BGS Degree) (6 credits)

Area 5: Humanities Course Requirements for a Bachelor of Science

Earn at least 6 credits from the following:

- Area 5: Humanities (BS or BGS Degree) (6 credits)

Area 6: Creative & Fine Art Requirement for a Bachelor of Science

Earn at least 3 credits from the following:

- Area 6: Creative and Fine Arts (BS, BA, or BGS Degree) (3 credits)

Area 7: Additional Humanities/Social Science Requirement for a Bachelor of Science

Earn at least 3 credits from the following:

- Area 7: Additional Courses from Areas 4, 5, 6 (BS, BA, or BGS Degree) (3 credits)

Additional Comments:

No Requirement Level

[Learning Outcomes]

Outcome
1. Knowledge base in Psychology

Outcome
2. Scientific inquiry and critical thinking

Outcome
3. Ethical and social responsibility in a diverse world

Outcome
4. Communication

Outcome
5. Professional development

[Sample 4-Year Curriculum Plan(s)]

Degree Map Name
Bachelor of Science in Psychology Sample Curriculum

Total Degree Map Credits
119

Degree Map Effective Catalog Year
2026 -

Year	Semester	Actual Credits
Year 1	Fall	15

Course
- PSYC1110 - g4:Introduction to Psychology

Actual Credits 3

Course
- ENGL1110 - g1:Composition I

Actual Credits 3

Course
- MATH1510 & MATH1510L: g:Calculus I & Lab

Actual Credits 4

Course
- CHEM1215 & CHEM1215L: g:General Chemistry I and Lab

Actual Credits 4

Course
- Elective (Generic)

Actual Credits 1

Year	Semester	Actual Credits
Year 1	Spring	11

Course
- Course Set Not Found

Actual Credits -

Course
- ENGL1120 - g1:Composition II

Actual Credits 3

Course
- MATH1520 - g2:Calculus II

Actual Credits 4

Course
- CHEM1225 & CHEM1225L: g: General Chemistry II and Lab

Actual Credits 4

Year	Semester	Actual Credits
Year 2	Fall	15

Course
- PSYC2310 - g4:Drugs & Behavior

Actual Credits 3

Course
- PSYC3023 - Child & Adolescent Development

Actual Credits 3

Course
- PHYS1310 & PHYS1310L: g:Calculus-Physics I and Lab

Actual Credits 5

Course
- BIOL2110 & BIOL2110L: Principles of Biology I and Lab

Actual Credits 4

Year	Semester	Actual Credits
Year 2	Spring	15

Course
- PSYC2110 - i4:Social Psychology

Actual Credits 3

Course
- MATH2350 - Statistical Methods

Actual Credits 3

Course
- PHYS1320 & PHYS1320L: g:Calculus-Based Physics II and Lab

Actual Credits 5

Course
- BIOL2610 & BIOL2610L: Principles of Biology II and Lab

Actual Credits 4

Year	Semester	Actual Credits
Year 3	Fall	18

Course
- PSYC3001 & PSYC3001L: Sensation & Perception and Lab

Actual Credits 4

Course
- HIST1130 - i5:World History I

Actual Credits 3

Course
- BIOL3031 - Cell Biology

Actual Credits 3

Course
- PHIL1146 - g5:Ethics & Values in STEM

Actual Credits 3

Course
- Electives (Generic)

Actual Credits 5

Year	Semester	Actual Credits
Year 3	Spring	15

Course
- PSYC3005 & PSYC3005L: Cognitive Psychology and Lab

Actual Credits 4

Course
- HIST1140 - i5:World History II

Actual Credits 3

Course
- BIOL3051 & BIOL3051: Anatomy & Physiology and Lab

Actual Credits 4

Course
- ENGL3041 - i1:Technical Writing

Actual Credits 3

Course
- Elective (Generic)

Actual Credits 1

Year	Semester	Actual Credits
Year 4	Fall	15

Course
- PSYC3009 & PSYC3009L: Behavioral Neuroscience and Lab

Actual Credits 4

Course
- PSYC3030 - Clinical Psychology

Actual Credits 3

Course
- BIOL3011 & BIOL3011L: Genetics and Lab

Actual Credits 4

Course
- Electives (Generic)

Actual Credits 4

Year	Semester	Actual Credits
Year 4	Spring	15

Course
- PSYC4072 - Senior Seminar

Actual Credits 1

Course
- PSYC3062 & PSYC3062L: Animal Behavior and Lab

Actual Credits 4

Course
- Electives/ Fine & Creative Arts (Generic)

Actual Credits 10

Courses

PSYC4091 - Directed Study

General

Credit Hrs

Credit Hrs: 0

Credit Hours Max: 6

Credit Hours Operator: TO

Grade Modes
Audit, Pass/Fail, Standard Letter

No Requirements

CLASS Dept/ Technical Communication (program) Department

Bachelor of Science in Technical Communication.

This program is housed within the CLASS department for more information about this department head over to the CLASS department.

Programs

Technical Communication (minor)

[Program Overview]

Program Title
Minor in Technical Communication

Department(s)
CLASS , CLASS Dept/ Technical Communication (program)

Program Description
Minimum of 18 credit hours required to obtain a minor in Technical Communication

Simple Requisites

Program Requirements

Minimum credit hours required—18

Restriction: If a student takes more than one minor in the CLASS Department, only six (6) credit hours of one minor may be applied towards another minor.

Minor in Technical Communication
Type
Completion Requirement

Technical Communication Courses Required

Complete ALL of the following Courses:
- TCOM1130 - i5:Visual Communication & Graphic Design
- TCOM2110 - g5:Technical Editing
- TCOM2120 - g5:Branding and Social Media

Electives in Technical Communication Courses

Earn at least 9 credits from the following:
- Technical Communication Electives

Additional Comments:

Institute General Requirements

See the NMT Institute Requirements.

No Requirement Level

BS-TC - B.S. in Technical Communication

[Program Overview]

Program Title
Bachelor of Science in Technical Communication

Department(s)
CLASS , CLASS Dept/ Technical Communication (program)

Degree & Program Code
BS-TC

Program Description
The Technical Communication curriculum combines courses from three fields of study to prepare students for technical communication positions upon graduation:

Program Information & Policies

- The TCOM courses introduce students to document design, graphics, and computer documentation, created online and for multimedia. The TCOM courses also develop students' writing, speaking, and editing abilities.
- The humanities and social science courses improve students' understanding and appreciation of history, literature, philosophy, psychology, and the arts.
- The science and technology courses provide students a background in one specific science or engineering discipline.

Simple Requisites

Program Requirements
Minimum credit hours required—120

In addition to the General Education and Institute Core Curriculum , the following courses are required:

Course Requirements
Type
Completion Requirement

Technical Communication Course Requirements

Earn at least 35 credits from the following:

- TCOM1110 - Community Service
- TCOM1120 - g:Orientation to Technical Communication
- TCOM1130 - i5:Visual Communication & Graphic Design
- TCOM2110 - g5:Technical Editing
- TCOM2120 - g5:Branding and Social Media
- TCOM3021 - Internship
- TCOM4011 - Persuasive Communication & Grant Writing
- TCOM4020 - Senior Seminar
- TCOM4021 - Documents & Client Project Management
- TCOM4022 - Senior Thesis

and nine credit hours of technical communication electives. MGT 330 is an approved TCOM elective. All technical communication courses must be completed with grade C or better. Students may use these TCOM courses to fulfill Area 5 of the General Education Core Curriculum Requirements with the exception of TCOM 3021, TCOM 4021, and TCOM 4022.

Humanities Course Requirements

12 credit hours in excess of the General Education Core Curriculum Requirements and excluding TCOM courses.

Foreign Language Requirements

Six credit hours of one language

Science or Engineering Requirements

12 credit hours in a single discipline in excess of general degree requirements

Additional Comments:
Electives to complete 120 hours

Institute General Requirements

Here you can find the NMT Institute Requirements .

Bachelor of Science General Education Degree Requirements
Type
Completion Requirement

Area 1: English Requirements for Bachelor of Science

Complete ALL of the following Courses:

- ENGL1110 - g1:Composition I
- ENGL1120 - g1:Composition II
- ENGL3041 - i1:Technical Writing

9 credits in Communications

Area 2: Math Requirements for Bachelor of Science

Complete ALL of the following Courses:

- MATH1510 - g2:Calculus I
  AND MATH1510L - g2:Calculus I Lab
- MATH1520 - g2:Calculus II

8 Credits in Mathematics

Area 3: Science Requirements for a Bachelor of Science

Complete ALL of the following Courses:

- CHEM1215 - g3:General Chemistry I
  AND CHEM1215L - g3:General Chemistry I Lab
- CHEM1225 - g3:General Chemistry II
  AND CHEM1225L - g3:General Chemistry II Lab
- PHYS1310 - g3:Calculus-based Physics I
  AND PHYS1310L - g3:Calculus-based Physics I Lab
- PHYS1320 - g3:Calculus-based Physics II
  AND PHYS1320L - g3:Calculus-based Physics II Lab

18 Credits in Sciences

Area 4: Social Science for a Bachelor of Science

Earn at least 6 credits from the following:

- Area 4: Social and Behavioral Science (BS or BGS Degree) (6 credits)

Area 5: Humanities Course Requirements for a Bachelor of Science

Earn at least 6 credits from the following:

- Area 5: Humanities (BS or BGS Degree) (6 credits)

Area 6: Fine & Creative Art Course Requirement for a Bachelor of Science

Earn at least 3 credits from the following:

- Area 6: Creative and Fine Arts (BS, BA, or BGS Degree) (3 credits)

Area 7: Additional Humanites/Social Science Requirement for a Bachelor of Science

Earn at least 3 credits from the following:

- Area 7: Additional Courses from Areas 4, 5, 6 (BS, BA, or BGS Degree) (3 credits)

Additional Comments:

No Requirement Level

[Learning Outcomes]

Outcome
1. Professionalism within the field of Technical Communication in Written Communication and Editing

Outcome
2. Professionalism within the field of Technical Communication in Visual and Design Communication

Outcome
3. Professionalism within the field of Technical Communication in Oral Presentation

Outcome
4. Ability to conduct original research in Technical Communication (measured through senior thesis, SRS, internship, and other class projects)

Outcome
5. Ability to work collaboratively and understand the way Technical Communication projects are products of negotiated interaction

Outcome
6. Ability to produce multimedia content for different purposes, audiences, and places

[Sample 4-Year Curriculum Plan(s)]

Degree Map Name
Sample Curriculum for the Bachelor of Science in Technical Communication
Total Degree Map Credits
120
Degree Map Effective Catalog Year
2025 -

Year	Semester	Actual Credits
Year 1	Fall	15

Course
- TCOM1120 - g:Orientation to Technical Communication

Actual Credits 1

Course
- ENGL1110 - g1:Composition I

Actual Credits 3

Course
- MATH1510 & MATH1510L: g:Calculus I & Lab

Actual Credits 4

Course
- TCOM1130 - i5:Visual Communication & Graphic Design

Actual Credits 3

Course
- Foreign Language

Actual Credits 3

Course
- Elective (Generic)

Actual Credits 1

Year	Semester	Actual Credits
Year 1	Spring	15

Course
- ENGL1120 - g1:Composition II

Actual Credits 3

Course
- MATH1520 - g2:Calculus II

Actual Credits 4

Course
- TCOM1110 - Community Service

Actual Credits 1

Course
- Foreign Language

Actual Credits 3

Course
- Elective (Generic)

Actual Credits 4

Year	Semester	Actual Credits
Year 2	Fall	15

Course
- TCOM2110 - g5:Technical Editing

Actual Credits 3

Course
- CHEM1215 & CHEM1215L: g:General Chemistry I and Lab

Actual Credits 4

Course
- Area 5: Humanities (BS or BGS Degree) (6 credits)

Actual Credits 3

Course
- Area 4: Social and Behavioral Science (BS or BGS Degree) (6 credits)

Actual Credits 3

Course
- Elective (Generic)

Actual Credits 2

Year	Semester	Actual Credits
Year 2	Spring	16

Course
- TCOM2120 - g5:Branding and Social Media

Actual Credits 3

Course
- CHEM1225 & CHEM1225L: g: General Chemistry II and Lab

Actual Credits 4

Course
- Area 5: Humanities (BS or BGS Degree) (6 credits)

Actual Credits 3

Course
- Area 4: Social and Behavioral Science (BS or BGS Degree) (6 credits)

Actual Credits 3

Course
- TC: Science or Engineering Electives

Actual Credits 3

Year	Semester	Actual Credits
Year 3	Fall	15

Course
- PHYS1310 & PHYS1310L: g:Calculus-Physics I and Lab

Actual Credits 5

Course
- TCOM4011 - Persuasive Communication & Grant Writing

Actual Credits 3

Course
- Technical Communication Electives

Actual Credits 3

Course
- TC: Science or Engineering Electives

Actual Credits 3

Course
- Elective (Generic)

Actual Credits 1

Year	Semester	Actual Credits
Year 3	Spring	15

Course
- ENGL3041 - i1:Technical Writing

Actual Credits 3

Course
- Technical Communication Electives

Actual Credits 3

Course
- PHYS1320 & PHYS1320L: g:Calculus-Based Physics II and Lab

Actual Credits 5

Course
- TC: Science or Engineering Electives

Actual Credits 3

Course
- Elective (Generic)

Actual Credits 1

Year	Semester	Actual Credits
Year 4	Fall	15

Course
- TCOM3021 - Internship

Actual Credits 3

Course
- TCOM4020 - Senior Seminar

Actual Credits 3

Course
- Technical Communication Electives

Actual Credits 3

Course
- Area 6: Creative and Fine Arts (BS, BA, or BGS Degree) (3 credits)

Actual Credits 3

Course
- TC: Science or Engineering Electives

Actual Credits 3

Year	Semester	Actual Credits
Year 4	Spring	14

Course
- Humanities Electives (TC Degree)

Actual Credits 3

Course
- TCOM4022 - Senior Thesis

Actual Credits 3

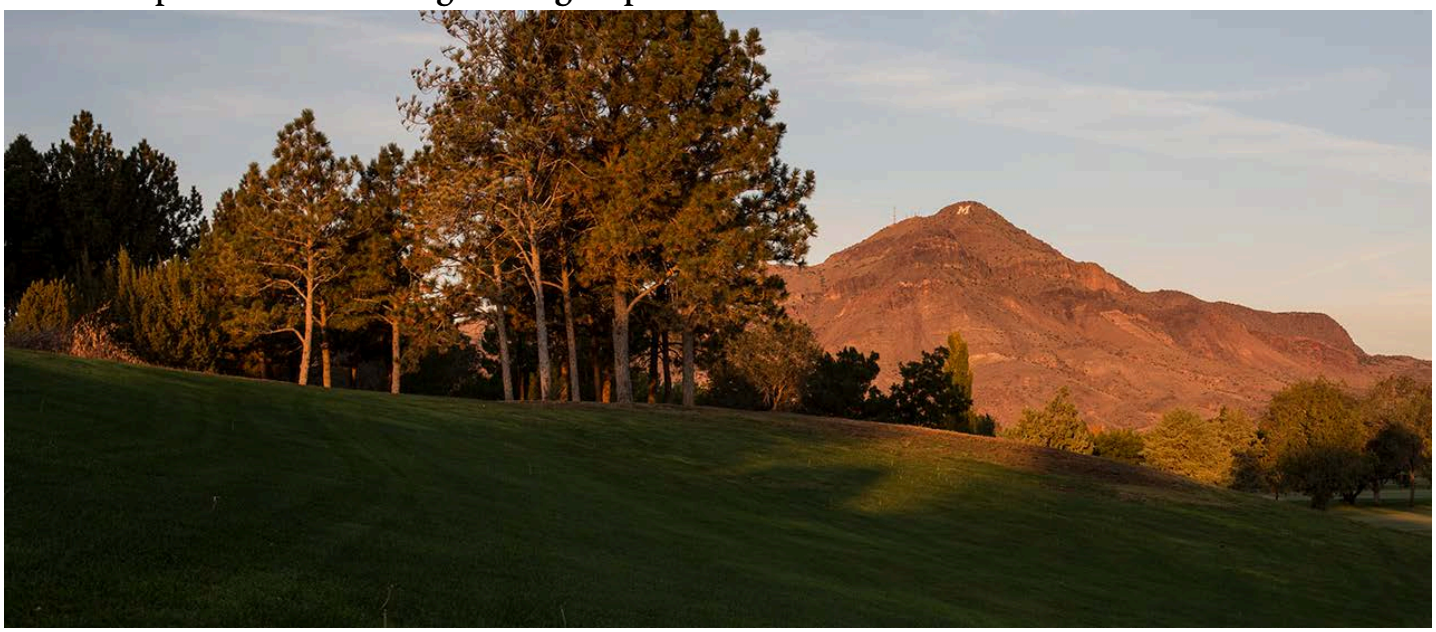
Course
- TCOM4021 - Documents & Client Project Management

Actual Credits 3

Course
- Elective (Generic)

Actual Credits 5

CSE Computer Science & Engineering Department



CONTACT US		
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State & Zip: NM 87801		
Phone: 575-835-5126		
Website: **https://www.nmt.edu/academics/compsci/**		

- **Professors:** Jeffery (Chair of Department), Liebrock, Mazumdar, Shin, Soliman, Zheng
- **Associate Professors:** Ramyaa
- **Assistant Teaching Professor:** Knowles

Degrees Offered: *B.S., M.S., and Ph.D. in Computer Science*

The Department of Computer Science and Engineering is focused on an exciting and rapidly growing body of knowledge with constantly changing emphasis.

The curriculum of the department includes courses in both theory and application. It prepares students to apply the principles of logic and mathematics to the design and construction of hardware and software systems using current engineering paradigms and also exposes them to major applications of computing.

The Bachelor of Science in Computer Science program is accredited by the Computing Accreditation Commission of ABET, https://www.abet.org. The program emphasizes fundamental principles while striking a careful balance between the applications of computer technology and the theory of computing. In addition to the required fundamental computer science courses, students must also take technical electives to broaden their knowledge in major computer science application areas. Graduates of this program will be well prepared for both industry employment and graduate study.

Our graduate programs provide students the opportunity to take courses, select advisory committee members, and pursue research in an area of interest to a faculty supervisor. The Master of Science in Computer Science program is designed for students who wish to further broaden or deepen their knowledge of computer science and applications. Master's students usually participate in faculty research projects to complete their thesis or (non-thesis) independent study report.

New Mexico Tech's Department of Computer Science and Engineering also offers a Ph.D. in Computer Science program. The Ph.D. program is appropriate for students with motivation for research and either a superior track record in coursework or substantial experience in industrial research and development.

The department has been certified, since 2002, by the National Security Agency and the Department of Homeland Security as a National Center of Academic Excellence in Information Assurance Education. Since 2009, the department has also been certified as a National Center of Academic Excellence in Information Assurance Research.

The department has its own network of computers and servers plus a variety of other equipment in several laboratories. The Tech Computer Center supports a larger network that is also available to the department. Computing equipment at the research labs associated with Tech includes both symmetric multiprocessors, GPU compute servers and special purpose massively parallel computers. The department also has access to massively parallel machines at national laboratories and supercomputing centers.

Mission

Our mission is to produce computer science graduates who, trained in the design, implementation, and analysis of computational systems and skilled in technical communication, will contribute towards the advancement of computing science and technology.

Program Educational Objectives

Within a few years of graduating with a B.S. degree in Computer Science, our students should be able to demonstrate that they have:

1. the ability to design, implement, and analyze computational systems;
2. the capability to tackle complex computer science related problems in the real world;
3. contributed towards the advancement of computing science and technology;
4. the capacity to work effectively with peers in computational tasks; and
5. cognizance of ethical, social, and legal issues pertaining to computer science.

Student Outcomes

By the time of their graduation, the undergraduate academic program in Computer Science should enable our graduates to:

1. analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions;
2. design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline;
3. effectively in a variety of professional contexts;
4. professional responsibilities and make informed judgments in computing practice based on legal and ethical principles;
5. effectively as a member or leader of a team engaged in activities appropriate to the program's discipline; and
6. computer science theory and software development fundamentals to produce computing-based solutions.

Programs

Accelerated M.S. in Computer Science (pathway)

[Program Overview]

Program Title
Accelerated Master's Degree in Computer Science

Department(s)
CSE Computer Science & Engineering

Program Description
Computer Science Accelerated M.S. Option

Students who want to obtain both the B.S. in Computer Science and M.S. in Computer Science degrees may pursue an Accelerated M.S. Degree option. Students must apply by mid-semester of their second semester in their junior year in Computer Science to be admitted for their senior year. Accepted students may apply nine credits of CSE courses numbered above 5000 to both degrees.

Data Science (minor)

[Program Overview]

Program Title
Interdisciplinary Data Science Minor

Department(s)
CSE Computer Science & Engineering, Mathematics

Program Description
CS/Math Interdisciplinary Data Science Minor

Program Information & Policies
This minor is offered jointly by computer science and mathematics.

Minimum credit hours required: 20

Simple Requisites

Program Requirements

The following courses are required
Type
Completion Requirement

Required courses

Complete ALL of the following Courses:

- CSCI1210 - Programming Fundamentals
- CSCI1220 - Programming Fund Python
- CSE3007 - Python for Data Science
- CSE4011 - Data Science
- MATH2420 - Applied Linear Algebra
- MATH3082 - Probability and Statistics
  AND MATH3082L - Probability and Statistics Lab

Select one course in

Complete at least 1 of the following courses:

- CSE4065 - Neural Networks
- CSE4066 - Machine Learning
- MATH4041 - Statistical Machine Learning

Additional Comments:

Institute General Requirements

See the Institute **General Education Core Requirements.**

No Requirement Level

M.S. in Computer Science

[Program Overview]

Program Title
Master of Science in Computer Science

Department(s)
CSE Computer Science & Engineering

Program Description
Students may earn a Master of Science degree in Computer Science or a Master of Science degree in Computer Science with Specialization in Information Technology through cooperation with the Information Technology faculty.

Program Information & Policies
Master of Science Degree in Computer Science

The M.S. program in Computer Science is based on course work as well as research (either thesis or independent study option). The student must meet the general requirements of the Graduate Program. In addition, the student must fulfill the following requirements, depending on the research option:

Without Thesis:

- Course work approved by the student's advisory committee fulfilling the general requirements of 30 credit hours for the master's degree must include
- CSE 5090 (Independent Study): 3 credit hours;
- CSE 5085 (Graduate Seminar): 3 credit hours;
- One course on theoretical aspects of computer science: either CSE 5044 or CSE 5046
- One course involving substantial programming on systems aspects: either CSE 4023 (not an option if already taken) or CSE 5025
- 9 credit hours from computer science courses numbered higher than 5000.

With Thesis:

Course work approved by the student's advisory committee fulfilling the general requirements of 30 credit hours for the master's degree must include

- CSE 5091 (Thesis): 6 credit hours;
- CSE 5085 (Graduate Seminar): 3 credit hours;
- One course on theoretical aspects of computer science: either CSE 5044 or CSE 5046

- One course on systems aspects involving substantial programming: either CSE 4023 (not an option if already taken) or CSE 5025
- 9 credit hours from computer science courses numbered higher than 5000.

[Learning Outcomes]

Outcome
1. Advanced knowledge of computer science in the areas of theoretical computer science, programming languages, and systems

Outcome
2. The ability to communicate computing concepts through written reports

Outcome
3. The ability to communicate computing concepts through oral presentations

Outcome
4. The ability to conduct research on a theoretical or applied problem in computer science

Computer Engineering (minor)

[Program Overview]

Program Title
Minor in Computer Engineering

Department(s)
CSE Computer Science & Engineering

Simple Requisites

Program Requirements

Minimum credit hours required: 25
Type
Completion Requirement

The following courses are required:

Complete ALL of the following Courses:
- CSCI1210 - Programming Fundamentals
- CSCI2220 - Data Structures & Algorithms
- CSCI2230 - Assembly Lang & Mach Org
- CSCI2240 - Systems Programming
- EE211 - Circuits & Signals I
- EE252 - Digital Electronics
- EE3051 - Microcontrollers

Any one out of the following

Complete at least 1 of the following courses:
- CSE3025 - Principles of Operating Systems
- CSE3026 - Software Engineering
- CSE3031 - Computer Architecture
- CSE3053 - Introduction to Computer Networks

along with their respective pre-requisites

Additional Comments:

Institute General Requirements

See the **Institute General Education Requirements.**

No Requirement Level

BS-CS - B.S. in Computer Science

[Program Overview]

Program Title
Bachelor of Science in Computer Science

Department(s)
CSE Computer Science & Engineering

Degree & Program Code
BS-CS

Program Description
The Bachelor of Science in Computer Science program is accredited by the Computing Accreditation Commission of ABET, https://www.abet.org. The program emphasizes fundamental principles while striking a careful balance between the applications of computer technology and the theory of computing. In addition to the required fundamental computer science courses, students must also take technical electives to broaden their knowledge in major computer science application areas. Graduates of this program will be well prepared for both industry employment and graduate study.

Simple Requisites

Program Requirements
Minimum credit hours required—123

In addition to the General Education and Institute Core Curriculum, the following courses are required:

Program Major Requirements
Type
Completion Requirement

Course Requirements

Complete ALL of the following Courses:
- CSCI1001 - Intro Comp Sci & Info Tech
- CSCI1210 - Programming Fundamentals
- CSCI2210 - Object Oriented Programming
- CSCI2220 - Data Structures & Algorithms
- CSCI2230 - Assembly Lang & Mach Org
- CSCI2240 - Systems Programming
- CSCI2310 - Discrete Mathematics for CS
- CSE3024 - Principles of Programming Languages
- CSE3025 - Principles of Operating Systems
- CSE3026 - Software Engineering
- CSE3031 - Computer Architecture
- CSE3042 - Formal Languages & Automata
- CSE3044 - Design & Analysis of Algorithm

- CSE3053 - Introduction to Computer Networks
- CSE3063 - Computer Security
- CSE3082 - Ethical and Social Issues in Computing and Information Technologies
- CSE4023 - Compiler Writing
- MATH3052 - Basic Concepts of Mathematics
- MATH3082 - Probability and Statistics
- MATH3082L - Probability and Statistics Lab

Additional Comments:

Technical Electives
Type
Completion Requirement

Technical Electives

A sequence of 12 hours of CSE courses numbered 300 or higher, pre-approved by the student's advisor and the CSE Department, with no more than one course numbered CSE 485. Students are encouraged to select a coherent set of courses as technical electives that will prepare them for a specific focus in their career;

Earn at least 12 credits from the following:

- CSE3020 - Video Game Design
- CSE3021 - Internet and Web Programming
- CSE3028 - Secure Software Construction
- CSE3051 - Modeling & Simulation Techniques for Information Systems
- CSE3073 - Intro to Database Systems
- CSE3089 - Pilot Course
- CSE3091 - 300-Level Directed Study
- CSE4011 - Data Science
- CSE4041 - Cryptography and Applications
- CSE4051 - Intro to Parallel Processing
- CSE4052 - Introduction Sensor Networks
- CSE4053 - Advances in Computer Networks & Internet
- CSE4054 - Computer Graphics
- CSE4063 - Information Assurance
- CSE4064 - Intro to Soft Computing
- CSE4065 - Neural Networks
- CSE4066 - Machine Learning
- CSE4076 - Visualization
- CSE4085 - Undergrad Seminar on Special Topics
- CSE4089 - Special Topics in CSE
- CSE4093 - Undergraduate Thesis
- CSE4094 - Undergraduate Thesis

General Electives to complete 123 credit hours.

All the courses listed above must be taken for a letter grade;

Additional Comments:

Institute General Requirements

General Education Core Requirements
Type
Completion Requirement

General Education Requirements

Area 1: Communication

Complete ALL of the following Course Sets:

- Area 1: Communications (BS Degree) (9 credits)

Area 2: Mathematics

Complete ALL of the following Course Sets:

- Area 2: Mathematics (BS Degree) (8 credits)

Area 3 Science

Complete ALL of the following Course Sets:

- Area 3: Science (BS Degree) (18 credits)

Area 4: Social and Behavioral Science

Earn at least 6 credits from the following:

- Area 4: Social and Behavioral Science (BS or BGS Degree) (6 credits)

Area 5 Humanities

Earn at least 6 credits from the following:

- Area 5: Humanities (BS or BGS Degree) (6 credits)

Area 6: Creative and Find Arts

Earn at least 3 credits from the following:

- Area 6: Creative and Fine Arts (BS, BA, or BGS Degree) (3 credits)

Area 7: Additional Courses from Areas 4, 5, 6

Earn at least 3 credits from the following:

- Area 7: Additional Courses from Areas 4, 5, 6 (BS, BA, or BGS Degree) (3 credits)

Additional Comments:

No Requirement Level

[Learning Outcomes]

Outcome
Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions

Outcome
Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline

Outcome
Communicate effectively in a variety of professional contexts

Outcome
Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles

Outcome
Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline

Outcome
Apply computer science theory and software development fundamentals to produce computing-based solutions

[Sample 4-Year Curriculum Plan(s)]

Degree Map Name
Sample Curriculum 1 for the Bachelor of Science in Computer Science program
Total Degree Map Credits
123 - 124
Degree Map Effective Catalog Year
2026 -

Year	Semester	Actual Credits
Year 1	Fall	15

Course
- MATH1510 - g2:Calculus I

Actual Credits 4

Course
- CSCI1001 - Intro Comp Sci & Info Tech

Actual Credits 2

Course
- CSCI1210 & CSCI1210L: Programming Fundamentals and Lab

Actual Credits 4

Course
- PHYS1310 & PHYS1310L: g:Calculus-Physics I and Lab

Actual Credits 5

Year	Semester	Actual Credits
Year 1	Spring	15

Course
- MATH1520 - g2:Calculus II

Actual Credits 4

Course
- CSCI2220 - Data Structures & Algorithms

Actual Credits 3

Course
- PHYS1320 & PHYS1320L: g:Calculus-Based Physics II and Lab

Actual Credits 5

Course
- ENGL1110 - g1:Composition I

Actual Credits 3

Year	Semester	Actual Credits
Year 2	Fall	16

Course
- CSCI2230 - Assembly Lang & Mach Org

Actual Credits 3

Course
- CSCI2310 - Discrete Mathematics for CS

Actual Credits 3

Course
- CHEM1215 & CHEM1215L: g:General Chemistry I and Lab

Actual Credits 4

Course
- ENGL1120 - g1:Composition II

Actual Credits 3

Course
- Area 5 (Humanities) (Course Attributes)

Actual Credits 3

Year	Semester	Actual Credits
Year 2	Spring	17

Course
- CSCI2210 - Object Oriented Programming

Actual Credits 3

Course
- CSCI2240 - Systems Programming

Actual Credits 3

Course
- MATH3082 & MATH3082L: Probability & Statistics and Lab

Actual Credits 4

Course
- CHEM1225 & CHEM1225L: g: General Chemistry II and Lab

Actual Credits 4

Course
- MATH3052 - Basic Concepts of Mathematics

Actual Credits 3

Year	Semester	Actual Credits
Year 3	Fall	14 - 15

Course
- CSE3025 & CSE3025L: Principals of Operating Systems and Lab

Actual Credits 4

Course
- CSE3044 & CSE3044L: Design & Analysis of Algorithms and Lab

Actual Credits 4 - 5

Course
- CSE3053 - Introduction to Computer Networks

Actual Credits 3

Course
- ENGL3041 - i1:Technical Writing

Actual Credits 3

Year	Semester	Actual Credits
Year 3	Spring	15

Course
- CSE3026 - Software Engineering

Actual Credits 3

Course
- CSE3042 - Formal Languages & Automata

Actual Credits 3

Course
- CSE3024 - Principles of Programming Languages

Actual Credits 3

Course
- CSE3063 - Computer Security

Actual Credits 3

Course
- Technical Electives (Generic)

Actual Credits 3

Year	Semester	Actual Credits
Year 4	Fall	15

Course
- Area 6 (Creative Arts) (Course Attributes)

Actual Credits 3

Course
- Area 5 (Humanities) (Course Attributes)

Actual Credits 3

Course
- Technical Electives (Generic)

Actual Credits 3

Course
- Technical Elective (Generic)

Actual Credits 3

Course
- Area 4 (Social Sciences) (Course Attributes)

Actual Credits 3

Year	Semester	Actual Credits
Year 4	Spring	16

Course
- CSE4023 - Compiler Writing

Actual Credits 4

Course
- CSE3031 - Computer Architecture

Actual Credits 3

Course
- CSE3082 - Ethical and Social Issues in Computing and Information Technologies

Actual Credits 3

Course
-

Actual Credits 3

Course
- Technical Elective (Generic)

Actual Credits 3

Degree Map Name
Sample Curriculum 2 for the Bachelor of Science in Computer Science program
Total Degree Map Credits
123 - 124
Degree Map Effective Catalog Year
2026 -

Year	Semester	Actual Credits
Year 1	Spring	15

Course
- MATH1510 - g2:Calculus I

Actual Credits 4

Course
- CSCI1210 & CSCI1210L: Programming Fundamentals and Lab

Actual Credits 4

Course
- ENGL1110 - g1:Composition I

Actual Credits 3

Course
- CHEM1225 & CHEM1225L: g: General Chemistry II and Lab

Actual Credits 4

Year	Semester	Actual Credits
Year 1	Fall	16

Course
- MATH1520 - g2:Calculus II

Actual Credits 4

Course
- CSCI1001 - Intro Comp Sci & Info Tech

Actual Credits 2

Course
- CSCI2220 - Data Structures & Algorithms

Actual Credits 3

Course
- CHEM1225 & CHEM1225L: g: General Chemistry II and Lab

Actual Credits 4

Course
- ENGL1120 - g1:Composition II

Actual Credits 3

Year	Semester	Actual Credits
Year 2	Spring	17

Course
- CSCI2210 - Object Oriented Programming

Actual Credits 3

Course
- CSCI2240 - Systems Programming

Actual Credits 3

Course
- CSE3024 - Principles of Programming Languages

Actual Credits 3

Course
- PHYS1310 & PHYS1310L: g:Calculus-Physics I and Lab

Actual Credits 5

Course
- Area 4 (Social Sciences) (Course Attributes)

Actual Credits 3

Year	Semester	Actual Credits
Year 2	Fall	17

Course
- CSCI2230 - Assembly Lang & Mach Org

Actual Credits 3

Course
- CSCI2310 - Discrete Mathematics for CS

Actual Credits 3

Course
- CSE3053 - Introduction to Computer Networks

Actual Credits 3

Course
- PHYS1320 & PHYS1320L: g:Calculus-Based Physics II and Lab

Actual Credits 5

Course
- Area 5 (Humanities) (Course Attributes)

Actual Credits 3

Year	Semester	Actual Credits
Year 3	Spring	16

Course
- CSE3026 - Software Engineering

Actual Credits 3

Course
- ENGL3041 - i1:Technical Writing

Actual Credits 3

Course
- CSE3042 - Formal Languages & Automata

Actual Credits 3

Course
- MATH3082 & MATH3082L: Probability & Statistics and Lab

Actual Credits 4

Course
- MATH3052 - Basic Concepts of Mathematics

Actual Credits 3

Year	Semester	Actual Credits
Year 3	Fall	14 - 15

Course
- CSE3025 & CSE3025L: Principals of Operating Systems and Lab

Actual Credits 4

Course
- CSE3044 & CSE3044L: Design & Analysis of Algorithms and Lab

Actual Credits 4 - 5

Course
- Technical Elective (Generic)

Actual Credits 3

Course
- Area 5 (Humanities) (Course Attributes)

Actual Credits 3

Year	Semester	Actual Credits
Year 4	Spring	16

Course
- CSE4023 - Compiler Writing

Actual Credits 4

Course
- CSE3031 - Computer Architecture

Actual Credits 3

Course
- CSE3063 - Computer Security

Actual Credits 3

Course
- CSE3082 - Ethical and Social Issues in Computing and Information Technologies

Actual Credits 3

Course
- Technical Elective (Generic)

Actual Credits 3

Year	Semester	Actual Credits
Year 4	Fall	12

Course
- Technical Elective (Generic)

Actual Credits 3

Course
- Technical Elective (Generic)

Actual Credits 3

Course
-

Actual Credits 3

Course
- Area 6 (Creative Arts) (Course Attributes)

Actual Credits 3

BS-IT - B.S. in Information Technology

[Program Overview]

Program Title
Bachelor of Science in Information Technology

Department(s)
CSE Computer Science & Engineering, CSE Dept/ Information Technology (program)

Degree & Program Code
BS-IT

Program Description
The Bachelor of Science in Information Technology program at New Mexico Tech is administered jointly by the Computer Science and Business Management faculty in the Computer Science and Engineering department. The curriculum includes relevant computer science, management, and engineering courses and emphasizes secure information systems and information assurance that are among the areas of research at Tech's Institute for Complex Additive Systems Analysis (ICASA) where IT students may find employment or internship opportunities. Students must also take a sequence of 6 hours of technical electives to broaden or deepen their knowledge in an IT area of their interest.

Simple Requisites

Program Requirements
Minimum credit hours required—120

In addition to the General Education and Institute Core Curriculum, the following courses are required:

Course Requirements
Type
Completion Requirement

Information Technology Course Requirements

Complete ALL of the following Courses:

- CSCI1001 - Intro Comp Sci & Info Tech
- CSCI1210 - Programming Fundamentals
- CSCI2220 - Data Structures & Algorithms
- CSCI2210 - Object Oriented Programming
- CSCI2230 - Assembly Lang & Mach Org
- CSCI2310 - Discrete Mathematics for CS
- CSCI2240 - Systems Programming
- IT3021 - Internet & Web Programming
- IT3026 - Software Engineering
- IT3030 - Management & Organizational Behavior
- IT3053 - Introduct to Computer Networks
- IT3063 - Computer Security
- IT3073 - Intro to Database Systems
- IT3082 - Ethics of Computing and IT
- IT4062 - Systems, Risk, & Decision Analysis
- IT4066 - Project Management
- IT4081 - Senior IT Design Project
- IT4082 - Senior IT Design Project

Managements Course Requirements

Complete ALL of the following Courses:

- MGMT4072 - Production & Operations Management

Math Requirements

Complete ALL of the following Courses:

- MATH2350 - Statistical Methods

Psychology Requirements

Complete ALL of the following Courses:

- PSYC1110 - g4:Introduction to Psychology

(can be applied as a social science course in the general education core curriculum)

Additional Comments:
Technical Electives: a sequence of 6 hours of computer science, information technology, or management courses numbered 3000 or higher, *pre-approved* by the student's advisor and an IT Program Coordinator, with no more than one course numbered IT4085. Students are encouraged to select a coherent set of courses as technical electives that will prepare them for a specific focus in their career, for instance, IT4041 & IT4063 for cybersecurity focus and MGMT3035 & MGMT4007 for management focus.

Institute General Requirements

Bachelor of Science General Education Requirements (53 credits)
Type
Completion Requirement

Area 1: English Requirements for Bachelor of Science

Complete ALL of the following Course Sets:

- Area 1: Communications (BS Degree) (9 credits)

Area 2: Math Requirements for Bachelor of Science

Complete ALL of the following Course Sets:

- Area 2: Mathematics (BS Degree) (8 credits)

Area 3: Science Requirements for a Bachelor of Science

Complete ALL of the following Course Sets:

- Area 3: Science (BS Degree) (18 credits)

Area 4: Social Science Requirements for a Bachelor of Science (6 credits)

Earn at least 6 credits from the following:

- Area 4: Social and Behavioral Science (BS or BGS Degree) (6 credits)

Area 5: Humanities Course Requirements for a Bachelor of Science (6 credits)

Earn at least 6 credits from the following:

- Area 4: Social and Behavioral Science (BS or BGS Degree) (6 credits)

Area 6: Fine & Creative Art Course Requirement for a Bachelor of Science (3 credits)

Complete ALL of the following Course Sets:

- Area 6: Creative and Fine Arts (BS, BA, or BGS Degree) (3 credits)

Area 7: Additional Humanities/Social Science Requirement for a Bachelor of Science (3 credits)

Earn at least 3 credits from the following:

- Area 7: Additional Courses from Areas 4, 5, 6 (BS, BA, or BGS Degree) (3 credits)

Additional Comments:

No Requirement Level

[Learning Outcomes]

Outcome
1. The ability to design, implement, test, and configure software programs

Outcome
2. The ability to analyze information technology requirements, assess risk, optimize resources, monitor and evaluate progress, and manage project budgets

Outcome
3. Knowledge of the fundamental principles of information processing and decision, networking, security, and database

Outcome
4. Exposure to one or more information technology areas

Outcome
5. Technical communication skills in written and oral forms

Outcome
6. The capacity to work as part of a team

Outcome
7. Awareness of the ethical and societal impact of developments in the field of information technology

Outcome
8. The ability to develop a business case for an organizational decision to pursue an IT project

[Sample 4-Year Curriculum Plan(s)]

Degree Map Name
Sample Curriculum for the Bachelor of Science Degree in Information Technology
Total Degree Map Credits
119
Degree Map Effective Catalog Year
2026 -

Year	Semester	Actual Credits
Year 1	Fall	17

Course
- MATH1510 - g2:Calculus I

Actual Credits 4

Course
- CSCI1001 - Intro Comp Sci & Info Tech

Actual Credits 2

Course
- CSCI1210 & CSCI1210L: Programming Fundamentals and Lab

Actual Credits 4

Course
- CHEM1215 & CHEM1215L: g:General Chemistry I and Lab

Actual Credits 4

Course
- ENGL1110 - g1:Composition I

Actual Credits 3

Year	Semester	Actual Credits
Year 1	Spring	14

Course
- MATH1520 - g2:Calculus II

Actual Credits 4

Course
- CSCI2220 - Data Structures & Algorithms

Actual Credits 3

Course
- CHEM1225 & CHEM1225L: g: General Chemistry II and Lab

Actual Credits 4

Course
- ENGL1120 - g1:Composition II

Actual Credits 3

Year	Semester	Actual Credits
Year 2	Fall	14

Course
- CSCI2230 - Assembly Lang & Mach Org

Actual Credits 3

Course
- CSCI2310 - Discrete Mathematics for CS

Actual Credits 3

Course
- PHYS1310 & PHYS1310L: g:Calculus-Physics I and Lab

Actual Credits 5

Course
- PSYC1110 - g4:Introduction to Psychology

Actual Credits 3

Year	Semester	Actual Credits
Year 2	Spring	17

Course
- CSCI2240 - Systems Programming

Actual Credits 3

Course
- CSCI2210 - Object Oriented Programming

Actual Credits 3

Course
- MATH2350 - Statistical Methods

Actual Credits 3

Course
- Humanities

Actual Credits 3

Course
- PHYS1320 & PHYS1320L: g:Calculus-Based Physics II and Lab

Actual Credits 5

Year	Semester	Actual Credits
Year 3	Fall	15

Course
- IT3021 - Internet & Web Programming

Actual Credits 3

Course
- IT3030 - Management & Organizational Behavior

Actual Credits 3

Course
- IT3053 - Introduct to Computer Networks

Actual Credits 3

Course
- IT3073 - Intro to Database Systems

Actual Credits 3

Course
- ENGL3041 - i1:Technical Writing

Actual Credits 3

Year	Semester	Actual Credits
Year 3	Spring	12

Course
- IT3026 - Software Engineering

Actual Credits 3

Course
- Technical Electives

Actual Credits 3

Course
- IT4062 - Systems, Risk, & Decision Analysis

Actual Credits 3

Course
- Social Sciences

Actual Credits 3

Year	Semester	Actual Credits
Year 4	Fall	15

Course
- IT3082 - Ethics of Computing and IT

Actual Credits 3

Course
- IT4081 - Senior IT Design Project

Actual Credits 3

Course
- IT3063 - Computer Security

Actual Credits 3

Course
- MGMT4072 - Production & Operations Management

Actual Credits 3

Course
- Humanities

Actual Credits 3

Year	Semester	Actual Credits
Year 4	Spring	15

Course
- Technical Electives

Actual Credits 3

Course
- IT4066 - Project Management

Actual Credits 3

Course
- IT4082 - Senior IT Design Project

Actual Credits 3

Course
- Area 6: Creative and Fine Arts (BS, BA, or BGS Degree) (3 credits)

Actual Credits 3

Course
- Humanities/Social Science

Actual Credits 3

CS - Computer Science (minor)

[Program Overview]

Program Title
Minor in Computer Science

Department(s)
CSE Computer Science & Engineering

Degree & Program Code
CS

Simple Requisites

Program Requirements
Minimum credit hours required: 28

The following courses are required
Type
Completion Requirement

Required courses

Complete ALL of the following Courses:
- CSCI1210 - Programming Fundamentals
- CSCI2220 - Data Structures & Algorithms

along with their respective pre-requisites

Four courses required

Complete at least 4 of the following courses:
- CSE3024 - Principles of Programming Languages
- CSE3025 - Principles of Operating Systems
- CSE3026 - Software Engineering
- CSE3042 - Formal Languages & Automata
- CSE3044 - Design & Analysis of Algorithm
- CSE3053 - Introduction to Computer Networks

Additional Comments:
along with their respective pre-requisites.

Institute General Requirements

See the **Institute General Education Core Requirements**.

No Requirement Level

PHD-COMP. SC - Ph.D. in Computer Science

[Program Overview]

Program Title
Doctor of Philosophy in Computer Science

Department(s)
CSE Computer Science & Engineering

Degree & Program Code
PHD-COMP. SC

Program Description
Students of exceptional ability as demonstrated in previous coursework are encouraged to pursue a doctor of philosophy degree; individuals with substantial experience in industrial research and development may also apply to the doctoral program. The current research programs of the department include artificial intelligence, machine learning, big data and cloud computing, computer security, privacy, computer networking, sensor networks, parallel computation, distributed computing, mobile computing, software engineering, databases, knowledge-based systems, visualization, computational theory, and computer science education. The department also encourages interdisciplinary work with other departments and divisions at Tech and in cooperation with researchers at Los Alamos and Sandia national laboratories.

Program Information & Policies
As computer science and engineering is a diverse and rapidly changing discipline, the program of study of a PhD student will depend on the area of specialization and on prior experience and education. All PhD students will be required to demonstrate master's-level knowledge of the core areas of computer science, as well as a thorough understanding of the intended area of specialization. The core areas include programming languages, algorithms, systems, and computational theory. In addition, all PhD students are required to take three credit hours of CSE 5085 (Graduate Seminar). The specific course requirements are determined with the consultation and approval of the student's advisory committee and the chair of the department.

Simple Requisites

Program Requirements
To earn a PhD degree, students must complete at least 60 post-baccalaureate credit hours. This includes at least 24 credit hours of dissertation research and at least 9 credit hours of coursework including CSE 5085.

Before the degree is approved and granted, at least one paper on the subject matter from the dissertation must be accepted for publication to a reputable journal or conference proceedings acceptable to the doctoral committee of the student.

Coursework Requirements Before Candidacy Exam
Type
Completion Requirement

Coursework Required Before Candidacy Exam

In order for CS PhD students to proceed to their candidacy exam, they must complete the following:

- CSE 5085 (Graduate Seminar, 3 credit hours): Students must take this and pass it with a grade of "B" or higher, unless taken before at NMT. It is recommended that they should take this in their first semester as a Ph.D. student.
- Complete at least three courses from the CS core areas (9 credit hours):

Earn at least 9 credits from the following:
- CSE5044 - Advanced Algorithms
- CSE5025 - Advanced Operating Systems
  OR CSE5053 - Advanced Computer Networks
- CSE5046 - Theory of Computation
  OR CSE5028 - Formal Methods of Software Development

For each of these three courses, either :
- Take the class and pass it with a grade of "B" or higher

or

- Pass the corresponding Competency Exam. Competency Exams are to be offered yearly, typically one week before the start of the semester when the corresponding course is offered.

For Students with MS in CS or closely related area

Complete the required minimum credit hours as follows:

- 6 credit hours of CSE graduate courses.

For student without MS in CS or closely related area

Complete the required minimum credit hours as follows:

- 21 credit hours, detailed as follows:
  - 15 credit hours of CSE graduate courses
  - 6 credit hours of 300-level or higher courses (CSE or related/needed areas)

All students who are financially supported by the department must finish the above requirements within their first four semesters (from the time of joining the PhD program); otherwise, their financial support is subject to termination without further notice.

Additional Comments:

Candidacy Exam
Type
Completion Requirement

Candidacy Exam Requirements

In order to advance to PhD candidacy, the student must pass a candidacy examination (PhD proposal defense) in his/her specific area of specialization. The student's advisory committee will conduct the proposal defense.

Additional Comments:

Dissertation
Type
Completion Requirement

Dissertation Requirements

The doctoral dissertation demonstrates the candidate's capacity for independent research. The student may register for dissertation hours only after successfully completing the candidacy exam. A minimum of 24 credit hours must be devoted to the dissertation. The student is encouraged to explore the various current research projects in his or her field of interest before choosing a dissertation subject. The dissertation must be defended before the Tech faculty under the supervision of the student's advisory committee. Manuscript requirements are in the catalog. An external examiner will be included on the defense committee. The candidate must be registered during the semester in which the completed dissertation is submitted to the Graduate Office. Doctoral candidates are required to present at least one departmental or general seminar on the dissertation during their tenure as a graduate student.

Additional Comments:

Institute General Requirements

No Requirement Level

[Learning Outcomes]

Outcome
Advanced knowledge of computer science in the areas of theoretical computer science, programming languages, and systems

Outcome
Ability to communicate computing concepts through written reports

Outcome
Ability to communicate computing concepts through oral presentations

Outcome
Expertise in conducting research on a theoretical or applied problem in computer science, demonstrated by the writing of a successful research proposal, a dissertation that contributes original and scholarly work to the field, and publications that have been accepted by the wider computer science community via peer review

Courses

ACCT2110 - Principles of Accounting I

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
An introduction to financial accounting concepts emphasizing the analysis of business transactions in accordance with generally accepted accounting principles (GAAP), the effect of these transactions on the financial statements, financial analysis, and the interrelationships of the financial statements.No prerequisites required.

Equivalent Courses: Previous & Current Courses
ACCT201

No Requirements

ACCT2120 - Principles of Accounting II

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
An introduction to the use of accounting information in the management decision making processes of planning, implementing, and controlling business activities. In addition, the course will discuss the accumulation and classification of costs as well as demonstrate the difference between costing systems.

Equivalent Courses: Previous & Current Courses
ACCT202

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:
- ACCT2110 - Principles of Accounting I

Additional Comments:

No Requirement Level

ACCT3050 - Managerial Accounting

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Cost-benefit choices among accounting methods and systems in support of strategic decisions and operational control, including behavioral effects of accounting systems within organizations. Analysis of cost behavior patterns and how they alter cost accounting for automated manufacturing environments. Construction of budgets, forecasts, and estimates for new product/process costs.

Equivalent Courses: Previous & Current Courses
ACCT350

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:
- ACCT2120 - Principles of Accounting II

or consent of instructor and advisor

Additional Comments:

No Requirement Level

ACCT3053 - Cost Accounting

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
The development and use of cost accounting for inventory valuation, income determination, cost control including process accounting and variance analysis.

Equivalent Courses: Previous & Current Courses
ACCT353

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

Prerequisites

Complete ALL of the following Courses:
- ACCT2120 - Principles of Accounting II

or consent of instructor and advisor

Additional Comments:

No Requirement Level

ACCT3071 - Financial Accounting

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
A detailed study of the financial recording and reporting process. Emphasis is placed on the form and content of financial statements.

Equivalent Courses: Previous & Current Courses
ACCT371

No Requirements

ACCT3072 - Financial Accounting II

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Current financial accounting theory and practice as they relate to financial statement preparation and analysis. Emphasis on special topics includes accounting for pensions and leases, accounting changes, and earnings per share presentation. Topics of current financial accounting interest are reviewed as they develop.

Equivalent Courses: Previous & Current Courses
ACCT372

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- ACCT3071 - Financial Accounting

Additional Comments:

No Requirement Level

ACCT4003 - Tax Accounting

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Federal income tax laws and the determination of taxable income for individuals, partnerships, corporations, and fiduciaries. Tax research and planning.

Equivalent Courses: Previous & Current Courses
ACCT403

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- ACCT3072 - Financial Accounting II

or consent of instructor and advisor

Additional Comments:

No Requirement Level

ACCT4005 - Accounting for Non-Profits

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Control and reporting problems for government organizations and other non-profit entities. Fund accounting principles, procedures, and reports.

Equivalent Courses: Previous & Current Courses
ACCT405

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

Prerequisites

Fulfill ANY of the following requirements:

Prerequisites

Complete ALL of the following Courses:

- ACCT3072 - Financial Accounting II

OR

Consent

consent of instructor and advisor

Additional Comments:

No Requirement Level

ACCT4090 - Selected Topics

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
3

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Current topics in accounting.

Equivalent Courses: Previous & Current Courses
ACCT490

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- ACCT2120 - Principles of Accounting II
- BFIN3002 - Introduction to Financial Economics
- ECON2110 - Macroeconomic Principles
- ECON2120 - Microeconomic Principles
- MGMT3030 - Management Behavior & Organization
- MATH2350 - Statistical Methods

and senior standing

Additional Comments:

No Requirement Level

ACCT4091 - Directed Study

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
3

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Individual studies directed by consenting faculty with prior approval of the department head.

Equivalent Courses: Previous & Current Courses
ACCT491

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

Prerequisite

Have upper-class standing or consent of instructor and advisor

Additional Comments:

No Requirement Level

BFIN3002 - Introduction to Financial Economics

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Introduction to financial systems, financial management and planning, introduction to financial investments including debt, and capital budgeting models with examples of applications.

Equivalent Courses: Previous & Current Courses
BFIN302

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- MATH1510 - g2:Calculus I
  OR MATH1430 - Application to Calculus 1
- MATH2350 - Statistical Methods
  OR MATH3082 - Probability and Statistics
- ECON2120 - Microeconomic Principles

Additional Comments:

No Requirement Level

BFIN4010 - Theory of Financial Decisions

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Detailed study of contemporary capital market and market equilibrium theories. Consideration of individual and firm risk attitudes and ways of dealing with financial risk. Discussion of firm valuation methods and firm level approaches to risky financial decision making.

Equivalent Courses: Previous & Current Courses
BFIN410

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

Prerequsite

Complete ALL of the following Courses:

- BFIN3002 - Introduction to Financial Economics
- MATH2350 - Statistical Methods

or consent of instructor and advisor

Additional Comments:

No Requirement Level

BFIN4080 - Investments

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Portfolio theory and empirical capital market analysis. Contemporary investment theory, including option pricing models and derivatives. Active portfolio management in light of the vast array of financial investment alternatives available in today's markets.

Equivalent Courses: Previous & Current Courses
BFIN480

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- MATH2350 - Statistical Methods
- BFIN3002 - Introduction to Financial Economics
  OR ES3016 - Engineering Economics

or consent of instructor and advisor

Additional Comments:

No Requirement Level

BFIN4090 - Selected Topics

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
3

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Current topics in finance.

Equivalent Courses: Previous & Current Courses
BFIN490

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

Prerequisite

Upper-class standing or consent of instructor and advisor

Additional Comments:

No Requirement Level

BFIN4091 - Independent Study

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
3

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, Standard Letter

Equivalent Courses: Previous & Current Courses
BFIN491

Simple Requisites

Course Requisite Requirements

No Requirement Level

Prerequisites
Type
Prerequisite

Fulfill ANY of the following requirements:

Upper-class standing

OR

consent of instructor and advisor

Additional Comments:

BUSA1110 - Introduction to Business

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Fundamental concepts and frameworks of business operations covering areas such as management, marketing, accounting, supply chain, personnel, and finance; and the environments in which business operates.

No Requirements

CSCI1001 - Intro Comp Sci & Info Tech

General

Credit Hrs
Credit Hrs:
2

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Students Must register for CSCI 1001 and CSCI 1001L concurrently. Brief overview of the discipline of computer science and information technology topics including computer architecture, operating systems and networks, automata and models of computation, programming languages and compilers, algorithms, databases, security and information assurance, artificial intelligence, graphics, and social/ethical issues of computing.

Equivalent Courses: Previous & Current Courses
CSE101, IT101

No Requirements

CSCI1001L - Intro Comp Sci & Info Tech Lab

General

Credit Hrs
Credit Hrs:
0

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Required lab for CSCI 1001.

No Requirements

CSCI1210 - Programming Fundamentals

General

Credit Hrs
Credit Hrs:
4

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course is an introduction to problem-solving methods and algorithm development. Students will learn how to design, code, debug, and document programs. Students will explore basic programming concepts including variables, data types, operators and expressions. Students will learn about input/output mechanisms, including command prompt interaction, and reading and writing data to files. Students will be introduced to control structures such as branching, conditionals, iteration, and loops and arrays. They will also learn how to define and use functions/methods to structure code and improve code reuse.

No Requirements

CSCI1210L - Programming Fundamentals

General

Credit Hrs
Credit Hrs:
0

Grade Modes
Audit, Pass/Fail, Standard Letter

No Requirements

CSCI1220 - Programming Fund Python

General

Credit Hrs
Credit Hrs:
4

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Co-requisite: MATH 1240 Students must register for CSCI 1220 and CSCI 1220L concurrentlyThis course is an introduction to fundamental programming concepts, with a focus on problem solving techniques and algorithm development using the Python programming language. Students will learn how

to create basic scripts, work with data types and variables, use control structures, and build functions. The course is designed for students with little or no prior experience in programming and is intended to provide a foundation in programming that can be applied in a variety of fields.

Equivalent Courses: Previous & Current Courses
CSE107, IT107

No Requirements

CSCI1220L - Programming Fund Python Lab

General

Credit Hrs
Credit Hrs:
0

Grade Modes
Audit, Pass/Fail, Standard Letter

Equivalent Courses: Previous & Current Courses
CSE107L, IT107L

No Requirements

CSCI2210 - Object Oriented Programming

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: CSCI 2222 or CSCI 2220 with a grade of C or higherThis course is an introduction to object-oriented programming. Including: Classes and objects, and associated topics such as constructors, properties, and methods, inheritance, polymorphism, encapsulation, abstraction, exception handling and best practices.

Equivalent Courses: Previous & Current Courses
CSE213, IT213

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Completion Requirement

Prerequisites

Complete ALL of the following Courses:

- CSCI1210 - Programming Fundamentals
- CSCI2220 - Data Structures & Algorithms
- CSCI2222 - Data Structures in Python
- MATH1520 - g2:Calculus II

Additional Comments:

No Requirement Level

CSCI2220 - Data Structures & Algorithms

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: CSCI 1210 with a grade of C or higherCorequisite: Math 1520 Usually offered in both Fall and Spring semesters.Design, implement, and use fundamental abstract data types including linked lists, stacks, queues, and trees. Analyze the time and space complexity of algorithms, such as sorting.

Equivalent Courses: Previous & Current Courses
CSE122, IT122

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Completion Requirement

Prerequisites

Complete ALL of the following Courses:

- CSCI1210 - Programming Fundamentals
- CSCI1220 - Programming Fund Python
- MATH1240 - Pre-Calculus

Additional Comments:

No Requirement Level

CSCI2222 - Data Structures in Python

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: CSCI 1210 or CSCI 1220, with a grade of C or higher; MATH 1240 Normally offered in Spring semester Using objects, lists, tuples, and dictionaries to implement data structures such as trees and graphs. Algorithms for sorting, searching, and other fundamental operations. Introduction to mathematical foundations for analysis of iterative and recursive algorithms and for basic correctness proofs. The math skills used in the algorithm analysis (e.g., series, inductive proofs) will be included in the course. Implementation of selected algorithms for different applications (e.g., data science, cybersecurity) using sound programming methodologies.

Equivalent Courses: Previous & Current Courses
CSE117, IT117

Simple Requisites

Course Requisite Requirements

Prerequisites
Type

Completion Requirement

Prerequisites

Complete ALL of the following Courses:

- CSCI1210 - Programming Fundamentals
- CSCI1220 - Programming Fund Python
- MATH1240 - Pre-Calculus

Additional Comments:

No Requirement Level

CSCI2230 - Assembly Lang & Mach Org

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: CSCI 1001 and 2220 each with a grade of C or higher Usually offered in the Fall semester.Computer structure and system organization, instruction execution, memory addressing modes, hardware/software interface. Programming in assembly language.

Equivalent Courses: Previous & Current Courses
CSE221, IT221

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Completion Requirement

Complete ALL of the following Courses:

- CSCI1001 - Intro Comp Sci & Info Tech
- CSCI2220 - Data Structures & Algorithms

Additional Comments:

No Requirement Level

CSCI2240 - Systems Programming

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: CSCI 1001, CSCI 2220 each with a grade of C or higher Usually offered in the Spring semester This course provides an introductory overview of operating systems and system programming, mainly focusing on system-level programming based on OS services and other APIs. Topics include system calls, file I/O, files and directories, memory management, process control, inter-process communication (IPC), socket-based network programming, remote procedure call (RPC) programming, and basic security mechanisms. Course work includes substantial programming homework and team-based projects.

Equivalent Courses: Previous & Current Courses
CSE222, IT222

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Completion Requirement

Complete ALL of the following Courses:

- CSCI2220 - Data Structures & Algorithms

Additional Comments:

No Requirement Level

CSCI2310 - Discrete Mathematics for CS

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: MATH 1520 with a grade of C or higher Usually offered in the Fall semester Students must register for CSCI 2310 and CSCI 2310L concurrently.Discrete mathematics required for Computer Science, including topics such as the basics of logic, number theory, methods of proof, sequences, mathematical induction, set theory, counting and functions.

Equivalent Courses: Previous & Current Courses
CSE241, IT241

No Requirements

CSCI2310L - Discrete Mathematics CS Lab

General

Credit Hrs

Credit Hrs:
0

Grade Modes
Audit, Pass/Fail, Standard Letter

Equivalent Courses: Previous & Current Courses
CSE241, IT241

No Requirements

CSE101L - Introduction to Computer Science & Information Techology Lab

General

Credit Hrs
Credit Hrs:
0

Grade Modes
Audit, Pass/Fail, Standard Letter

Equivalent Courses: Previous & Current Courses
IT101L

No Requirements

CSE209 - Programming Language Practicum

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
A practical course teaching the use of a programming language of current interest. May be repeated for credit with different languages.

Simple Requisites

Course Requisite Requirements

Prerequisite Type
Prerequisite

Prerequisite

Prerequisite: Knowledge of elementary programming and CSE 101 with a grade of C or higher.

Complete ALL of the following Courses:
- CSCI1001 - Intro Comp Sci & Info Tech

Additional Comments:

No Requirement Level

CSE525D - Advanced Operating Systems

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Advanced topics in operating systems such as real-time, distributed systems, fault-tolerance, parallel I/O, performance, safety-critical systems, and verification.

Equivalent Courses: Previous & Current Courses
CSE5052D

No Requirements

CSE551D - Advanced Parallel Processing

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course focuses on the application of models of parallel computation, parallel algorithms, synchronization, parallel languages, parallel performance analysis, and parallel debugging to large problems and complex systems. Topics include: integrating data and shared memory parallelism, multilevel domain decompositions, portability, and scalability. Student will parallelize and analyze the performance of a complex system or application.

Equivalent Courses: Previous & Current Courses
CSE5051D

No Requirements

CSE589D - Pilot Course

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Equivalent Courses: Previous & Current Courses
CSE5089D

No Requirements

CSE3007 - Python for Data Science

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Types and functions; Mechanisms for parameter passing, optional and keyword-based parameters. Dictionary and list comprehension. Native data structures, e.g. dictionaries, lists, strings, and tuples; arrays using NumPy. File input/output. Techniques for noise removal, cleaning, and transformations on real-world datasets.

Simple Requisites

Course Requisite Requirements

Prerequisite Type
Prerequisite

Prerequisite

Prerequisites: MATH 1520; and either CSCI 1210 or CSCI 1220, passed with a grade of C or better, or instructor permission based on previous computer programming experience.

Complete ALL of the following Courses:

- MATH1520 - g2:Calculus II
- CSCI1220 - Programming Fund Python
  OR CSCI1210 - Programming Fundamentals

Additional Comments:

No Requirement Level

CSE3020 - Video Game Design

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Types and functions; Mechanisms for parameter passing, optional and keyword-based parameters. Dictionary and list comprehension. Native data structures, e.g. dictionaries, lists, strings, and tuples; arrays using NumPy. File input/output. Techniques for noise removal, cleaning, and transformations on real-world datasets.

When Offered
Spring

Equivalent Courses: Previous & Current Courses
CSE320

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisites: ENGL 1110; CSE 107 or CSE 113; and CSE 213. CSE prerequisite courses passed with a C or better.

Normally offered: Spring every other year

Complete ALL of the following Courses:

- ENGL1110 - g1:Composition I
- CSCI1220 - Programming Fund Python
  OR CSCI1210 - Programming Fundamentals
- CSCI2210 - Object Oriented Programming

Additional Comments:

No Requirement Level

CSE3021 - Internet and Web Programming

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course has a practical emphasis on the design and techniques for developing internet-based applications, mainly focusing on web programming. Topics include HTML, client-side scripting language (JavaScript), server-side programming (e.g., Servlets, JSP, and J2EE), and XML/web services (e.g., Java and .NET). This course will also cover some important topics needed for internet-based application development, such as Internet architectures, basic object-oriented programming (OOP) concepts, and web security. Course work includes substantial programming homework and team-based projects. (Same as IT 3021.)

Equivalent Courses: Previous & Current Courses
CSE321

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisite: CSCI 2222 or CSCI 2220 and CSCI 2210 each with a grade of C or higher

Complete ALL of the following Courses:

- CSCI2210 - Object Oriented Programming
- CSCI2222 - Data Structures in Python
  OR CSCI2220 - Data Structures & Algorithms

Additional Comments:

No Requirement Level

CSE3024 - Principles of Programming Languages

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Introduction to low (micro/macro) and high level languages (L/HLLs) -- features and positions within the computer system, definition of HLLs of syntax and semantics. Data types, control structures, concurrency, declarations, procedures. Recursion and recursive definitions. Procedural and data abstraction. Critique of major programming languages features and design issues (e.g., power, efficiency,

When Offered
Spring

security, modularity, readability, etc). Examples from major realms of current programming languages – imperative (block structured, object oriented), declarative (function, logic) paradigms.

Equivalent Courses: Previous & Current Courses
CSE324

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisite: CSCI 2220 with a grade of C or higher

Usually offered in the Spring semester.

Complete ALL of the following Courses:

- CSCI2220 - Data Structures & Algorithms

Additional Comments:

No Requirement Level

CSE3025 - Principles of Operating Systems

General

Credit Hrs
Credit Hrs:
4

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course provides an introduction to the fundamentals of operating systems and their components. Topics include processes and threads, process scheduling, process synchronization, deadlocks, memory management, file systems, storage systems, I/O systems, security and protection, and introduction to distributed systems. Each student is expected to design and implement components of a small operating system.

Equivalent Courses: Previous & Current Courses
CSE325

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisites: CSCI 2230, 2240 each with a grade of C or higher

Usually offered in the Fall semester.

Complete ALL of the following Courses:

- CSCI2230 - Assembly Lang & Mach Org
  AND CSCI2240 - Systems Programming

Additional Comments:

Corequisite
Type
Corequisite

Corequisite

Students must register for CSE 3025 and CSE 3025L concurrently

Complete ALL of the following Courses:

- CSE3025 - Principles of Operating Systems

Additional Comments:

No Requirement Level

CSE3025L - Operating Systems Lab

General

Credit Hrs
Credit Hrs:
0

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Required lab for CSE 3025.

Equivalent Courses: Previous & Current Courses
CSE325L

No Requirements

CSE3026 - Software Engineering

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course provides the introductory overview of software engineering, concentrating on large- scale software system design and implementation. Topics include software life cycle, UML-based design language, design tools and techniques, design documentation, software testing, secure software construction, and software project management. Course work includes a team-based project. (Same as IT 3026.)

When Offered
Spring

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisites: CSCI 2222 or CSCI 2220, CSCI 2210 each with a grade of C or higher

Complete ALL of the following Courses:

- CSCI2222 - Data Structures in Python
  OR CSCI2220 - Data Structures & Algorithms
- CSCI2210 - Object Oriented Programming

Additional Comments:

Prerequisite/Corequisite
Type
Completion Requirement

Prerequisite/Corequisite

Prerequisites/Co-requisites: ENGL 3041

Usually offered in the Spring semester

Complete ALL of the following Courses:

- ENGL3041 - i1:Technical Writing

Additional Comments:

No Requirement Level

CSE3028 - Secure Software Construction

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Formal methods and practical techniques for the specification, design, implementation, and validation of computer software. Current software engineering and management practices, with emphasis on ensuring software reliability, safety, and security. Course work includes a team project to develop a sizeable, real-world application software. (Same as IT 3028.)

Equivalent Courses: Previous & Current Courses
CSE328

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisite: CSCI 2240, CSCI 2210 each with a grade of C or higher

Complete ALL of the following Courses:

- CSCI2240 - Systems Programming
  AND CSCI2210 - Object Oriented Programming

Additional Comments:

No Requirement Level

CSE3031 - Computer Architecture

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
The course introduces the fundamentals of modern computer architecture and design. Topics include instruction set architectures, pipelining, memory hierarchies, instruction-level parallelism, introduction to distributed and parallel computing, and performance modeling and measurements.

When Offered
Spring

Equivalent Courses: Previous & Current Courses
CSE331

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisite: CSE 221 with a grade of C or higher

Usually offered in the Spring semester.

Complete ALL of the following Courses:

- CSE221 - Computer System Organization (Inactive)

Additional Comments:

No Requirement Level

CSE3042 - Formal Languages & Automata

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Regular expressions. Regular, context-free, context-sensitive and unrestricted grammars and languages. Finite and pushdown automata. Turing machines, recursive and recursively enumerable languages. Decidability and the halting problem.

When Offered
Spring

Equivalent Courses: Previous & Current Courses
CSE342

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:
- CSCI2310 - Discrete Mathematics for CS

Additional Comments:

Prerequisite/Corequisite
Type
Completion Requirement

Prerequisite/Corequisite

Prerequisite/Co-requisite: MATH 3052

Usually offered in the Spring semester.

Complete ALL of the following Courses:
- MATH3052 - Basic Concepts of Mathematics

Additional Comments:

No Requirement Level

CSE3044 - Design & Analysis of Algorithm

General

Credit Hrs

Credit Hrs:
3

Credit Hours Max:
4

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Asymptotic complexity of algorithms. Analysis of iterative and recursive algorithms; amortized analysis. Design paradigms: greedy and dynamic programming approaches. Interplay of data structures and algorithms. Graph algorithms. Introduction to the theory of complexity classes and NP–completeness.

Equivalent Courses: Previous & Current Courses
CSE344

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Completion Requirement

Prerequisites: CSCI 2220 with a grade of C or higher

Complete ALL of the following Courses:
- CSCI2220 - Data Structures & Algorithms
- CSCI2310 - Discrete Mathematics for CS

Additional Comments:

No Requirement Level

CSE3044L - Design & Analysis of Algorithms Lab

General

Credit Hrs

Credit Hrs:
0

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Required lab for CSE 3044.

Equivalent Courses: Previous & Current Courses
CSE344L

No Requirements

CSE3051 - Modeling & Simulation Techniques for Information Systems

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Fundamentals and techniques for designing and using simulation, modeling, and optimization algorithms with applications in system performance modeling, business infrastructure modeling, and distributed and parallel computing. An introduction to advanced complex systems models. (Same as IT 3051.)

Equivalent Courses: Previous & Current Courses
CSE351

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisites: CSCI 2220; CSCI 2310 each with a grade of C or higher

Complete ALL of the following Courses:

- CSCI2220 - Data Structures & Algorithms
  AND CSCI2310 - Discrete Mathematics for CS

Additional Comments:

No Requirement Level

CSE3053 - Introduction to Computer Networks

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Introduction to computer networking, the ISOOSI protocol stack, LAN, MAN, and WAN. Physical layer: transmission media (wireline and wireless); data signaling, modulation, and coding; multiplexing. Fiber optics networking technology: protocols & examples. Data link Layer: error/flow control— protocols design issues; MAC protocols for channel access and allocation. Wireless technology and protocols standards — IEEE 802.11 physical layer and MAC sublayer protocols. Network layer: subnet switching (CS/DG/VC) & routing protocols (Non/Adaptive); Congestion Control and QoS protocols. ISO vs. (TCP-UDP)/IP the Internet protocol stacks. Internet relays and protocols, e.g., routers, gateways, etc. Introduction to network security. Application layer protocols, E.G., DNS, E-mail, etc. (Same as IT 3053.)

When Offered
Fall

Equivalent Courses: Previous & Current Courses
CSE353

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisites: CSCI 2240 with a grade of C or higher

Usually offered in the Fall semester

Complete ALL of the following Courses:

- CSCI2240 - Systems Programming

Additional Comments:

No Requirement Level

CSE3063 - Computer Security

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course provides an overview of the principles and practices of secure computing, mainly focusing on their application in security solution design and implementation. Topics include risk/threat analysis, secure coding practices, cryptographic tools, security architectures, system security, software security, and network security. Course work include quizzes, homework, midterm and final exams, and one final team-based project. (Same as IT 3063.)

When Offered
Spring

Equivalent Courses: Previous & Current Courses
CSE363

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisite: CSE 221 with a grade of C or higher; CSE 3053

Usually offered in the Spring semester

Complete ALL of the following Courses:

- CSE221 - Computer System Organization (Inactive)
  AND CSE3053 - Introduction to Computer Networks

Additional Comments:

No Requirement Level

CSE3073 - Intro to Database Systems

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Conceptual modeling and database design using the entity-relationship model. The relational model; relational algebra and relational query languages. Database integrity. Physical data organization. Non-relational models such as NoSQL and graph databases. Introduction to concurrency control and recovery. Course work includes a project using SQL and the Oracle Database Management System. (Same as IT 3073.)

Simple Requisites

Course Requisite Requirements

Prerequisite Type
Prerequisite

Prerequisite

Prerequisite: CSCI 2222 or 2220; and CSCI 2310, each with a grade of C or higher

Complete ALL of the following Courses:

- CSCI2222 - Data Structures in Python
  OR CSCI2220 - Data Structures & Algorithms
- CSCI2310 - Discrete Mathematics for CS

Additional Comments:

No Requirement Level

CSE3082 - Ethical and Social Issues in Computing and Information Technologies

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
In this class, students will examine ethical and social questions regarding computing and information technologies. The course challenges students to think about connections among digital technologies, the responsibilities of information technology professionals, and social justice as they study topics such as social media, military applications of digital media, gendered technologies, and access to information technologies. In addition to learning the basics of research ethics and social responsibility, students will examine real-world debates regarding subjects like big data, computer code, and digital networks, and they will analyze the legal, political, and social stakes of information technologies. (Same as IT 3082and PHIL 382) This course may be used to satisfy 3 credit hours of the General Education Area 5 requirements.

When Offered
Spring

Equivalent Courses: Previous & Current Courses
CSE382, IT3082, IT382, PHIL3082, PHIL382

Simple Requisites

Course Requisite Requirements

Usually offered in the Spring semester

No Requirement Level

CSE3091 - 300-Level Directed Study

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
12

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, Standard Letter

Equivalent Courses: Previous & Current Courses
CSE391

No Requirements

CSE4011 - Data Science

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Data preprocessing: assembly, integration, cleaning, analysis. Visualization. Introduction to Machine Learning using Python: Continuous and categorical features. Evaluation metrics such as F1-score and AuC. Problems from different domains. Students are expected to communicate and present their findings and results. Every student must complete at least one hands-on project.

Equivalent Courses: Previous & Current Courses
CSE411

Simple Requisites

Course Requisite Requirements

Prerequisite Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- CSE3007 - Python for Data Science
- MATH1520 - g2:Calculus II
- MATH3082 - Probability and Statistics
  AND MATH3082L - Probability and Statistics Lab

Additional Comments:

No Requirement Level

CSE4023 - Compiler Writing

General

Credit Hrs

Credit Hrs:
4

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Implementation of compilers for higher level computer languages including: parsing, symbol table management, code emission, and code optimization. Each student implements a small compiler and designs an optimizing compiler as a substantial portion of the course grade. Individual and group projects. Practice in developing software requirement, specification, design, and test plan documents.

Equivalent Courses: Previous & Current Courses
CSE423

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisites: CSE 3042 with a grade of C or higher; CSE 3024, 326, 344

Complete ALL of the following Courses:

- CSE3042 - Formal Languages & Automata
- CSE3024 - Principles of Programming Languages
- CSE3026 - Software Engineering
  AND CSE3044 - Design & Analysis of Algorithm

Additional Comments:

Corequisite
Type
Corequisite

Corequisite

Co-requisite: CSE 3031

Usually offered in the Spring semester.

Students must register for CSE 4023 and CSE 4023L concurrently

Complete ALL of the following Courses:

- CSE3031 - Computer Architecture
  AND CSE4023L - Compiler Writing Lab

Additional Comments:

No Requirement Level

CSE4023L - Compiler Writing Lab

General

Credit Hrs

Credit Hrs:
0

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Required lab for CSE 4023.

No Requirements

CSE4041 - Cryptography and Applications

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course provides an introductory overview of modern cryptographic theory and techniques, mainly focusing on their application into real systems. Topics include number theory, probability and information theory, computational complexity, symmetric and asymmetric cryptosystems, one-way functions, block and stream ciphers, Kerberos authentication systems, public key infrastructure (PKI), secure socket layer/transport layer security (SSL/TLS), and cryptographic protocols/applications in many real systems. Shares lecture with CSE 5041 with additional expectations for graduate credit. (Same as IT 4041.)

Equivalent Courses: Previous & Current Courses
CSE441

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisites: CSCI 2220, CSCI 2310 each with a grade of C or higher

Complete ALL of the following Courses:

- CSCI2220 - Data Structures & Algorithms
  AND CSCI2310 - Discrete Mathematics for CS

Additional Comments:

No Requirement Level

CSE4051 - Intro to Parallel Processing

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Introduction to supercomputers and massively-parallel machine architecture, models of parallel computation, parallel algorithms, synchronization, parallel languages, data and functional parallelism, parallel performance analysis, popular interfaces, and parallel debugging. Students will gain experience in parallelization of sequential algorithms and implementation of parallel algorithms. (Same as IT 4051.)

Equivalent Courses: Previous & Current Courses
CSE451

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisites: CSCI 2220 with a grade of C or higher

Complete ALL of the following Courses:
- CSCI2220 - Data Structures & Algorithms

Additional Comments:

No Requirement Level

CSE4052 - Introduction Sensor Networks

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
4

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Introduction to sensory technology with special focus on wireless sensor networks (WSNs) applications, topologies, deployment, sensed data manipulation, mobile ad-hoc wireless communication, security. Low power consumption and data rates WSNs protocols (e.g., ZigBee/IEEE808.15.4). Students will get familiar with sensor nodes' hardware (motes and sensor boards) and programming (Tiny OS and ZigBee application objects) via a set of practical lab/field experiments that covers the design, implementation, deployment, and data collection/analysis of some actual WSNs data/vent acquisition systems (e.g., environment monitoring, remote asynchronous event detection–forest fire, border intrusion, tsunami, earthquake, volcanic activities, etc).

Equivalent Courses: Previous & Current Courses
CSE452

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisites: CSE 3025 and CSE 3053, or consent of instructor and advisor

Complete ALL of the following Courses:
- CSE3025 - Principles of Operating Systems
  AND CSE3053 - Introduction to Computer Networks

Additional Comments:

No Requirement Level

CSE4053 - Advances in Computer Networks & Internet

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
In depth coverage of layering of protocols' stacks (ISOOSI and TCP/IP) and computer networks architectures, modern examples of LANs, MANs, WANs protocols/architectures. Recent developments in Fiber optics technology — protocols and architectures. High speed "all-fiber-optics" networks. Internetworking: global addresses/names and translation, virtual networks and tunnels, routing, subnetworks switching protocols, IPv6, multicasting. Mobile IP. End-to-end protocols, TCP and UDP. Advances in congestion control and resource allocation. Client-server models & applications. The QoS mechanism integrated/differentiated), ATM QoS. Network security: information and link security, encryption, internetworking security, IPsec, firewalls, VPN, wireless security. Analysis of networks protocols. (Same as IT 4053.)

Equivalent Courses: Previous & Current Courses
CSE453

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:
- CSE3053 - Introduction to Computer Networks

Additional Comments:

No Requirement Level

CSE4054 - Computer Graphics

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Design and implementation of visual interfaces. Graphics input and output hardware, display programming, 2-D transformations, approximation techniques for curve and surface representation. Introduction to the creation of 3-D computer-generated images, color theory, lighting and shading.

Equivalent Courses: Previous & Current Courses
CSE454

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisites: CSCI 2210, 2240; MATH 2420 each with a grade of C or higher

Complete ALL of the following Courses:

- CSCI2210 - Object Oriented Programming
- CSCI2240 - Systems Programming
  AND MATH2420 - Applied Linear Algebra

Additional Comments:

No Requirement Level

CSE4061 - Foundations of Information Security

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Standard Letter

Simple Requisites

Course Requisite Requirements

Prerequisites: Graduate standing or consent of instructor and advisor

No Requirement Level

CSE4061 - Foundtns of Informatn Security

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Standard Letter

No Requirements

CSE4063 - Information Assurance

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Defense and offensive information warfare. Information system security. Computer break-ins, hacking, and other attack methods. Vulnerability and risk analysis. Theory and applications of cryptography. Intrusion detection and incident response. Security planning and management. (Same as IT 4063.)

Equivalent Courses: Previous & Current Courses
CSE463

Simple Requisites

Course Requisite Requirements

Prerequisite: Senior standing

No Requirement Level

CSE4064 - Intro to Soft Computing

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Major types of artificial neural networks. Fuzzy logic theory and fuzzy systems construction. Genetic algorithms and evolutionary computing. Intelligent systems and engineering applications. Comparative study of the soft computing paradigm as a problem solving methodology.

Equivalent Courses: Previous & Current Courses
CSE464

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- CSE3044 - Design & Analysis of Algorithm
  AND MATH3082 - Probability and Statistics

Additional Comments:

No Requirement Level

CSE4065 - Neural Networks

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Biological neurons and their modeling. An overview of single/multilayer feedforward/back ANN models and learning rules, single layer perceptron model, multi-layer feedforward error backpropagation, recurrent associative memory, Hopfield model, multilayer ANNs for clustering & competitive learning, Hamming/Max, un/supervised learning, Kohonen SOFM, Learning Vector Quantization, counter propagation ANN model, Adaptive Resonance Theory model. ANNs applications (projects).

Equivalent Courses: Previous & Current Courses
CSE465

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisites: CSE 3007 or CSE 3044 passed with a grade of C or better; MATH 2420 MATH 3082 and MATH 3082L; or consent of instructor and advisor

Complete ALL of the following Courses:

- CSE3007 - Python for Data Science
  OR CSE3044 - Design & Analysis of Algorithm
- MATH2420 - Applied Linear Algebra
- MATH3082 - Probability and Statistics
  AND MATH3082L - Probability and Statistics Lab

Additional Comments:

No Requirement Level

CSE4066 - Machine Learning

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course introduces machine learning concepts such as unsupervised and semi-supervised learning, naive bayesian, decision trees/regression tree, K-means, K-NN, regression, SVM, neural networks. The associated training & operating algorithms are presented, including ensemble machine learning. Solutions for related problems such as classification, regression, anomaly detection, time series prediction, image-to-image, sequence-to-sequence, rule learning, Markov chain learning etc. Concepts used to prepare training datasets.

Equivalent Courses: Previous & Current Courses
CSE466

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisites: CSE 3007 or CSE 3044 passed with a grade of C or better;; MATH 3082; or consent of instructor and advisor

Complete ALL of the following Courses:

- CSE3007 - Python for Data Science
  OR CSE3044 - Design & Analysis of Algorithm
- MATH3082 - Probability and Statistics

Additional Comments:

No Requirement Level

CSE4076 - Visualization

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course presents application of graphical visualization to current problems, with a focus on extracting and representing information in multidimensional data sets using 2D and 3D graphics. Topics include visualization tools and techniques, human vision and perception, color mapping, sound, data representation for insight extraction, time visualization, visual analytics, volume rendering, surface extraction and rendering. Students will develop visualizations of real world problems. (Same as IT 4076.)

Equivalent Courses: Previous & Current Courses
CSE476

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- CSE122 - Algorithms & Data Structures (Inactive)

Additional Comments:

No Requirement Level

CSE4085 - Undergrad Seminar on Special Topics

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
A research seminar for undergraduate students with a focus either on special topics in computer science or on the methodology and skills required for research in computer science. Use as technical electives is limited (see requirements above), but may be taken multiple times as a general elective.

Equivalent Courses: Previous & Current Courses
CSE485

Simple Requisites

Course Requisite Requirements

Prerequisite: Senior standing, one semester of upper division courses in computer science, and consent of the instructor

No Requirement Level

CSE4091 - Directed Study

General

Credit Hrs

Credit Hrs:
0

Credit Hours Max:
12

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, Standard Letter

Equivalent Courses: Previous & Current Courses
CSE491

Simple Requisites

Course Requisite Requirements

Cannot be used toward graduation.

No Requirement Level

CSE4093 - Undergraduate Thesis

General

Credit Hrs

Credit Hrs:
1

Grade Modes
Pass/Fail, No Report

Course Description
Undergraduate Honors Thesis option.

Equivalent Courses: Previous & Current Courses
CSE493

Simple Requisites

Course Requisite Requirements

Prerequisite Type
Prerequisite

Prerequisite

Acceptance into the Computer Science Undergraduate Honors Thesis option

Additional Comments:

No Requirement Level

CSE4094 - Undergraduate Thesis

General

Credit Hrs

Credit Hrs:
2

Grade Modes
Pass/Fail

Equivalent Courses: Previous & Current Courses
CSE494

Simple Requisites

Course Requisite Requirements

Prerequisite Type
Prerequisite

Complete ALL of the following Courses:

- CSE4094 - Undergraduate Thesis

Additional Comments:

No Requirement Level

CSE5000 - Directed Research

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
12

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, No Report, Standard Letter

Equivalent Courses: Previous & Current Courses
CSE500

Simple Requisites

Course Requisite Requirements

This course may not be used to fulfill graduate degree requirements. Research under the guidance of a faculty member.

No Requirement Level

CSE5023 - Advanced Compiler Writing

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Advanced topics in compilation, such as theory of parsing, error recovery, optimization, semantics- directed translation, and hardware-independent and hardware-specific code generation.

Equivalent Courses: Previous & Current Courses
CSE523

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisite: CSE 4023 with a grade of C or higher

Complete ALL of the following Courses:
- CSE4023 - Compiler Writing

Additional Comments:

No Requirement Level

CSE5024 - Advanced Programming Languages

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
In depth coverage of High Level languages pure/hybrid Paradigms, data manipulation and coding complexity. Modern trends in the design and philosophy of languages. Formal semantics of programming languages. Selected topics from current research.

Equivalent Courses: Previous & Current Courses
CSE524

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisites: CSE 3024, 344 each with a grade of C or higher, or consent of instructor and advisor

Complete ALL of the following Courses:
- CSE3024 - Principles of Programming Languages
  AND CSE3044 - Design & Analysis of Algorithm

Additional Comments:

No Requirement Level

CSE5025 - Advanced Operating Systems

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Advanced topics in operating systems such as real-time, distributed systems, fault-tolerance, parallel I/O, performance, safety-critical systems, and verification.

Equivalent Courses: Previous & Current Courses
CSE525

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisites: CSE 3025 and 331 each with a grade of C or higher or consent of instructor and advisor

Complete ALL of the following Courses:
- CSE3025 - Principles of Operating Systems

AND CSE3031 - Computer Architecture

Additional Comments:

No Requirement Level

CSE5028 - Formal Methods of Software Development

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Use of mathematics, logic, and computer science theory in software development. Formal specifications; systematic development of programs from specifications. Correctness proofs and other analysis techniques.

Equivalent Courses: Previous & Current Courses
CSE528

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- CSE3026 - Software Engineering
- CSE3042 - Formal Languages & Automata
  AND CSE3044 - Design & Analysis of Algorithm

Additional Comments:

No Requirement Level

CSE5031 - Advanced Computer Architecture

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course covers advanced topics in computer architecture which may include superscalar and super-pipelined architectures, memory hierarchies, multicore systems, multiprocessor systems, vector processors, interconnection networks.

Equivalent Courses: Previous & Current Courses
CSE531

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisite: CSE 3031 with a grade of C or higher or consent of instructor and advisor

Complete ALL of the following Courses:

- CSE3031 - Computer Architecture

Additional Comments:

No Requirement Level

CSE5032 - Fault-Tolerant Computing

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Techniques for design of fault-tolerant digital devices with on-line self-error-detection and self-error-correction. Fault-tolerant PLAs, gate arrays, and computer memories. Fault-tolerant computer architectures. Application of error-detecting and error-correcting codes for design of reliable devices with self-error detection/correction. Design of self-checking checkers. Combining on-line and off-line error-detecting techniques. Reliability analysis of fault-tolerant devices. Self-error detection/correction for multiprocessors.

Equivalent Courses: Previous & Current Courses
CSE532

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisite: CSE 3031 with a grade of C or higher, or consent of instructor and advisor

Complete ALL of the following Courses:

- CSE3031 - Computer Architecture

Additional Comments:

No Requirement Level

CSE5041 - Advanced Cryptography

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course provides an overview of modern cryptographic theory and techniques, mainly focusing on their application into real systems. Topics include number theory, probability and information theory, computation complexity, symmetric and asymmetric cryptosystems, one-way functions, block and stream ciphers, Kerberos authentication systems, public key infrastructure (PKI), secure socket layer/transport layer security (SSL/TLS), and cryptographic protocols/ applications in many real systems. Shares lecture with CSE 4041, with additional expectations for graduate credit

Equivalent Courses: Previous & Current Courses
CSE541

Simple Requisites

Course Requisite Requirements

Prerequisite: Graduate Standing or consent of instructor and advisor

No Requirement Level

CSE5042 - Advanced Formal Language Theory

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Extensive study of context-sensitive and recursively enumerable languages; closure properties, decidability, and ambiguity of various language classes. Special topics as time permits.

Equivalent Courses: Previous & Current Courses
CSE542

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisite: CSE 3042 with a grade of C or higher

Complete ALL of the following Courses:
- CSE3042 - Formal Languages & Automata

Additional Comments:

No Requirement Level

CSE5044 - Advanced Algorithms

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Analysis of correctness and complexity of asymptotically efficient algorithms. Hybrid data structures; Competitive algorithms; Graph algorithms including flow networks and maximum bipartite matching; Algorithms for matrix inversion and solution of linear equations; Linear Programming; Computational geometry; NP-complete problems and Approximation algorithms. Algorithms in areas of current interest.

Equivalent Courses: Previous & Current Courses
CSE544

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisite: CSE 3044 with a grade of C or higher, or consent of instructor and advisor

Complete ALL of the following Courses:
- CSE3044 - Design & Analysis of Algorithm

Additional Comments:

No Requirement Level

CSE5046 - Theory of Computation

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Effective computability of functions and sets in terms of Turing machines and other computational models. Universal machines and examples of unsolvable problems. The Church-Turing thesis and formal proofs of the equivalence of Turing machines, systems of recursion equations, and other models of computation. Mathematical properties of the classes of recursive functions. Recursive and recursively enumerable sets.

Equivalent Courses: Previous & Current Courses
CSE546

Simple Requisites

Course Requisite Requirements

Prerequisite
Type

Prerequisite

Prerequisite

Prerequisite: CSE 3042 with a grade of C or higher

Complete ALL of the following Courses:

- CSE3042 - Formal Languages & Automata

Additional Comments:

No Requirement Level

CSE5051 - Advanced Parallel Processing

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course focuses on the application of models of parallel computation, parallel algorithms, synchronization, parallel languages, parallel performance analysis, and parallel debugging to large problems and complex systems. Topics include: integrating data and shared memory parallelism, multilevel domain decompositions, portability, and scalability. Student will parallelize and analyze the performance of a complex system or application.

Equivalent Courses: Previous & Current Courses
CSE551

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisite: CSE 4051 with a grade of C or higher, or consent of instructor and advisor

Complete ALL of the following Courses:

- CSE4051 - Intro to Parallel Processing

Additional Comments:

No Requirement Level

CSE5053 - Advanced Computer Networks

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Models of computer networks. Design and analysis issues. Abstract syntax notation, data compression, security and authentication. Recent developments in the field.

Equivalent Courses: Previous & Current Courses
CSE553

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisite: CSE 3053 with a grade of C or higher

Complete ALL of the following Courses:

- CSE3053 - Introduction to Computer Networks

Additional Comments:

No Requirement Level

CSE5054 - Computer Network Security

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course will explore each layer of the internet protocol stack, focusing on security deficiencies, and remedies to those security deficiencies, and will involve extensive lab exercises using the Deter Lab shared testbed (accessed via the Internet to enable distance education participants). It will study computer network security architecture and security mechanisms to protect against sophisticated adversarial attacks. This course reviews cryptographic primitives that underlie most network security mechanisms, then applies this understanding to network services proving authentication for data and transaction integrity and availability, and encryption for confidentiality. It also covers the integration of security services into network applications and utilities including secure mail, secure web services, secure wireless, and investigates system security issues such as for firewalls and intrusion detections systems.

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisite: CSE 5061 with a grade of C or higher, or consent of instructor and advisor

Complete ALL of the following Courses:

- CSE5061 - Foundations of Information Security

Additional Comments:

No Requirement Level

CSE5057 - Hardware-Based Network Security

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course will cover networking protocols, cryptography, and network security from the hardware implementation perspective. Topics include security of ND, NAT, IPSEC and other specialized IPv6 protocols in support of IoT functionality. The focus will be on implementation of security policy enforcement mechanisms in IPv6 network protocols in a Field Programmable Gate Array (FPGA) platform to protect an IoT application against sophisticated adversaries. Lab exercises using a FPGA platform will enable investigation of hardware-based security technologies such as the use of Physically Unclonable Functions that are not otherwise accessible from software.

Equivalent Courses: Previous & Current Courses
CSE557

Simple Requisites

Course Requisite Requirements

Prerequisite Type
Prerequisite

Prerequisite

Prerequisite: CSE 5061 and CSE 5054, each with a grade of C or higher, or consent of instructor and advisor

Complete ALL of the following Courses:

- CSE5061 - Foundations of Information Security
  AND CSE5054 - Computer Network Security

Additional Comments:

No Requirement Level

CSE5061 - Foundations of Information Security

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course will explore the ideas, literature, and worked examples that established the foundations of information security. The course introduces the concept of the Information Domain as the fundamental primitive that is the axis for introducing the policy requirements of Confidentially, Integrity and Availability that motivate the need for Information Security. The concept of the reference monitor is the organizing principle for the course. The examination of

Equivalent Courses: Previous & Current Courses
CSE5060

Simple Requisites

Course Requisite Requirements

Prerequisites: Graduate standing or consent of instructor and advisor

No Requirement Level

CSE5063 - Access Countrol & System Security

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Topics include theoretical foundations for access control, formal access control models, access control mechanisms, tools and techniques, information flow policy, trust management, security architectures, and current issues o advanced research in access control. In addition, the protection mechanisms of general-purpose operating systems, software systems, and web applications are discussed.

Equivalent Courses: Previous & Current Courses
CSE563

Simple Requisites

Course Requisite Requirements

Prerequisites: Consent of instructor

No Requirement Level

CSE5064 - Secure Systems Administration

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course is primarily a Laboratory based course. The intention of the course is to give the students an experience of administering an IT system for a hypothetical business with the IT system experiencing increasingly aggressively sophisticated cyber-attacks. They are expected to build a business plan for the hypothetical business, a policy-based IT protection plan that they then implement on the host machines and networks in the laboratory. Simultaneously the adversary builds an exploitation plan that attempts to defeat the business's IT protection implementation and is able to achieve his/her exploitation objectives. The adversary has access to any/all exploit technology available, but there is a moderating factor of cost associated with the exploitation technology. The defenders have access to protection technology, but again there is a mitigating cost factor associated with the protection technology . The objective of the class is to experience and learn the capabilities an effectiveness of both defensive and

exploitative technology with an appreciation of the need for policy and planning that directs, supports, and constrains the actions of both sets of actors. (This course cannot be offered via Distance Education.)

Equivalent Courses: Previous & Current Courses
CSE564

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisites: CSE 5061 and CSE 5054 and with grades of C or higher, or consent of instructor and advisor

Complete ALL of the following Courses:

- CSE5061 - Foundations of Information Security
  AND CSE5054 - Computer Network Security

Additional Comments:

No Requirement Level

CSE5065 - Neural Networks

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Neuron modeling. The perceptron and multilayer perceptrons. Learning algorithms. The Kohonen model, the Grossberg model, the Hopfield model. Associative memory. Applications. Recent developments in the field.

Equivalent Courses: Previous & Current Courses
CSE565

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisites: CSE 3044; MATH 2420 and 382; each with a grade of C or higher, or consent of instructor and advisor

Complete ALL of the following Courses:

- CSE3044 - Design & Analysis of Algorithm
- MATH2420 - Applied Linear Algebra
  AND MATH382 - Probability and Statistics (Inactive)

Additional Comments:

No Requirement Level

CSE5067 - Soft Computing

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Artificial neural networks, with emphasis on multiplayer feedback networks, self-organizing networks, and Hopfield-style networks. Learning algorithms. Introduction to fuzzy systems and evolutionary computing. Engineering applications of soft computing. (Same as MENG 567: Smart Engineering Systems)

Equivalent Courses: Previous & Current Courses
CSE567

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisites: MATH 2420, 382; CSE 3044 each with a grade of C or higher, or consent of instructor and advisor

Complete ALL of the following Courses:

- MATH2420 - Applied Linear Algebra
  AND MATH3082 - Probability and Statistics
- CSE3044 - Design & Analysis of Algorithm

Additional Comments:

No Requirement Level

CSE5068 - Intelligent Systems

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Overview of the major paradigms of soft computing: neural networks, fuzzy systems, and evolutionary computing. In-depth coverage of selected topics in each area as relevant to intelligent systems. Recent advances in the field, and case studies of intelligent systems. Coursework includes a large-scale project. (Same as MENG 568: Smart Engineering Systems II)

Equivalent Courses: Previous & Current Courses
CSE568

Simple Requisites

Course Requisite Requirements

Prerequisite
Type

Prerequisite

Prerequisite

Prerequisites: MATH 2420, 382; CSE 3044 each with a grade of C or higher, or consent of instructor and advisor

Complete ALL of the following Courses:

- MATH2420 - Applied Linear Algebra
  AND MATH3082 - Probability and Statistics
- CSE3044 - Design & Analysis of Algorithm

Additional Comments:

No Requirement Level

CSE5070 - Privacy in Mobile Environments

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
The notion of privacy; privacy threat model; Anonymity through k-anonymity, l-diversity, t-closeness, etc. Approaches to protest the location, identity, and query history of mobile users. Recent developments.

Equivalent Courses: Previous & Current Courses
CSE570

Simple Requisites

Course Requisite Requirements

Prerequisite: consent of instructor

No Requirement Level

CSE5072 - Advanced Data Management

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Semi-structured, unstructured, and graph data; Large data versus Big Data; Relational versus NoSQL and centralized versus distributed databases; Query processing and the MapReduce model; Storage, Recovery, Concurrency, Consistency, Availability, and Scalability.

Equivalent Courses: Previous & Current Courses
CSE572

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisite: CSE 5073 with a C or higher or consent of instructor and advisor

Complete ALL of the following Courses:

- CSE5073 - Databases & Knowledge-Base Systems

Additional Comments:

No Requirement Level

CSE5073 - Databases & Knowledge-Base Systems

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Databases, object bases, and knowledge bases. Data models. Logical foundations of database and knowledge-base systems. Query optimization. Selected topics from current research.

Equivalent Courses: Previous & Current Courses
CSE573, CSE573D

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisites: CSE 3073, CSE 241 each with a grade of C or higher

Complete ALL of the following Courses:

- CSE3073 - Intro to Database Systems
  AND CSCI2310 - Discrete Mathematics for CS

Additional Comments:

No Requirement Level

CSE5076 - Advanced Visualization

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course presents application of graphical visualization to large problems and complex systems, with a focus on extracting and representing information in multidimensional data sets using 2D and 3D graphics. Topics include visualization tools and techniques, human vision and perception, color mapping, sound, data representation for insight extraction, time visualization, visual analytics, volume rendering, surface extraction and rendering. Students will perform visual analytics research for large problems and/or complex systems.

Equivalent Courses: Previous & Current Courses
CSE576

Simple Requisites

Course Requisite Requirements

Prerequisite: consent of instructor

No Requirement Level

CSE5081 - Directed Study

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
12

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, Standard Letter

Equivalent Courses: Previous & Current Courses
CSE581

No Requirements

CSE5085 - Graduate Seminar

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
An introduction to the methodology and skills required for academic research with emphasis on computer science. Students will learn the skills involved in discussing technical ideas; articulating research problems; critiquing, writing, and defending research proposals; reading, reviewing, and presenting research articles with appropriate visual aids; and exploring ethical issues associated with research. Students are expected to attend all presentations by outside speakers in the CS Speaker Series during the semester. Typically offered each fall.

Equivalent Courses: Previous & Current Courses
CSE585

Simple Requisites

Course Requisite Requirements

Prerequisite: CSE Graduate Standing

No Requirement Level

CSE5090 - Independent Study

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
12

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, No Report, Standard Letter

Course Description
Under the direction of a faculty member appointed by the department, the student shall prepare a paper making use of standard reference sources on some topics not covered by other course work.

Equivalent Courses: Previous & Current Courses
CSE590

No Requirements

CSE5091 - Thesis

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
12

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, No Report, Standard Letter

Equivalent Courses: Previous & Current Courses
CSE591

No Requirements

CSE5095 - Dissertation

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
12

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, No Report, Standard Letter

Equivalent Courses: Previous & Current Courses
CSE595

Simple Requisites

Course Requisite Requirements

Prerequisite: Successful completion of PhD candidacy exam and Academic Advisor recommendation for candidacy.

No Requirement Level

ECON2110 - Macroeconomic Principles

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Macroeconomics is the study of national and global economies. Topics include output, unemployment, inflation, economic and sustainable development; and how they are affected by financial systems, fiscal and monetary policies. [General Education Area IV]

Equivalent Courses: Previous & Current Courses
ECON251

No Requirements

ECON2120 - Microeconomic Principles

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Broad overview of microeconomics. Microeconomics is the study of issues specific to households, firms, or industries with an emphasis on the role of markets. Topics discussed will include household and firm behavior, demand and supply, government intervention, market structures and failures, and the efficient allocation of resources. [General Education Area IV]

Equivalent Courses: Previous & Current Courses
ECON252

No Requirements

ECON3062 - Managerial Economics

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
A coordination of economic theory and managerial practice. Consumer demand, production functions, cost behavior, output determination, and pricing within various market structures.

Equivalent Courses: Previous & Current Courses
ECON362

Simple Requisites

Course Requisite Requirements

Corequisites
Type
Corequisite

Corequisite

Enroll in the following Courses:
- ECON2120 - Microeconomic Principles
  AND MATH2350 - Statistical Methods

Additional Comments:

No Requirement Level

ECON3063 - Internet Economics & E-Commerce

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Standard Letter

When Offered
Spring

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Enroll in the following Courses:
- ECON2120 - Microeconomic Principles

Coreq of Math 2350

Enroll in the following Courses:
- MATH2350 - Statistical Methods

Additional Comments:

No Requirement Level

ECON3063 - Internet Economics & Electronic Commerce

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
A coordination of economic theory and managerial practice. Consumer demand, production functions, cost behavior, output determination, and pricing within various market structures.

When Offered
Spring

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prereq of ECON 2120

Complete ALL of the following Courses:
- ECON2120 - Microeconomic Principles

Additional Comments:

Corequisite Requirement
Type
Corequisite

Coreq of MATH 2350

Enroll in the following Courses:
- MATH2350 - Statistical Methods

Additional Comments:

No Requirement Level

ECON3072 - Natural Resource & Environmental Economics

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Introduction to the economic concepts and methods used in defining and analyzing natural resources and environmental quality problems.

Equivalent Courses: Previous & Current Courses
ECON372

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:
- ECON2120 - Microeconomic Principles

Additional Comments:

No Requirement Level

ECON4090 - Selected Topics

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
3

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Current topics in economics.

Equivalent Courses: Previous & Current Courses
ECON490

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

Prerequisite

Upper-class standing or consent of instructor and advisor

Additional Comments:

No Requirement Level

ECON4091 - Independent Study

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
3

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, Standard Letter

Equivalent Courses: Previous & Current Courses
ECON491

Simple Requisites

Course Requisite Requirements

No Requirement Level

Prerequisites
Type
Prerequisite

Fulfill ANY of the following requirements:

Upper-class standing

OR

consent of instructor and advisor

Additional Comments:

EMGT5001 - Management Science for Engineering Management

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course exposes students to up-to-date management science applications in engineering and technology organizations. Key techniques include linear programming, inventory models, and forecasting models.

Equivalent Courses: Previous & Current Courses
EMGT501, EMGT501D

No Requirements

EMGT5002 - Financial Management

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course begins with study of the interaction between financial and accounting systems and continues with a discussion of cash flow analysis, performance analysis, and business projections. This foundation is followed by discussion of the latest in corporate financial management, capital budgeting, business valuation, merger and acquisition, among other topics.

Equivalent Courses: Previous & Current Courses
EMGT502, EMGT502D

No Requirements

EMGT5003 - Information Systems in Technology Organizations

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
The role of information systems in the decision processes of data- and technology-intensive organizations. Topics include methodology for database design; models for business processes and workflows; approaches for data analytics and prediction; and ethical and social impacts of information systems. The course involves some hands-on experience with systems such as Oracle or a similar industry-standard DBMS (Data Base Management System). This course shares lectures with MGMT 4003, with additional requirements for graduate credits, such as term paper.

Equivalent Courses: Previous & Current Courses
EMGT503, EMGT503D

No Requirements

EMGT5004 - Engineering Analytics

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Standard Letter

Course Description
This course is designed to provide engineering managers with a basic foundation for data-driven decision making. Decisions by modern engineering managers increasingly require a range of statistical skills including gathering and describing data, designing samples and experiments, drawing statistical inferences and conclusions, evaluating the confidence of conclusions, developing regression and other empirical models for anticipating future behavior and use of statistical quality control and six Sigma to drive process improvement. The course will also cover selected recent developments in data analytics with applications in engineering and technology contexts.

Equivalent Courses: Previous & Current Courses
EMGT504, EMGT504D

No Requirements

EMGT5005 - Technology Marketing

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Design, development, marketing, and sustaining of new products and technologies both inside and outside an engineering and technology organization. The course also introduces basic methodologies for market research, including data-driven empirical analysis and other qualitative approaches. This course shares lectures with MGMT 4005, with additional requirements for graduate credits, such as a term paper.

Equivalent Courses: Previous & Current Courses
EMGT505, EMGT505D

No Requirements

EMGT5006 - Managing HR in Technolgy Organizations

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
The study of human resource management within technology and engineering organizations at the project, department, and enterprise levels. The course exposes students to theories and practices related to leading project teams, managing employee performance and productivity, diagnosing organizational issues, developing strategic human resource plans, managing employee compensation, and responding to the changing legal and technological workplace environments. This course shares lectures with MGMT 4006, with additional requirements for graduate credits, such as a term paper.

Equivalent Courses: Previous & Current Courses
EMGT506, EMGT506D

No Requirements

EMGT5007 - Technology Entrepreneurship

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Entrepreneurship is important for new startups and existing companies. This course is focused on development of skills that will assist in the advancement of innovations that will help innovators gain resources to support their efforts. Topics covered include game-theory based negotiation exercises, development of the value proposition for new products and services, and design of the business model in hyper-competitive environments.

Equivalent Courses: Previous & Current Courses
EMGT507, EMGT507D

No Requirements

EMGT5009 - Systems Risk & Decision Analysis

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
An advanced treatment on major topics involved in modern engineering decision-making and risk management: fundamental statistics/probability/economics theoretical prelims for decision theory; multi-criteria decision-making and decision making under uncertainty; game theory and its applications; decision making processes and risk evaluation; and an introduction to Monte Carlo and Marko decision processes.

Equivalent Courses: Previous & Current Courses
EMGT509, EMGT509D

Simple Requisites

Course Requisite Requirements

Prerequsites
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- EMGT5004 - Engineering Analytics

or consent of the instructor

Additional Comments:

No Requirement Level

EMGT5010 - Energy Markets

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
An advanced research-oriented class that utilizes a managerial methodology (DEA: Data Envelopment Analysis) for complex energy policy and environmental assessment to include techniques used in modeling business/policy applications for understanding business strategy, and policy implications for energy and environmental problems.

No Requirements

EMGT5011 - Financial Modeling

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Portfolio optimization and other applications of Management Science techniques in a financial context.. Analysis of domestic and international risky assets, including commodities, financial assets, and debt instruments. Coverage of the latest techniques in financial risk management, including hedging and other risk sharing techniques.

Equivalent Courses: Previous & Current Courses
EMGT511, EMGT511D

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisites: EMGT 5002 and three other courses from EMGT 5001-507 or consent of instructor and advisor

Complete ALL of the following Courses:

- EMGT5002 - Financial Management
- EMGT5001 - Management Science for Engineering Management
- EMGT5002 - Financial Management
- EMGT5003 - Information Systems in Technology Organizations
- EMGT5004 - Engineering Analytics
- EMGT5005 - Technology Marketing
- EMGT5006 - Managing HR in Technolgy Organizations
- EMGT5007 - Technology Entrepreneurship

Additional Comments:

No Requirement Level

EMGT5012 - Complex Financial Systems

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Modern financial systems are complex, interconnected, and sensitive to a variety of information from a variety of sources. This course is devoted to development and testing of valid simulation models of complex financial systems and the analysis of model outputs.

Equivalent Courses: Previous & Current Courses
EMGT512, EMGT512D

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

Prerequisite

EMGT 5011 or consent of instructor and advisor

Complete ALL of the following Courses:

- EMGT5011 - Financial Modeling

or consent of instructor and advisor

Additional Comments:

No Requirement Level

EMGT5013 - Technology Leadership Seminar

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Explore classical and modern leadership theories and their practical application to technology and engineering organizations. Apply leadership and decision tools and techniques to address issues of organizational change, employee motivation, conflict resolution, team development, and professional ethics.

No Requirements

EMGT5014 - Managerial Economics

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course will introduce the intermediate microeconomic theory with applications focusing on the area of technology and engineering management. Specific topics should cover the nature of firms, consumer demand, production theory, cost estimation, market structure and competition, pricing strategies and practices, firm capital budgeting and risk, multinational corporations, government, and industrial policies. This course shares lectures with ECON 4014, with additional expectations for graduate credit, such as a term paper.

When Offered
Spring

Simple Requisites

Course Requisite Requirements

Prerequisites: graduate standing or consent of instructor

No Requirement Level

EMGT5015 - Supply Chain Management

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course focuses on the management and improvement of supply chain processes and performance. Introduction to key concepts and techniques to analyze, manage and improve the supply chain processes in different markets. Additional topics may include global supply chain design, planning and coordinating the supply chain, planning, and managing inventories, transportation networks, etc.

When Offered
Spring

No Requirements

EMGT5021 - Advanced Management of Science Applications

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Use of management science techniques such as Data Envelopment Analysis (DEA) to optimally solve resource allocation problems. Management Science techniques applied to public policy issues.

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

Prerequisites

EMGT 5001 and three other courses from EMGT 5001-507 or consent of instructor and advisor

Complete ALL of the following Courses:

- EMGT5001 - Management Science for Engineering Management
  AND EMGT5002 - Financial Management
  AND EMGT5003 - Information Systems in Technology Organizations
  AND EMGT5004 - Engineering Analytics
  AND EMGT5005 - Technology Marketing
  AND EMGT5006 - Managing HR in Technolgy Organizations
  AND EMGT5007 - Technology Entrepreneurship

Additional Comments:

No Requirement Level

EMGT5022 - Engineering Management Seminar

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Study of latest research data concerning engineering management issues. Issues such as measuring performance, project management, and human resource management in technology organizations where tasks and outcomes may be ill defined.

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- EMGT5007 - Technology Entrepreneurship

Additional Comments:

No Requirement Level

EMGT5071 - Topics in Engineering Management

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Study of a special topic in Engineering Management not otherwise treated.

No Requirements

EMGT5081 - Directed Study

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
12

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Study a current topic in Engineering Management with a member of the faculty. Most directed study topics will be based on and grow out of Engineering Management program coursework. A directed study usually progressions to an independent study project or thesis research that fulfills the requirement of the M.S in Engineering Management degree.

Equivalent Courses: Previous & Current Courses
EMGT581, EMGT581D

No Requirements

EMGT5089F - First Responder Special Topics

General

Credit Hrs

Credit Hrs:
2

Grade Modes
Audit, Pass/Fail, Standard Letter

No Requirements

EMGT5090 - Final Project

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
9

Credit Hours Operator:
TO

Grade Modes
Pass/Fail, No Report, Standard Letter

Course Description
In this course students engage in an analytical research project. Objectives and scope are open, but workplace applications are encouraged. The project will culminate in a written project report and an oral presentation.

Equivalent Courses: Previous & Current Courses
EMGT590

Simple Requisites

Course Requisite Requirements

Corequisite Type
Corequisite

Corequisite
At least 18 credits of EMGT courses or consent of the advisor.

Additional Comments:

No Requirement Level

ENTR1110 - Creativity, Innovation, & Entrepreneurship

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course provides a hands-on exploration of the entrepreneurial process, from opportunity recognition and evaluation to resource acquisition and management. Students will analyze real-world case studies of successful and failed startups, gaining insights into the challenges and complexities of building a business. Through practical exercises and projects, students will learn how to create viable business models, conduct effective market research, and craft compelling pitches to potential investors and other stakeholders. The course emphasizes critical thinking, problem-solving, and effective communication—essential skills for entrepreneurial success.

No Requirements

ENTR1120 - Creativity, Innovation, & Entrepreneurship

General

Credit Hrs

Credit Hrs:
1

Grade Modes
Standard Letter

Course Description
Learn how to develop your creative ideas into opportunities working with faculty and guest speakers who will share their hands-on experience and insight into creating and commercializing innovative products and services.

No Requirements

IT101L - Intro to Computer Science & Information Technology

General

Credit Hrs

Credit Hrs:
0

Grade Modes
Audit, Pass/Fail, Standard Letter

Equivalent Courses: Previous & Current Courses
CSE101L

No Requirements

IT3011 - Human Information Processing & Decision Making

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Recent advances in knowledge about how people process and act upon information are presented. Models of human decision making are analyzed in the context of secure information systems and used to assess ways to best manage the people and technology associated with secure information systems.

Equivalent Courses: Previous & Current Courses
IT311, IT311D

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

PHYS 1310 with a grade of C or higher and upper division standing in the IT program

Complete ALL of the following Courses:
- PHYS1310 - g3:Calculus-based Physics I

Additional Comments:

No Requirement Level

IT3021 - Internet & Web Programming

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course has a practical emphasis on the design and techniques for developing internet-based applications, mainly focusing on web programming. Topics include HTML, client-side scripting language (JavaScript), server-side programming (e.g., Servlets, JSP, and J2EE), and XML/web services (e.g., Java and .NET). This course will also cover some important topics needed for internet-based application development, such as Internet architectures, basic object-oriented programming (OOP) concepts, and web security. Course work includes substantial programming homework and team-based projects. (Same as CSE 3021.)

Equivalent Courses: Previous & Current Courses
IT321

Simple Requisites

Course Requisite Requirements

IT Prerequisites
Type
Prerequisite

Course Requirements

Fulfill ALL of the following requirements:

100 Level Courses

Passed with a C or higher

Complete ANY of the following Courses:
- IT117 - Data Structures in Python (Inactive)
- IT122 - Data Structure and Algorithms (Inactive)

AND

200 Level Courses

Passed with a C or higher

Complete ALL of the following Courses:
- IT213 - Intro Obj Oriented Programming (Inactive)

Additional Comments:

No Requirement Level

IT3026 - Software Engineering

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course provides the introductory overview of software engineering, concentrating on large-scale software system design and implementation. Topics include software life cycle, UML-based design language, design tools and techniques, design documentation, software testing, secure software construction, and software project management. Course work includes a team-based project. (Same as CSE 3026.)

Equivalent Courses: Previous & Current Courses
IT326

Simple Requisites

Course Requisite Requirements

IT Prerequisites
Type
Prerequisite

Course Requirements

Fulfill ALL of the following requirements:

100 Level Courses

Passed with a C or higher

Complete ANY of the following Courses:
- IT117 - Data Structures in Python (Inactive)
- IT122 - Data Structure and Algorithms (Inactive)

AND

200 Level Courses

Passed with a C or higher

Complete ALL of the following Courses:

- IT213 - Intro Obj Oriented Programming (Inactive)

Additional Comments:

IT Corequisites
Type
Corequisite

English Requirement

Enroll in the following Courses:

- ENGL3041 - i1:Technical Writing
  OR ENGL341 - Technical Writing (Inactive)

Additional Comments:

No Requirement Level

IT3028 - Secure Software Construction

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Formal methods and practical techniques for the specification, design, implementation, and validation of computer software. Current software engineering and management practices, with emphasis on ensuring software reliability, safety, and security. Course work includes a team project to develop a sizeable, real-world application software. (Same as CSE 3028.)

Equivalent Courses: Previous & Current Courses
IT328

Simple Requisites

Course Requisite Requirements

IT Prerequisites
Type
Prerequisite

Computer Science Courses

Passed with a C or higher

Complete ALL of the following Courses:

- CSE222 - Systems Programming (Inactive)
- IT213 - Intro Obj Oriented Programming (Inactive)

Additional Comments:

No Requirement Level

IT3030 - Management & Organizational Behavior

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Classical and contemporary organization theories, interpersonal and organization behavior, motivation, communication, leadership, decision process in organizations. (Same as MGMT 3030.)

Equivalent Courses: Previous & Current Courses
IT330

Simple Requisites

Course Requisite Requirements

IT Prerequisites
Type
Prerequisite

Course Requirements

Fulfill ANY of the following requirements:

Condition A

Fulfill ALL of the following requirements:

English Requirement

Complete ALL of the following Courses:

- ENGL1120 - g1:Composition II

AND

Level Restriction

Upper-class standing

OR

Condition B

Consent of instructor and advisor

Additional Comments:

No Requirement Level

IT3051 - Modeling & Simulat Tech for IS

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Fundamentals and techniques for designing and using simulation, modeling, and optimization algorithms with applications in system performance modeling, business infrastructure modeling, and distributed and parallel computing. An introduction to advanced complex systems models. (Same as CSE 3051.)

Equivalent Courses: Previous & Current Courses
IT351

Simple Requisites

Course Requisite Requirements

IT Prerequisites
Type
Prerequisite

Computer Science Requirements

Passed with a C or higher

Complete ALL of the following Courses:

- CSCI2220 - Data Structures & Algorithms
- CSCI2310 - Discrete Mathematics for CS

Additional Comments:

No Requirement Level

IT3053 - Introduct to Computer Networks

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Introduction to computer networking, the ISOOSI protocol stack, LAN, MAN, and WAN. Physical layer: transmission media (wireline and wireless); data signaling, modulation, and coding; multiplexing. Fiber optics networking technology: protocols & examples. Data link Layer: error/flow control— protocols design issues; MAC protocols for channel access and allocation. Wireless technology and protocols standards — IEEE 802.11 physical layer and MAC sublayer protocols. Network layer: subnet switching (CS/DG/VC) & routing protocols (Non/Adaptive); Congestion Control and QoS protocols. ISO vs. (TCP-UDP)/IP the Internet protocol stacks. Internet relays and protocols, e.g., routers, gateways, etc. Introduction to network security. Application layer protocols, E.G., DNS, E-mail, etc. (Same as CSE 3053.)

When Offered
Fall

Equivalent Courses: Previous & Current Courses
IT353

Simple Requisites

Course Requisite Requirements

IT Prerequisites
Type
Prerequisite

Computer Science Courses

Passed with a C or higher

Complete ALL of the following Courses:

- CSE222 - Systems Programming (Inactive)

Additional Comments:

No Requirement Level

IT3063 - Computer Security

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course provides an overview of the principles and practices of secure computing, mainly focusing on their application in security solution design and implementation. Topics include risk/threat analysis, secure coding practices, cryptographic tools, security architectures, system security, software security, and network security. Course work include quizzes, homework, midterm and final exams, and one final team-based project. (Same as CSE 3063.)

When Offered
Spring

Equivalent Courses: Previous & Current Courses
IT363

Simple Requisites

Course Requisite Requirements

IT Prerequisites
Type
Prerequisite

IT Courses

Passed with a C or higher

Complete ALL of the following Courses:

- IT221 - Computer System Organization (Inactive)
- IT3053 - Introduct to Computer Networks

Additional Comments:

No Requirement Level

IT3073 - Intro to Database Systems

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Conceptual modeling and database design using the entity-relationship model. The relational model; relational algebra and relational query languages. Database integrity. Physical data organization. Non-relational models such as NoSQL and graph databases. Introduction to concurrency control and recovery. Course work includes a project using SQL and the Oracle Database Management System. (Same as CSE 3073.)

Equivalent Courses: Previous & Current Courses
IT373

Simple Requisites

Course Requisite Requirements

IT Prerequisites
Type
Prerequisite

Computer Science Courses

Each passed with a C or higher

Complete ALL of the following Courses:
- CSCI2222 - Data Structures in Python
- CSCI2220 - Data Structures & Algorithms
- CSCI2310 - Discrete Mathematics for CS

Additional Comments:

No Requirement Level

IT3082 - Ethics of Computing and IT

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
In this class, students will examine ethical and social questions regarding computing and information technologies. The course challenges students to think about connections among digital technologies, the responsibilities of information technology professionals, and social justice as they study topics such as social media, military applications of digital media, gendered technologies, and access to information technologies. In addition to learning the basics of research ethics and social responsibility, students will examine real-world debates regarding subjects like big data, computer code, and digital networks, and they will analyze the legal, political, and social stakes of information technologies. (Same as CSE 3082and PHIL 3082). This course may be used to satisfy 3 credit hours of the General Education Area 5 requirements.

When Offered
Spring

Equivalent Courses: Previous & Current Courses
IT382, IT382D

No Requirements

IT4041 - Cryptography & Applications

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course provides an introductory overview of modern cryptographic theory and techniques, mainly focusing on their application into real systems. Topics include number theory, probability and information theory, computational complexity, symmetric and asymmetric cryptosystems, one-way functions, block and stream ciphers, Kerberos authentication systems, public key infrastructure (PKI), secure socket layer/transport layer security (SSL/TLS), and cryptographic protocols/applications in many real systems. (Same as CSE 4041.)

Equivalent Courses: Previous & Current Courses
IT441

Simple Requisites

Course Requisite Requirements

IT Prerequisites
Type
Prerequisite

Computer Science Courses

Each passed with a C or higher

Complete ALL of the following Courses:
- CSCI2220 - Data Structures & Algorithms
- CSCI2310 - Discrete Mathematics for CS

Additional Comments:

No Requirement Level

IT4051 - Intro to Parallel Processing

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Introduction to supercomputers and massively-parallel machine architecture, models of parallel computation, parallel algorithms, synchronization, parallel languages, data and functional parallelism, parallel performance analysis,

popular interfaces, and parallel debugging. Students will gain experience in parallelization of sequential algorithms and implementation of parallel algorithms. (Same as CSE 4051.)

Equivalent Courses: Previous & Current Courses
IT451, IT451D

Simple Requisites

Course Requisite Requirements

IT Prerequisites
Type
Prerequisite

IT Courses

Passed with a C or higher

Complete ALL of the following Courses:

- IT122 - Data Structure and Algorithms (Inactive)

Additional Comments:

No Requirement Level

IT4053 - Advances in Computer Networks & Internet

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
In depth. coverage of layering protocols; stacks (ISOOSI and TCP/IP) and computer networks architectures, modern examples of LANs, MANs, WANs protocols/architectures. Recent developments in Fiber optics technology — protocols and architectures. High speed “all-fiber-optics” networks. Internetworking: global addresses/ names and translation, virtual networks and tunnels, routing, subnetworks switching protocols, IPv6, multicasting, Mobile IP. End-to-end protocols, TCP and UDP. Advances in Congestion control and resource allocation. Client-server models & applications. The QoS mechanism integrated/differentiated, ATM QoS. Network security: information and link security, encryption, internetworking security, IPsec, firewalls, VPN, wireless security. Analysis of networks protocols. (Same as CSE 4053.)

Equivalent Courses: Previous & Current Courses
IT453

Simple Requisites

Course Requisite Requirements

IT Prerequisites
Type
Prerequisite

IT Courses

Passed with a C or higher

Complete ALL of the following Courses:

- IT3053 - Introduct to Computer Networks

Additional Comments:

No Requirement Level

IT4062 - Systems, Risk, & Decision Analysis

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Analysis of systems and managerial decisions under conditions of risk or uncertainty. Optimal project evaluations and ranking of alternatives using expected value and expected utility criteria. Topics include risk sharing, Bayesian revision of probabilities, value of information, and preference assessment procedures. (Same as MGMT 4062.)

Equivalent Courses: Previous & Current Courses
IT462, IT462D

Simple Requisites

Course Requisite Requirements

IT Prerequisites
Type
Prerequisite

Course Requirements

Fulfill ALL of the following requirements:

Math Courses

Passed with a grade of C or higher

Complete ANY of the following Courses:

- MATH2350 - Statistical Methods
- MATH3082 - Probability and Statistics

AND

Level Restriction

upper division standing

Additional Comments:

No Requirement Level

IT4063 - Information Assurance

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Defensive and offensive information warfare. Information system security. Computer break-ins, hacking, and other attack methods. Vulnerability and risk analysis. Theory and applications of cryptography. Intrusion detection and incident response. Security planning and management. (Same as CSE 4063.)

Equivalent Courses: Previous & Current Courses
IT463

Simple Requisites

Course Requisite Requirements

IT Prerequisites
Type
Prerequisite

Level Requirement

Senior standing

Additional Comments:

No Requirement Level

IT4066 - Project Management

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Development of work breakdown structures and multi-factor project simulations to be used in dynamic resource allocations. Assessment and evaluation of project models over time. (Same as MGMT 4076.)

Equivalent Courses: Previous & Current Courses
EMGT508, IT406, IT466D, MGMT476, MGT476

Simple Requisites

Course Requisite Requirements

IT Prerequisites
Type
Prerequisite

Course Requirements

Fulfill ANY of the following requirements:

Required Classes

Each passed with a grade of C or higher

Complete ALL of the following Courses:

- MATH2350 - Statistical Methods
- MGMT4072 - Production & Operations Management

OR

Instructor Approval

consent of instructor and advisor

Additional Comments:

No Requirement Level

IT4076 - Visualization

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course presents application of graphical visualization to current problems, with a focus on extracting and representing information in multidimensional data sets using 2D and 3D graphics. Topics include visualization tools and techniques, human vision and perception, color mapping, sound, data representation for insight extraction, time visualization, visual analytics, volume rendering, surface extraction and rendering. Students will develop visualizations of real world problems. (Same as CSE 4076.)

Equivalent Courses: Previous & Current Courses
IT476

Simple Requisites

Course Requisite Requirements

IT Prerequisites
Type
Prerequisite

Course Requirements

Fulfill ANY of the following requirements:

Computer Sciences Courses

Passed with a C or higher

Complete ALL of the following Courses:

- CSCI2240 - Systems Programming

OR

Instructor Approval

consent of instructor and advisor

Additional Comments:

No Requirement Level

IT4081 - Senior IT Design Project

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
In this capstone course for IT majors, students begin a two-semester practical research project designed to integrate coursework in computer science and business management in order to identify, analyze, and implement a solution to a practical information technology problem posed by a public, nonprofit, or business organization. The first semester is focused on characterizing the problem(s), identifying technical requirements, articulating the feasibility of and

business case for a practical solution, and establishing project goals. Regular meetings with faculty and client, a final report, and an oral presentation are required.

Equivalent Courses: Previous & Current Courses
IT481

Simple Requisites

Course Requisite Requirements

IT Prerequisites
Type
Prerequisite

IT Courses

All passed with a grade of C- or better

Complete ALL of the following Courses:

- IT3026 - Software Engineering
- IT3030 - Management & Organizational Behavior
- IT3053 - Introduct to Computer Networks
- IT3073 - Intro to Database Systems

Additional Comments:

IT Corequisites
Type
Corequisite

IT Courses

Complete ALL of the following Courses:

- IT3063 - Computer Security

Additional Comments:

No Requirement Level

IT4082 - Senior IT Design Project

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
IT 4082 must be taken in the semester immediately following IT 4081 to maintain project continuity. This course is focused on evaluating alternative approaches to solve the problem(s) identified in IT 4081, specifying a technical solution(s), and designing and implementing the selected solution. A final report and oral presentation to faculty, reviewers, and the client are required. Typically offered in the Spring semester.

Equivalent Courses: Previous & Current Courses
IT482

Simple Requisites

Course Requisite Requirements

IT Prerequisites
Type
Prerequisite

IT Courses

Passed with a C- or higher

Complete ALL of the following Courses:

- IT4081 - Senior IT Design Project

Additional Comments:

IT Corequisites
Type
Corequisite

IT Courses

Complete ALL of the following Courses:

- IT3021 - Internet & Web Programming
- IT3082 - Ethics of Computing and IT
- IT4062 - Systems, Risk, & Decision Analysis
- IT4066 - Project Management

Additional Comments:

No Requirement Level

IT4085 - Undergrad Seminar Spec Topics

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
A research seminar for undergraduate students with a focus either on special topics in computer science/information technology or on the methodology and skills required for research in computer science/information technology. Use as a technical elective is limited (see requirements above), but may be taken multiple times as a general elective.

Equivalent Courses: Previous & Current Courses
IT485

Simple Requisites

Course Requisite Requirements

IT Prerequisites
Type
Prerequisite

Level Resitriction

Senior standing, one semester of upper division courses in computer science/information technology, and consent of the instructor

Additional Comments:

No Requirement Level

MGMT1110 - Principles of Management

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Standard Letter

When Offered
Spring

MGMT2110 - Principles of Management

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
An introduction to the basic theory of management including the functions of planning, organizing, staffing, leading, and controlling, while considering management's ethical and social responsibilities.

No Requirements

MGMT2110 - Principles of Management

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
An introduction to the basic theory of management including the functions of planning, organizing, staffing, leading, and controlling, while considering management's ethical and social responsibilities.

No Requirements

MGMT3001 - Survey of Engineering Management

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Survey designed for engineering majors. Topics include introductions to qualitative and quantitative management models and their implementation.

Equivalent Courses: Previous & Current Courses
MGT301

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- ES110 - Intro to Engineering Design
  AND ES111 - Computer Programming for Engineers

Additional Comments:

No Requirement Level

MGMT3030 - Management Behavior & Organization

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Classical and contemporary organization theories, interpersonal and organization behavior, motivation, communication, leadership, decision process in organizations.

Equivalent Courses: Previous & Current Courses
MGMT330

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Completion Requirement

Prerequisite

Complete ALL of the following Courses:

- ENGL1120 - g1:Composition II

and upper-class standing or consent of instructor and advisor.

Additional Comments:

No Requirement Level

MGMT3081 - Strategic Market Analysis

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Analysis of data derived from either survey instruments, archival sources, or both. Design and implementation of instruments designed to elicit information useful to managers. Single and multiple variable impacts on managerial decision making.

Equivalent Courses: Previous & Current Courses
MGMT381

No Requirements

MGMT4003 - Info Systems in Tech Org

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
The role of information systems in the decision processes of data- and technology-intensive organizations. Topics include methodology for database design;, models for business processes and workflows;, approaches for data analytics and prediction;, and ethical and social impacts of information systems. The course involves some hands-on experience with systems such as Oracle or a similar industry-standard DBMS (DataBase Management System). This course shares lectures with EGMT 5003, with additional requirements for graduate credits, such as a term paper.

Equivalent Courses: Previous & Current Courses
MGMT403, MGMT403D

No Requirements

MGMT4005 - Technology Marketing

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Design, development, marketing, and sustaining of new products and technologies both inside and outside an engineering and technology organization. The course also introduces basic methodologies for market research, including data-driven empirical analysis and other qualitative approaches.

Simple Requisites

Course Requisite Requirements

MGMT 4005 Prereq
Type
Prerequisite

MGMT 4005 Prereq

Complete ALL of the following Courses:
- ECON2120 - Microeconomic Principles
- or upper-class standing and consent of the instructor

Additional Comments:

No Requirement Level

MGMT4006 - Human Resource Management

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisites: MGMT 3030; or upper-class standing and consent of the instructorThe study of human resource management within technology and engineering organizations at the project, department, and enterprise levels. The course exposes students to theories and practices related to leading project teams, managing employee performance and productivity, diagnosing organizational issues, developing strategic human resource plans, managing employee compensation, and responding to the changing legal and technological workplace environments. Same as EMGT 5006

No Requirements

MGMT4007 - Technology Entrepreneurship

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Entrepreneurs are the cornerstone of economic growth; they must be organized and armed with the tools necessary to raise capital, recruit talent and negotiate contracts. This course is an overview of the various organizational forms used by entrepreneurs, sources of capital available to growing companies, and mechanisms and methods for accessing that capital. Emphasis on practical, hands-on activities that demonstrate this process. Shares lecture with EMGT 5003. Additional work required at the graduate level.

Equivalent Courses: Previous & Current Courses
MGMT407, MGMT407D

No Requirements

MGMT4015 - Supply Chain Management

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course focuses on the management and improvement of supply chain processes and performance. Introduction to key concepts and techniques to analyze, manage and improve the supply chain processes in different markets. Additional topics may include global supply chain design, planning and coordinating the supply chain, planning, and managing inventories, transportation networks, etc. Same as EMGT 5015

Equivalent Courses: Previous & Current Courses
EMGT5015

No Requirements

MGMT4015 - Supply Chain Management

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course focuses on the management and improvement of supply chain processes and performance. Introduction to key concepts and techniques to analyze, manage and improve the supply chain processes in different markets. Additional topics may include global supply chain design, planning and coordinating the supply chain, planning, and managing inventories, transportation networks, etc. Same as EMGT 5015

Simple Requisites

Course Requisite Requirements

MGMT 4015 Prereq
Type
Prerequisite

MGMT4015

or consent of instuctor

Complete ALL of the following Courses:

- ECON2110 - Macroeconomic Principles
- MGMT3030 - Management Behavior & Organization

Additional Comments:

No Requirement Level

MGMT4051 - Technology Management Seminar

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Seminar focused on building new technology products or services from idea creation through commercialization, to include budgeting, financial analysis, marketing, project planning, and strategies for intellectual property protection.

Equivalent Courses: Previous & Current Courses
MGMT451

No Requirements

MGMT4062 - Systems, Risk, & Decision Analysis

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Analysis of systems and managerial decisions under conditions of risk or uncertainty. Optimal project evaluations and ranking of alternatives using expected value and expected utility criteria. Topics include risk sharing, Bayesian revision of probabilities, value of information, and preference assessment procedures. (Same as IT 462)

Equivalent Courses: Previous & Current Courses
MGMT462, MGMT462D

No Requirements

MGMT4072 - Production & Operations Management

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Application of quantitative methods to problems encountered in management. Problem solving emphasis with extensive use of applications software. Topics include linear and integer programming, forecasting, queueing theory and simulation.

Equivalent Courses: Previous & Current Courses
MGMT472

No Requirements

MGMT4073 - Production & Operations Management I

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Application of concepts and principles related to management of the production function in manufacturing and services. Problem solving emphasis with extensive use of applications software. Topics include independent and dependent demand inventory models, facility layout, facility location; quality control; and project management.

Equivalent Courses: Previous & Current Courses
MGMT473

No Requirements

MGMT4076 - Project Management

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Development of work breakdown structures and multi-factor project simulations to be used in dynamic resource allocations. Assessment and evaluation of project models over time.

Equivalent Courses: Previous & Current Courses
MGMT476, MGMT476D

No Requirements

MGMT4081 - Senior Seminar Technical Management

General

Credit Hrs
Credit Hrs:
1

Credit Hours Max:
3

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Senior research project that integrates course content across the management curriculum

Equivalent Courses: Previous & Current Courses
MGMT481

No Requirements

MGMT4086 - Business Policy & Corporate Strategy

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Integration of the basic functions of a business enterprise—e.g., marketing, finance, and production—through case analysis. From the perspective of top management, emphasis will be placed on examination of external environments, and the development of strategies for the organization's creation of proper relationships and responses to social, political, and economic conditions.

Equivalent Courses: Previous & Current Courses
MGMT486

Simple Requisites

Course Requisite Requirements

MGMT 4086 Prerequisite courses
Type
Prerequisite

Prerequisites: MATH 2350, ECON 2110 or 2120, and MGMT 3030 or 3035

Complete ALL of the following Courses:

- MATH2350 - Statistical Methods
- ECON2110 - Macroeconomic Principles
  OR ECON2120 - Microeconomic Principles
- MGMT3030 - Management Behavior & Organization
  OR MGMT3035 - Marketing New Products/Innovat (Inactive)

Additional Comments:

No Requirement Level

MGMT4088 - Technology Entrepreneurship

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Pass/Fail, Standard Letter

Course Description
This workshop is designed to familiarize participants with the process of technology marketing. Assessment of new-product marketability, development of marketing and business plans, presentation of plans in a competitive environment to an evaluation panel composed of people from various business backgrounds.

Equivalent Courses: Previous & Current Courses
MGMT488

No Requirements

CSE Dept/ Business and Technology Management (program) Department

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- ***Professor*** *Sueyoshi*
- ***Associate Professors*** *Anselmo, Reinow*
- ***Assistant Professor*** *Wang*
- ***Visiting Assistant Professor*** *Ryu*
- ***Adjunct Faculty:*** *Berl, Lentz, Mazumdar, Stephenson, Udell*

Degrees offered: A.S. of Business; B.S. of Management, B.S. of Management of Technology, B.A in Management and Master of Engineering Management (MEM), M.S in Engineering Management

The Business and Technology Management (BTM) program provides undergraduate and graduate degree programs that draw heavily on Tech's strengths in science, engineering, technology and math (STEM). The aim of the department is to develop in students substantive decision-making and analytical skills and tools, as well as the functional knowledge required to effectively lead complex technology-based organizations in today's competitive global economy.

The program offers an additional career path that prepares students to be future technology innovators and entrepreneurs. Students will take courses in accounting, economics, human resources, finance, management, business strategy, marketing, operations research, statistics and entrepreneurship.

New Mexico Tech offers three undergraduate degree options: The B.S. Management degree provides students with the knowledge and skills required to manage complex projects and functional areas of an enterprise, i.e. accounting, finance, logistics, marketing, or human resources. In addition, the B.S. in Management prepares potential technology entrepreneurs to start their own companies.

The B.S. Management of Technology integrates management course work with study in an engineering or science field of the student's choice, providing specific knowledge and skills required to lead those organizations. Whichever degree option a student may choose, BTM students are problem solvers across disciplines, to include natural resources, energy, manufacturing, information systems, and environmental management. Students may also pursue a minor in management in addition to their major course of study. Each management student is assigned a faculty advisor who will help him or her select a degree option and recommend courses to be taken.

The BTM program also offers an A.S. degree in Business. This program is designed for students seeking to complete a two-year degree in business (potentially in addition to their major B.S. degree) and/or those who may wish to transfer to a four-year college or university. Required courses are often transferable among participating New Mexico colleges and universities. The department also offers a Master of Engineering Management (MEM) graduate degree that prepares students with a B.S. degree in science or engineering for leadership positions in engineering, science, and technology organizations. Please see the "Engineering Management" section of this catalog for further information.

Programs

Economics (minor)

[Program Overview]

Program Title
Minor in Economics

Department(s)
CSE Dept/ Business and Technology Management (program)

Program Description
The Minor in Management degree option (18 credit hours) supports the growing demand for a minor that focuses on industry, public policy, and economic development.
Minimum credit hours required—18

Simple Requisites

Program Requirements

Course Requirements
Type
Completion Requirement

Principle Courses

Nine (9) credit hours from the following courses:

Complete ALL of the following Courses:

- ECON2110 - Macroeconomic Principles
- ECON2120 - Microeconomic Principles
- BFIN3002 - Introduction to Financial Economics

Elective Credits (9)

Earn at least 9 credits from the following:

- 3000 & 4000 Level: ECON

AND/OR

- ES3016 Engineering Economics,
- MGMT4072 Prod & Operations Mgmt,
- MGMT4073 Production & Ops Management I

Additional Comments:

Institute General Requirements

No Requirement Level

Management (minor)

[Program Overview]

Program Title
Minor in Management

Department(s)
CSE Dept/ Business and Technology Management (program)

Program Description
The Minor in Management degree option (18 credit hours) provides NMT students with an opportunity to develop their knowledge and skills in business and management through courses of their interest within the management curriculum, and explore a management career path in their respective field of study. Minimum credit hours required—18

Simple Requisites

Program Requirements

Course Requirements
Type
Completion Requirement

Principle Courses

Nine (9) credit hours from the following courses:

Complete ALL of the following Courses:

- ACCT2110 - Principles of Accounting I
- ECON2120 - Microeconomic Principles
- ES3016 - Engineering Economics

and any ENTR courses (no more than 6 credit hours from ENTR)

Management Required Course: MGMT3030 Management Behavior & Org.

Management Elective Courses: At least Six (6) credit hours of electives from 3000-level and above MGMT courses.

Additional Comments:

Institute General Requirements

No Requirement Level

Undergraduate Certificate in Accounting & Financial Management

[Program Overview]

Program Title
Undergraduate Certificate in Accounting & Financial Managment

Department(s)
CSE Dept/ Business and Technology Management (program)

Program Description
The certificate in Accounting and Financial Management program aims to provide NMT students and employees an effective option to obtain essential training in accounting and financial management skills (at both professional and personal levels). The program has learning objectives focused on mastering common knowledge and entry-level analytical skills in the domain of accounting and financial management.

Simple Requisites

Program Requirements

Certificate Requirements
Type
Completion Requirement

Six Credit Hours Chosen From The Following:

Earn at least 6 credits from the following:

- ACCT Electives

Management Courses

Earn at least 6 credits from the following:

- ECON2120 - Microeconomic Principles

and:

- ACCT courses
- BFIN courses
- BUSA 1110

Additional Comments:

Institute General Requirements

No Requirement Level

[Learning Outcomes]

Outcome
1. Understand how to use an accounting system to manage financial information;

Outcome
2. Can plan and manage project and business finances using information systems;

Outcome
3. Can conduct basic analysis for project finance, investment, and financial planning in both personal and professional contexts.

Undergraduate Certificate in Business

[Program Overview]

Program Title
Undergraduate Certificate in Business

Department(s)
CSE Dept/ Business and Technology Management (program)

Program Description
The Certificate in Business (18 credit hours) provide students with an introduction to business fundamentals that can meet their diverse educational needs and prepare them for future career opportunities. Students select courses of interest from the management program. This option is an opportunity for community residents, business owners, government and public school employees, and NM Tech employees to increase their business knowledge and skills. The certificate program serves as a catalyst to develop local entrepreneurs who can start their own business or work for existing and new businesses.

Simple Requisites

Program Requirements

Certificate Requirements
Type
Completion Requirement

Nine Credit Hours Chosen From The Following:

Earn at least 9 credits from the following:

- ACCT2110 - Principles of Accounting I
  OR ACCT2120 - Principles of Accounting II
- ECON2110 - Macroeconomic Principles
  OR ECON2120 - Microeconomic Principles
- MGMT3030 - Management Behavior & Organization
  OR MGMT3031 - Human Resource Management (Inactive)
- ENGL1110 - g1:Composition I
- ENGL1120 - g1:Composition II

Mathematics Requirements

Earn at least 3 credits from the following:

- MATH1240 - Pre-Calculus
- MATH1230 - Trigonometry
- MATH1510 - g2:Calculus I

Requirement

Complete ALL of the following Courses:

- TCOM1130 - i5:Visual Communication & Graphic Design

Additional Comments:

Institute General Requirements

No Requirement Level

AS-BUS - Associate of Science in Business

[Program Overview]

Program Title
Associate of Science in Business

Department(s)
CSE Dept/ Business and Technology Management (program)

Degree & Program Code
AS-BUS

Program Description
The A.S. degree in Business (60 credit hours) is designed for students seeking to learn about the inner workings of business and organizations who are interested in pursuing a management career in their respective field of study. In addition, this option is available for NMT staff and community members interested in pursuing a terminal two-year business degree and those wishing to acquire an associate's degree before working toward a bachelor's degree to increase their career options.

Simple Requisites

Program Requirements
Minimum credit hours required—60

The following courses are required:

Associate of Science in Business
Type
Completion Requirement

Required Accounting Courses

Complete ALL of the following Courses:

- ACCT2110 - Principles of Accounting I

- ACCT2120 - Principles of Accounting II

Required Economics Courses

Complete ALL of the following Courses:

- ECON2110 - Macroeconomic Principles
- ECON2120 - Microeconomic Principles

Required English Courses

Complete ALL of the following Courses:

- ENGL1110 - g1:Composition I
- ENGL1120 - g1:Composition II

Required Management Courses

Complete ALL of the following Courses:

- MGMT3030 - Management Behavior & Organization
- MGMT3031 - Human Resource Management (Inactive)

Required Accounting Courses

Complete at least 1 of the following courses:

- ACCT3050 - Managerial Accounting
- ACCT3053 - Cost Accounting
- ACCT3071 - Financial Accounting

Required Math Courses

Earn at least 6 credits from the following:

- MATH1240 - Pre-Calculus
- MATH1230 - Trigonometry
- MATH1510 - g2:Calculus I

Required Technical Communications Courses

Complete ALL of the following Courses:

- TCOM1130 - i5:Visual Communication & Graphic Design

Additional Comments:

- Business and Management Electives: Nine credit hours selected in consultation with the faculty advisor
- Humanities and Social Science Electives: Three credit hours chosen from Area 4 or Area 5 of the General Education Core Curriculum
- Eight credit hours in courses with associated laboratories from the disciplines of biology, chemistry, earth science, or physics
- AND electives to complete 60 credit hours

Students must achieve a minimum GPA of 2.0 in required courses in order to graduate.

Institute General Requirements

Institute General Requirement for Associate of Science in Business
Type
Completion Requirement

Institutional Requirements

Complete ALL of the following Course Sets:

- Area 1: Communications (BS Degree) (9 credits)
- Area 2: Mathematics (BS Degree) (8 credits)
- Area 3: Science (BS Degree) (18 credits)
- Area 4: Social and Behavioral Science (BS or BGS Degree) (6 credits)
- Area 5: Humanities (BS or BGS Degree) (6 credits)
- Area 6: Creative and Fine Arts (BS, BA, or BGS Degree) (3 credits)
- Area 7: Additional Courses from Areas 4, 5, 6 (BS, BA, or BGS Degree) (3 credits)

Additional Comments:

No Requirement Level

[Sample 4-Year Curriculum Plan(s)]

Degree Map Name
Sample Curriculum for the associate of Science in Business
Total Degree Map Credits
54
Degree Map Effective Catalog Year
2025 -

Year	Semester	Actual Credits
Year 1	Summer	3

Course

- Mathematics (Generic)

Actual Credits 3

Year	Semester	Actual Credits
Year 1	Fall	9

Course

- ENGL1110 - g1:Composition I

Actual Credits 3

Course

- Mathematics (Generic)

Actual Credits -

Course

- ACCT2110 - Principles of Accounting I

Actual Credits 3

Course

- ECON2110 - Macroeconomic Principles

Actual Credits 3

Year	Semester	Actual Credits
Year 1	Spring	13

Course

- ENGL1120 - g1:Composition II

Actual Credits 3

Course
- Science with lab (biol, chem, earth science, or physics) (Generic)

Actual Credits 4

Course
- ACCT2120 - Principles of Accounting II

Actual Credits 3

Course
- ECON2120 - Microeconomic Principles

Actual Credits 3

Year	Semester	Actual Credits
Year 2	Fall	13

Course
- MGMT3030 - Management Behavior & Organization

Actual Credits 3

Course
- Science with lab (biol, chem, earth science, or physics) (Generic)

Actual Credits 4

Course
- TCOM1130 - i5:Visual Communication & Graphic Design

Actual Credits 3

Course
- Humanities/Social Science

Actual Credits 3

Year	Semester	Actual Credits
Year 2	Spring	16

Course
- MGMT3031 - Human Resource Management (Inactive)

Actual Credits 3

Course
- Business Electives (Generic)

Actual Credits 9

Course
- Electives (Generic)

Actual Credits 4

BA-BUSM - B.A. in Business Management

[Program Overview]

Program Title
Bachelor of Arts in Business Management

Department(s)
CSE Dept/ Business and Technology Management (program)

Degree & Program Code
BA-BUSM

Program Description
The B.A. in Business Management provides students with a broad exposure to the field and the practical knowledge and skills required to manage a functional area, project team, or department in public or private sector organizations. The program offers an additional career path for those students interested in developing their own business or becoming future entrepreneurs. Students can choose courses of interest outside the program as electives to gain a wider view and understanding of the world of business and entrepreneurship

Simple Requisites

Program Requirements
Minimum credit hours required – 120
In addition to the General Education and Institute Core Curriculum for a B.A degree, the following courses are required:

Degree Requirements
Type
Completion Requirement

Required accounting courses

Complete ALL of the following Courses:
- ACCT2110 - Principles of Accounting I
- ACCT2120 - Principles of Accounting II

Complete at least 1 of the following:

Complete at least 1 of the following courses:
- ACCT3050 - Managerial Accounting
- ACCT3053 - Cost Accounting
- ACCT3071 - Financial Accounting

Required economic courses

Complete ALL of the following Courses:
- ECON2110 - Macroeconomic Principles
- ECON2120 - Microeconomic Principles

3 credit hours may be used to fulfill Area 4 of the General Education Requirement.

Additional required courses

Complete ALL of the following Courses:
- ENTR1110 - Creativity, Innovation, & Entrepreneurship
- BFIN3002 - Introduction to Financial Economics

Earn at least 15 credits from the following:

Earn at least 15 credits from the following:
- MGMT3030 - Management Behavior & Organization
- MGMT3031 - Human Resource Management (Inactive)
- MGMT3035 - Marketing New Products/Innovat (Inactive)
- MGMT4062 - Systems, Risk, & Decision Analysis
- MGMT4072 - Production & Operations Management
- MGMT4076 - Project Management

Additional requirements

9 additional credit hours chosen from upper-division MGT and ECON courses, ES 3016, and MATH 3082.

Required computer science engineering courses

Complete at least 1 of the following courses:

- CSCI1210 - Programming Fundamentals
- CSCI1220 - Programming Fund Python

Required math courses

additional to courses used to fulfill the General Education Requirement Area 2

Earn at least 6 credits from the following:

- MATH1430 - Application to Calculus 1
- MATH2350 - Statistical Methods
- MATH2420 - Applied Linear Algebra
- MATH3082 - Probability and Statistics

Note pre-requisites of MATH classes must be satisfied.

Complete at least 1 of the following courses

Complete at least 1 of the following courses:

- COMM1130 - g5: Public Speaking
- COMM3060 - g5:Advanced Public Speaking

The chosen course cannot be used to fulfill the General Education Requirement Area 5.

Additional Comments:

- 13-17 credit hours of electives to complete 120 credit hours. Students are recommended to take these electives as part of a minor in a program such as Computer Science, Mathematics, or Technical Communication.
- Two semesters of a foreign language are suggested.
- Required classes cannot be taken on an S/U basis. B.A. degree must achieve a minimum GPA of 2.0.

Institute General Requirements

General Education Requirements for Bachelor of Arts in Business Managment
Type
Completion Requirement

Area 1: Communications Requirement for Bachelor of Arts

Complete ALL of the following Course Sets:

- Area 1: Communications (BA Degree) (9 credits)

Area 2: Mathematics and Quantitative Reasoning Requirements for Bachelor of Arts

Complete ALL of the following Course Sets:

- Area 2: Mathematics (BA Degree) (6 credits)

Area 3: Science Requirements for a Bachelor of Arts

Earn at least 14 credits from the following:

- Area 3: Science (BA Degree) (12 credits)

Area 4a: Policy and Technology for Bachelor of arts

Earn at least 3 credits from the following:

- Area 4a: Social Sciences: Policy and Technology (BA Degree) (3 credits)

Area 4b: Other Social Sciences for Bachelor of Arts

Earn at least 6 credits from the following:

- Area 4b: Other Social Sciences (BA Degree) (6 credits)

Area 5a: Ethics and Technology for Bachelor of Arts

Earn at least 3 credits from the following:

- Area 5a: Humanities: Ethics and Technology (BA Degree) (3 credits)

Area 5b: Other Humanities

Earn at least 6 credits from the following:

- Area 5b: Other Humanities (BA Degree) (6 credits)

Area 6: Creative and Fine Arts

Earn at least 3 credits from the following:

- Area 6: Creative and Fine Arts (BS, BA, or BGS Degree) (3 credits)

Area 7: Additional Humanities/Social Science Requirement for Bachelor of Arts

Earn at least 3 credits from the following:

- Area 7: Additional Courses from Areas 4, 5, 6 (BS, BA, or BGS Degree) (3 credits)

Additional Comments:

No Requirement Level

[Science Options]

Program Science Option (must be declared with the Registrar Office)

Science Option 1: Title
Information Systems Management Option

Requirements
In addition to the General Education and Institute Core Curriculum for a B.A degree, the following courses are required:

ACCT 2110 (3), ACCT 2120 (3), and one course chosen from ACCT 3050 (3), ACCT 3053 (3), and ACCT 3071 (3)

ECON 2110 (3), ECON 2120 (3), and ECON 3063 (3) (may be used to fulfill Area 4 and Area 7 of the General Education Requirement)

MATH 2350 (3)

BFIN 3002 (3)

MGMT 2110 (3), MGMT/IT 3030 (3), MGMT 4003 (3), and MGMT/IT 4062 (3)

One course chosen from CSCI 1220 (4) and CSCI 1210 (4) (CSCI 1220 may be used to fulfill Area 2 of the General Education Requirement)

One course chosen from COMM 1130 (3) and TCOM 4011 (3) (may be used to fulfill Area 5 of the General Education Requirement)

One course chosen from MATH 1430 and MATH 1510 (may be used to fulfill Area 2 of the General Education Requirement)

One course chosen from ENTR 1110 (3) and BUSA 1110 (3)

One course chosen from from IT 3011 (3) and IT/PHIL 3082 (3)

9 credit hours chosen from MGMT 4031 (3), 4035 (3), 4072 (3), 4076 (3), and 4086 (3)

9 credit hours chosen from CSCI 2222 (3), CSCI 2210 (3), IT 3021 (3), IT 3026 (3), and IT 4063 (3)

6 additional credit hours chosen from 4000-level IT, MGMT, BFIN, and ECON courses.

Additional general elective credits to complete 120 credit hours. Students are recommended to take these electives as part of a minor in a program such as Computer Science, Mathematics, or Technical Communication.

Required classes cannot be taken on an S/U basis. B.A. degree must achieve a minimum GPA of 2.0.

[Engineering Concentrations]

Concentration Option (must be declared with the Registrar Office)

Requirements

[Learning Outcomes]

Outcome
1. Each student will be able to define business concepts, interpret theories, and apply models to address issues concerning business finance and operations.

Outcome
2. Each student will master the necessary quantitative and technical skills to analyze data and interpret results to develop business models and improve business performance.

Outcome
3. Each student will be able to manage business projects and communicate business models, analytics, and reports professionally.

Outcome
4. Each student will demonstrate awareness of legal, ethical, cultural, policy, and professional perspectives of entrepreneurship and the business environment.

[Sample 4-Year Curriculum Plan(s)]

Degree Map Name
Sample Curriculum for the Bachelor of Arts in business Management
Total Degree Map Credits
121 - 125
Degree Map Effective Catalog Year
2026 -

Year	Semester	Actual Credits
Year 1	Fall	15 - 16

Course
- BUSA 1110- Introduction to Business (Generic)

Actual Credits 3

Course
- ENGL1110 - g1:Composition I

Actual Credits 3

Course
- Science 1 (Generic)

Actual Credits 3 - 4

Course
- MATH1220 - College Algebra

OR
- MATH1240 - Pre-Calculus

Actual Credits 3

Course
- Humanities

Actual Credits 3

Year	Semester	Actual Credits
Year 1	Spring	16 - 17

Course
- ENGL1120 - g1:Composition II

Actual Credits 3

Course
- Science 2 (Generic)

Actual Credits 3 - 4

Course
- MATH1430 - Application to Calculus 1

Actual Credits 3

Course
- CSCI1220 - Programming Fund Python

Actual Credits 4

Course
- ENTR1110 - Creativity, Innovation, & Entrepreneurship

Actual Credits 3

Year	Semester	Actual Credits
Year 2	Fall	15 - 16

Course
- Science 3 (Generic)

Actual Credits 3 - 4

Course
- ACCT2110 - Principles of Accounting I

Actual Credits 3

Course
- ECON2120 - Microeconomic Principles

Actual Credits 3

Course
- Humanities

Actual Credits 3

Course
- MATH2350 - Statistical Methods

Actual Credits 3

Year	Semester	Actual Credits
Year 2	Spring	15 - 16

Course
- Science 4 (Generic)

Actual Credits 3 - 4

Course
- ACCT2120 - Principles of Accounting II

Actual Credits 3

Course
- ECON3063 - Internet Economics & E-Commerce

Actual Credits 3

Course
- ECON2110 - Macroeconomic Principles

Actual Credits 3

Course
- Elective (Generic)

Actual Credits 3

Year	Semester	Actual Credits
Year 3	Fall	15

Course
- ACCT 3000 Level (Generic)

Actual Credits 3

Course
- MGMT3031 - Human Resource Management (Inactive)

Actual Credits 3

Course
- MGMT3030 - Management Behavior & Organization

Actual Credits 3

Course
- ENGL3041 - i1:Technical Writing

Actual Credits 3

Course
- ELECTIVE (Generic)

Actual Credits 3

Year	Semester	Actual Credits
Year 3	Spring	15

Course
- BFIN3002 - Introduction to Financial Economics

Actual Credits 3

Course
- MGMT4062 - Systems, Risk, & Decision Analysis

Actual Credits 3

Course
- MGMT3035 - Marketing New Products/Innovat (Inactive)

Actual Credits 3

Course
- Elective (Generic)

Actual Credits 3

Course
- Policy and Technology Course (Generic)

Actual Credits 3

Year	Semester	Actual Credits
Year 4	Fall	15

Course
- Management Elective (Generic)

Actual Credits 3

Course
- MGMT4072 - Production & Operations Management

Actual Credits 3

Course
- MATH2420 - Applied Linear Algebra

Actual Credits 3

Course
- Elective (Generic)

Actual Credits 3

Course
- Area 6: Creative and Fine Arts (BS, BA, or BGS Degree) (3 credits)

Actual Credits 3

Year	Semester	Actual Credits
Year 4	Spring	15

Course
- MGMT4076 - Project Management

Actual Credits 3

Course
- Management Elective (Generic)

Actual Credits 3

Course
- Ethics and Technology Course (Generic)

Actual Credits 3

Course
- Elective (Generic)

Actual Credits 3

Course
- COMM1130 - g5: Public Speaking

Actual Credits 3

BS-MGTT - B.S. in Management of Technology

[Program Overview]

Program Title
Bachelor of Science in Management of Technology

Department(s)
CSE Dept/ Business and Technology Management (program)

Degree & Program Code
BS-MGTT

Program Description
The B.S. degree in Management of Technology (130 credit hours) integrates the business and management curriculum with more extensive coursework in an engineering or science field of the student's choice, providing specific technical knowledge and skills required to lead project teams and technical organizations with an in depth understanding of both the technology and business components of the organization.

Simple Requisites

Program Requirements
Minimum credit hours required—130

In addition to the General Education and Institute Core Curriculum and the core business, management, finance, and economics requirements, students are required to complete six (6) credit hours of fundamentals courses in engineering or science and (9) credit hours of engineering or science courses numbered 3000 or above, depending on their preferred track.

Program Requirements
Type
Completion Requirement

Additional Comments:
- Engineering Traces 201 (3), 216 (3), and nine (9) approved credit hours of engineering courses numbered 3000 or above, ES 3016 does not count toward the Management of Technology degree
- Science Track: fundamentals courses and 3000 level courses will be approved in consultation with the student's faculty advisor
- MATH 2532 (4)
- At least two semesters of a single approved foreign language are strongly suggested but not required.
- Electives to complete 130 hours

Institute General Requirements

General Education Requirements for Bachelor of Science in Management of Technology
Type
Completion Requirement

Area 1: Communications Requirement for Bachelor of Science

Complete ALL of the following Course Sets:
- Area 1: Communications (BS Degree) (9 credits)

Area 2: Mathematics and Quantitative Reasoning Requirements for Bachelor of Science

Complete ALL of the following Course Sets:
- Area 2: Mathematics (BS Degree) (8 credits)

Area 3: Science Requirements for a Bachelor of Science

Complete ALL of the following Course Sets:

- Area 3: Science (BS Degree) (18 credits)

Area 4: Social and Behavioral Science Requirements for a Bachelor of Science

Earn at least 6 credits from the following:

- Area 4: Social and Behavioral Science (BS or BGS Degree) (6 credits)

Area 5: Humanities Course Requirements for a Bachelor of Science

Earn at least 6 credits from the following:

- Area 5: Humanities (BS or BGS Degree) (6 credits)

Area 6: Creative & Fine Art Requirement for a Bachelor of Science

Earn at least 3 credits from the following:

- Area 6: Creative and Fine Arts (BS, BA, or BGS Degree) (3 credits)

Area 7: Additional Humanities/Social Science Requirement for a Bachelor of Science

Earn at least 3 credits from the following:

- Area 7: Additional Courses from Areas 4, 5, 6 (BS, BA, or BGS Degree) (3 credits)

Additional Comments:

No Requirement Level

[Learning Outcomes]

Outcome
1. Identify, analyze, and evaluate global, economic, policy, and social problems related to engineering and technology.

Outcome
2. Identify, analyze, and evaluate risk and uncertainty in engineering and technology organizations.

Outcome
3. Identify, formulate, and solve complex problems in accounting, finance, operations, marketing, and organizational behavior related to engineering and technology.

Outcome
4. Apply business and management analytical techniques to improve system and process efficiency.

Outcome
5. Integrate technical solutions and business models to lead, develop, pilot, and scale complex engineering projects.

[Sample 4-Year Curriculum Plan(s)]

Degree Map Name
Sample Curriculum for the Bachelor of Science in Management of Technology
Total Degree Map Credits
133 - 134
Degree Map Effective Catalog Year
2026 -

Year	Semester	Actual Credits
Year 1	Fall	15

Course
- ENTR1120 - Creativity, Innovation, & Entrepreneurship

Actual Credits 1

Course
- Humanities

Actual Credits 3

Course
- ENGL1110 - g1:Composition I

Actual Credits 3

Course
- CHEM1215 & CHEM1215L: g:General Chemistry I and Lab

Actual Credits 4

Course
- MATH1510 - g2:Calculus I

Actual Credits 4

Year	Semester	Actual Credits
Year 1	Spring	17 - 18

Course
- Social Sciences

Actual Credits 3

Course
- ENGL1120 - g1:Composition II

Actual Credits 3

Course
- CHEM1225 & CHEM1225L: g: General Chemistry II and Lab

Actual Credits 4

Course
- MATH1520 - g2:Calculus II

Actual Credits 4

Course
- ES111 - Computer Programming for Engineers

OR
- CSCI1220 - Programming Fund Python

Actual Credits 3 - 4

Year	Semester	Actual Credits
Year 2	Fall	18

Course
- PHYS1310 & PHYS1310L: g:Calculus-Physics I and Lab

Actual Credits 5

Course
- ECON2110 - Macroeconomic Principles

Actual Credits 3

Course
- MATH2532 - Calculus III

Actual Credits 4

Course
- ACCT2110 - Principles of Accounting I

Actual Credits 3

Course
- ES201 - Statics

Actual Credits 3

Year	Semester	Actual Credits
Year 2	Spring	17

Course
- PHYS1320 & PHYS1320L: g:Calculus-Based Physics II and Lab

Actual Credits 5

Course
- MATH2350 - Statistical Methods

Actual Credits 3

Course
- ECON2120 - Microeconomic Principles

Actual Credits 3

Course
- ES216 - Engineering Fluid Mechanics

Actual Credits 3

Course
- ACCT2120 - Principles of Accounting II

Actual Credits 3

Year	Semester	Actual Credits
Year 3	Fall	18

Course
- ACCT 3000 Level (Generic)

Actual Credits 3

Course
- MGMT3031 - Human Resource Management (Inactive)

Actual Credits 3

Course
- MGMT3030 - Management Behavior & Organization

Actual Credits 3

Course
- ENGL3041 - i1:Technical Writing

Actual Credits 3

Course
- Social Sciences

Actual Credits 3

Course
- Engineering or science prerequisite or elective (Generic)

Actual Credits 3

Year	Semester	Actual Credits
Year 3	Spring	18

Course
- BFIN3002 - Introduction to Financial Economics

Actual Credits 3

Course
- MGMT3035 - Marketing New Products/Innovat (Inactive)

Actual Credits 3

Course
- Humanities

Actual Credits 3

Course
- MGMT4062 - Systems, Risk, & Decision Analysis

Actual Credits 3

Course
- Engineering or Science prerequisite or Elective (Generic)

Actual Credits 6

Year	Semester	Actual Credits
Year 4	Fall	15

Course
- MGMT4051 - Technology Management Seminar

Actual Credits 3

Course
- MGMT4072 - Production & Operations Management

Actual Credits 3

Course
- Elective (Generic)

Actual Credits 3

Course
- Engineering or science prerequisite or Elective (Generic)

Actual Credits 6

Year	Semester	Actual Credits
Year 4	Spring	15

Course
- MGMT4076 - Project Management

Actual Credits 3

Course
- MGMT4081 - Senior Seminar Technical Management

Actual Credits 3

Course
- Engineering or science Elective (Generic)

Actual Credits 3

Course
- MGMT4086 - Business Policy & Corporate Strategy

Actual Credits 3

Course
- Management Elective (Generic)

Actual Credits 3

CSE Dept/ Engineering Management (Program) Department

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- ***Associate Professor,*** *Reinow, Wang*
- ***Assistant Professor,*** *Zhang*
- ***Instructor*** *Ghimire*
- ***Adjunct Faculty*** *Berl, Fetrow, Kennedy, Marsyla, Mazumdar,-Shaanan*

Degrees offered: Master of Engineering Management (course-based), Master of Science in Engineering Management, Graduate Certificate in Technology Leadership

The degree programs in Engineering Management are specifically designed for engineers, scientists, managers, and technologists holding a bachelor's degree in their respective disciplines who seek the knowledge and practical skills required to lead project teams and technical organizations through today's competitive and fast-changing business environment. Our focus is to provide students with a challenging educational experience that builds on their background and career interests. Our innovative and rigorous curriculum is delivered live via interactive webcasts both on campus and globally through the internet. Students are encouraged to participate in the live course lectures, with accommodation (e.g. recordings) available when work or personal schedules do not permit in-class participation. The program is designed with a student's technical degree and background in mind, as few undergraduate engineering and science degree programs prepare their graduates for their transition to management and leadership roles. Meanwhile, our programs welcome and prepare students with non-STEM backgrounds to the realm of engineering management and corporate leadership.

The graduate programs are 30 credit hours with three degree options: the course-based Master of Engineering Management (MEM) degree designed for professional managers and the Master of Science in Engineering Management (MSEM) degree with an independent study project or thesis designed to provide more analytical and research training for interested students.

Graduate Program

Admission to the Program

Entrance into the MEM and MSEM requires competence in engineering, science, and mathematics comparable to a calculus-based bachelor's degree in a management, economics, engineering, or science discipline. For the MEM, preference will be given to individuals with professional work experience in an engineering, technology, or science field. The Graduate Record Examination (GRE) is required for admission but may be waived depending on the applicant's transcript and professional experience. Engineering Management faculty will evaluate program applicants and recommend admission to the Office of Graduate Studies. For complete information on applying to the Graduate Engineering Management Program, see the New Mexico Tech Center for Graduate Studies website.

Master of Engineering Management (MEM)

Each MEM student will be assigned a faculty advisor to guide the student in course selection and meeting program requirements. The final product should demonstrate the ability to identify a project objective (or research question), plan, and conduct research.

Program Requirements for MEM

Total credit hours required: 30.

The following courses are required (18 credits): EMGT 501 (3), EMGT 502 (3), EMGT 503 (3), EMGT 504 (3), EMGT 505 (3), and EMGT 506 (3).

12 additional credits of electives (at least 9 credits should be 5000-level EMGT courses).

Master of Science in Engineering Management (MSEM) Graduate Advisory Committee

In addition to the general requirements for the Master of Science degree, MSEM (both Independent Study and Thesis options) students need to form a three-member committee that is composed of at least two New Mexico Tech management faculty members and one other qualified individual with knowledge of the student's research project. Examples of qualified individuals include faculty members at New Mexico Tech, faculty members at other higher-education institutions, workplace supervisors, and/or professional peers with a master's or doctoral degree. The student should identify a committee chair, who usually also serves as the student's research advisor. The primary role of the committee is to assist the student in course selection and advise and approve the final independent study project or thesis.

Independent Study Option:

An independent study project should be supervised by the graduate advisory committee. The chosen project should be implemented with a clearly identified project objective (or research question), sound methodology, and rigorous analysis. Each project will be accompanied by a written project report and an oral presentation to a diverse audience in a professional setting.

Thesis Option:

The student must clearly demonstrate the ability to plan, organize, and pursue research. Thesis research is expected to be carried out in at least two semesters and shall be supervised by the graduate advisory committee. A written research report and a public oral presentation are required.

Program Requirements for MSEM: In meeting the general requirements for the Master of Science degree, the requirements for one of the following options must be met:

MSEM degree with an independent study project:

Total credit hours required: 30.

The following courses are required (18 credits): EMGT 501 (3), EMGT 502 (3), EMGT 503 (3), EMGT 504 (3), EMGT 505 (3), and EMGT 506 (3).

3 credits of 5000-level EMGT courses

6 credits of upper-division or graduate out of program course work

3 credits of EMGT 590 (Independent Study)

MSEM degree with a thesis:

Total credit hours required: 30.

The following courses are required (18 credits): EMGT 501 (3), EMGT 502 (3), EMGT 503 (3), EMGT 504 (3), EMGT 505 (3), and EMGT 506 (3).6 credits of upper-division or graduate out of program course work

6 credits of EMGT 591 (Thesis)

Programs

Accelerated M.S. in Engineering Management (pathway)

[Program Overview]

Program Title
Accelerated Master of Science in Engineering Management

Department(s)
CSE Dept/ Engineering Management (Program)

Program Description
Qualified undergraduate students with two semesters of calculus (or one semester of calculus and one semester of statistics or linear algebra) may apply for admission to the Accelerated Master of Engineering Management (MEM) or Accelerated Master of Science in Engineering Management (MSEM) program. In fulfillment of the requirements for both bachelor's and master's degrees, as outlined in their respective sections, accepted students may apply twelve (12) credits of 5000-level courses to both degrees. For the accelerated MSEM program, the master's level independent study project or thesis cannot be the same as the student's senior thesis or final project for their bachelor's degree. For more information about the Institute's requirements that apply to all accelerated Masters programs, please visit the newest catalog.

Program Information & Policies

G.C. in Technology Leadership

[Program Overview]

Program Title
Graduate Certificate in Technology Leadership

Department(s)
CSE Dept/ Engineering Management (Program)

Program Description
An additional option for prospective students is the Graduate Certificate in Technology Leadership designed for those professionals who do not wish to pursue a master's degree but require the knowledge and skills to lead teams, projects and organizations through the complex environment of change. The rapid pace of technology innovation requires leaders who possess the knowledge, skills, and vision to guide their organizations through the process with an understanding of strategic and operational issues and solutions.

Simple Requisites

Program Requirements

The certificate requires a total of 15 credit hours selected from the engineering management curriculum, including EMGT5013 Technology Leadership Seminar - Technology Leadership Seminar.

Courses completed for the certificate may be counted toward a master's degree.

It is recommended that prospective students have completed a calculus-based bachelor's degree and a semester of probability and statistics prior to entering the program.

Institute General Requirements

No Requirement Level

BS-EMGT - B.S. in Engineering Management

[Program Overview]

Program Title
Bachelor of Science in Engineering Management

Department(s)
CSE Dept/ Engineering Management (Program)

Degree & Program Code
BS-EMGT

Program Description
The B.S. in Engineering Management degree aims to train students to apply business and management analytical techniques to improve system and process efficiency in technology organizations. The program curriculum balances among accounting, economics, and finance principles, entrepreneurship and technology leadership mindset, and analytical skill sets to address risk and uncertainty in engineering and technology contexts. Students are usually well prepared to plan, organize, and lead interdisciplinary project teams. In addition, the B.S. in Engineering Management degree prepares potential entrepreneurs to start their own business.

Simple Requisites

Program Requirements
In addition to the General Education and Institute Core Curriculum, the following core business, management, accounting, finance, and economics courses are required for all B.S. in Engineering Management students:

BS-EMGT Degree Requirements
Type
Completion Requirement

Accounting Courses

Complete ALL of the following Courses:

- ACCT2110 - Principles of Accounting I
- ACCT2120 - Principles of Accounting II

and One course from:

- ACCT 3000 level

Math & Engineering

Complete ALL of the following Courses:

- MATH2350 - Statistical Methods
- CSCI1220 - Programming Fund Python
- ES111 - Computer Programming for Engineers

Management Courses

Complete ALL of the following Courses:

- ENTR1110 - Creativity, Innovation, & Entrepreneurship
- MGMT3030 - Management Behavior & Organization
- MGMT4005 - Technology Marketing
- MGMT4062 - Systems, Risk, & Decision Analysis
- MGMT4072 - Production & Operations Management
- MGMT4076 - Project Management
- MGMT4081 - Senior Seminar Technical Management
- MGMT4086 - Business Policy & Corporate Strategy
- BFIN3002 - Introduction to Financial Economics
- ECON2110 - Macroeconomic Principles
- ECON2120 - Microeconomic Principles

- Management Elective Sequence: At least fifteen (15) credit hours selected in consultation with and approved by the student's faculty advisor.
- At least two semesters of a single approved foreign language are strongly suggested but not required.
- Electives to complete 120 credit hours to be selected in consultation with a faculty advisor.

  Any required class or technical elective used toward a B.S. in Engineering Management or a B.S. in Management of Technology may not be taken on an S/U basis.

Additional Comments:

Institute General Requirements

General Education for a Bachelor of Science in Engineering Management
Type
Completion Requirement

Institute General Education Requirements

Complete ALL of the following Course Sets:

- Area 1: Communications (BS Degree) (9 credits)
- Area 2: Mathematics (BS Degree) (8 credits)
- Area 3: Science (BS Degree) (18 credits)
- Area 4: Social and Behavioral Science (BS or BGS Degree) (6 credits)
- Area 5: Humanities (BS or BGS Degree) (6 credits)
- Area 6: Creative and Fine Arts (BS, BA, or BGS Degree) (3 credits)
- Area 7: Additional Courses from Areas 4, 5, 6 (BS, BA, or BGS Degree) (3 credits)

Additional Comments:

No Requirement Level

MEM - Master of Engineering Management

[Program Overview]

Program Title
Master of Engineering Management

Department(s)
CSE Dept/ Engineering Management (Program)

Degree & Program Code
MEM

Program Description
The degree programs in Engineering Management are specifically designed for engineers, scientists, managers, and technologists who seek the knowledge and practical skills required to lead project teams and technical organizations through today's competitive and fast-changing business environment. Our focus is to provide students with a challenging but inspiring educational experience that builds on their background and career interests. Our innovative and rigorous graduate curriculum is delivered live via interactive webcasts both on campus and globally through the internet. Students are encouraged to participate in the live course lectures, with accommodation (e.g. recordings) available when work or personal schedules do not permit in-class participation. The program is designed with a student's technical background in mind, as few undergraduate engineering and science degree programs prepare their graduates for a transition to management and leadership roles. Meanwhile, our programs welcome and prepare students with non-STEM backgrounds to the realm of engineering management and industry leadership.

Program Information & Policies

Admission to the Program

Entrance into the MEM and MSEM requires competence in mathematics comparable to a calculus-based bachelor's degree in a management, economics, engineering, or science discipline. For the MEM, preference will be given to individuals with professional work experience in an engineering, technology, or science field. The Graduate Record Examination (GRE) is required for admission but may be waived depending on the applicant's academic preparation and professional experience. Engineering Management faculty will evaluate program applicants and recommend admission to the Office of Graduate Studies. For complete information on applying to the Graduate Engineering Management Program, see the New Mexico Tech Graduate Studies website.

Master of Engineering Management (MEM)

Each MEM student will be assigned a faculty advisor to guide the student in course selection and meeting program requirements. Upon program completion, an MEM graduate should be able to apply management principles and analytical solutions to improve operational efficiency, plan projects, and manage project finance and operations in technology organizations.

Total credit hours required: 30.

Simple Requisites

Program Requirements

Program Requirements for MEM (30 Total Credits Required)
Type
Completion Requirement

The following Courses Are Required (18 Credits)

Complete ALL of the following Courses:

- EMGT5001 - Management Science for Engineering Management
- EMGT5002 - Financial Management
- EMGT5003 - Information Systems in Technology Organizations
- EMGT5004 - Engineering Analytics
- EMGT5005 - Technology Marketing
- EMGT5006 - Managing HR in Technolgy Organizations

12 additional credits of electives (at least 9 credits should be 5000-level EMGT courses).

Additional Comments:

Institute General Requirements

No Requirement Level

[Learning Outcomes]

Outcome
1. Apply management and organization design principles to improve operational efficiency in organizations;

Outcome
2. Apply analytical and simulation models to solve engineering and technology management problems;

Outcome
3. Identify, analyze, and evaluate complex engineering problems under multiple levels of risk and uncertainty;

Outcome
4. Identify, analyze, and evaluate new technologies, products, and innovations for commercialization;

Outcome
5. Be able to plan projects and manage project finance and operations.

MS-EMGT - M.S. in Engineering Management

[Program Overview]

Program Title
Master of Science in Engineering Management

Department(s)
CSE Dept/ Engineering Management (Program)

Degree & Program Code
MS-EMGT

Program Description
The curriculum is innovative and rigorous, and delivered live via interactive webcasts both on campus and globally through internet streaming; students are encouraged to participate during the live course lectures, with accommodations available when work or personal schedules do not permit in class participation. The graduate program is designed to build on a student's bachelor's degree and technical background, exposing them to the latest methods, tools, and research to expand their career options. Students have the ability to select their degree option depending on their personal interest and career objective, from either a course-based option or course and research option; see Program Requirements for further details.

Program Information & Policies
In addition to the general requirements for the Master of Science degree, Master of Science in Engineering Management (MSEM) students need to form a three-member committee that is composed of at least two New Mexico Tech management faculty members and one other qualified individual with knowledge of the student's research project. Examples of qualified individuals include faculty members at New Mexico Tech, faculty members at other higher-education institutions, workplace supervisors, and/or professional peers with a master's or doctoral degree. The student should identify a committee chair, who usually also serves as the student's research advisor. The primary role of the committee is to assist the student in course selection and advise and approve the final independent study project or thesis.

Simple Requisites

Program Requirements

Program Requirements for MSEM: in meeting the general requirements for the Master of Science degree, the requirements for one of the following options must be met:

MSEM Degree With an Independent Study Project
Type
Completion Requirement

The Following Courses Are Required (30 Credits)

Complete ALL of the following Courses:

- EMGT5001 - Management Science for Engineering Management
- EMGT5002 - Financial Management
- EMGT5003 - Information Systems in Technology Organizations
- EMGT5004 - Engineering Analytics
- EMGT5005 - Technology Marketing
- EMGT5006 - Managing HR in Technolgy Organizations
- 3 credits of 5000-level EMGT courses
- 6 credits of upper-division or graduate out of program course work
- 3 credits of EMGT 590 (Independent Study)

Independent Study Option

An independent study project should be supervised by the graduate advisory committee. The chosen project should be implemented with a clearly identified project objective (or research question), sound methodology, and rigorous analysis. Each project will be accompanied by a written project report and an oral presentation to a diverse audience in a professional setting.

Additional Comments:

MSEM Degree With a Thesis
Type
Completion Requirement

The Following Courses Are Required (30 credits)

Complete ALL of the following Courses:

- EMGT5001 - Management Science for Engineering Management
- EMGT5002 - Financial Management
- EMGT5003 - Information Systems in Technology Organizations
- EMGT5004 - Engineering Analytics
- EMGT5005 - Technology Marketing
- EMGT5006 - Managing HR in Technolgy Organizations
- 6 credits of upper-division or graduate out of program course work
- 6 credits of EMGT 591 (Thesis)

Thesis Option

The student must clearly demonstrate the ability to plan, organize, and pursue research. Thesis research is expected to be carried out in at least two semesters and shall be supervised by the graduate advisory committee. A written research report and a public oral presentation are required.

Additional Comments:

Institute General Requirements

No Requirement Level

[Learning Outcomes]

Outcome
1. Apply management and organization design principles to improve operational efficiency in organizations.

Outcome
2. Apply analytical and simulation models to solve engineering and technology management problems.

Outcome
3. Identify, analyze, and evaluate complex engineering problems under multiple levels of risk and uncertainty.

Outcome
4. Identify, analyze, and evaluate new technologies, products, and innovations for commercialization.

Outcome
5. Be able to plan projects and manage project finance and operations.

Outcome
6. Conduct independent research on complex engineering and technology management problems and develop analytical reports.

CSE Dept/ Information Technology (program) Department

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- ***Professors :*** *Zheng (Chair of the Department), Liebrock, Mazumdar (Program Coordinator), Shin, Soliman*
- ***Associate Professors :*** *Ramyaa, Wang (Program Coordinator)*
- ***Instructors*** *Algaraibeh, Knowles*

Degree Offered: B.S. in Information Technology

Information Technology (IT) is an evolving interdisciplinary subject that has been driven and shaped by the rapid development of computing, communication, and Internet-related technologies and their tremendous impact on our daily lives.

In contrast to the more traditional Information Systems discipline, Information Technology deals with the development, utilization, interrelation, and confluence of computers, networking, telecommunication, business, and technology management in the context of the global Internet. As we enter the Information Age of the 21st century, society is increasingly dependent on Information Technology and demand for IT professionals will remain high throughout the decades to come.

The *Bachelor of Science in Information Technology* program at New Mexico Tech is administered jointly by the *Computer Science* and *Business Management* faculty in the Computer Science and Engineering department. The curriculum includes relevant computer science, management, and engineering courses and emphasizes secure information systems and information assurance that are among the areas of research at Tech's Institute for Complex Additive Systems Analysis (ICASA) where IT students may find employment or internship opportunities. Students must also take a sequence of 6 hours of technical electives to broaden or deepen their knowledge in an IT area of their interest.

Graduates of the IT program are well prepared for immediate industry employment or graduate study in an IT-related discipline.

Programs

BS-IT - B.S. in Information Technology

[Program Overview]

Program Title
Bachelor of Science in Information Technology

Department(s)
CSE Computer Science & Engineering, CSE Dept/ Information Technology (program)

Degree & Program Code
BS-IT

Program Description
The Bachelor of Science in Information Technology program at New Mexico Tech is administered jointly by the Computer Science and Business Management faculty in the Computer Science and Engineering department. The curriculum includes relevant computer science, management, and engineering courses and emphasizes secure information systems and information assurance that are among the areas of research at Tech's Institute for Complex Additive Systems Analysis (ICASA) where IT students may find employment or internship opportunities. Students must also take a sequence of 6 hours of technical electives to broaden or deepen their knowledge in an IT area of their interest.

Simple Requisites

Program Requirements
Minimum credit hours required—120

In addition to the General Education and Institute Core Curriculum, the following courses are required:

Course Requirements
Type
Completion Requirement

Information Technology Course Requirements

Complete ALL of the following Courses:

- CSCI1001 - Intro Comp Sci & Info Tech
- CSCI1210 - Programming Fundamentals
- CSCI2220 - Data Structures & Algorithms
- CSCI2210 - Object Oriented Programming
- CSCI2230 - Assembly Lang & Mach Org
- CSCI2310 - Discrete Mathematics for CS
- CSCI2240 - Systems Programming
- IT3021 - Internet & Web Programming
- IT3026 - Software Engineering
- IT3030 - Management & Organizational Behavior
- IT3053 - Introduct to Computer Networks
- IT3063 - Computer Security
- IT3073 - Intro to Database Systems
- IT3082 - Ethics of Computing and IT
- IT4062 - Systems, Risk, & Decision Analysis
- IT4066 - Project Management
- IT4081 - Senior IT Design Project
- IT4082 - Senior IT Design Project

Managements Course Requirements

Complete ALL of the following Courses:

- MGMT4072 - Production & Operations Management

Math Requirements

Complete ALL of the following Courses:

- MATH2350 - Statistical Methods

Psychology Requirements

Complete ALL of the following Courses:

- PSYC1110 - g4:Introduction to Psychology

(can be applied as a social science course in the general education core curriculum)

Additional Comments:
Technical Electives: a sequence of 6 hours of computer science, information technology, or management courses numbered 3000 or higher, *pre-approved* by the student's advisor and an IT Program Coordinator, with no more than one course numbered IT4085. Students are encouraged to select a coherent set of courses as technical electives that will prepare them for a specific focus in their career, for instance, IT4041 & IT4063 for cybersecurity focus and MGMT3035 & MGMT4007 for management focus.

Institute General Requirements

Bachelor of Science General Education Requirements (53 credits)
Type
Completion Requirement

Area 1: English Requirements for Bachelor of Science

Complete ALL of the following Course Sets:

- Area 1: Communications (BS Degree) (9 credits)

Area 2: Math Requirements for Bachelor of Science

Complete ALL of the following Course Sets:

- Area 2: Mathematics (BS Degree) (8 credits)

Area 3: Science Requirements for a Bachelor of Science

Complete ALL of the following Course Sets:

- Area 3: Science (BS Degree) (18 credits)

Area 4: Social Science Requirements for a Bachelor of Science (6 credits)

Earn at least 6 credits from the following:

- Area 4: Social and Behavioral Science (BS or BGS Degree) (6 credits)

Area 5: Humanities Course Requirements for a Bachelor of Science (6 credits)

Earn at least 6 credits from the following:

- Area 4: Social and Behavioral Science (BS or BGS Degree) (6 credits)

Area 6: Fine & Creative Art Course Requirement for a Bachelor of Science (3 credits)

Complete ALL of the following Course Sets:

- Area 6: Creative and Fine Arts (BS, BA, or BGS Degree) (3 credits)

Area 7: Additional Humanities/Social Science Requirement for a Bachelor of Science (3 credits)

Earn at least 3 credits from the following:

- Area 7: Additional Courses from Areas 4, 5, 6 (BS, BA, or BGS Degree) (3 credits)

Additional Comments:

No Requirement Level

[Learning Outcomes]

Outcome
1. The ability to design, implement, test, and configure software programs

Outcome
2. The ability to analyze information technology requirements, assess risk, optimize resources, monitor and evaluate progress, and manage project budgets

Outcome
3. Knowledge of the fundamental principles of information processing and decision, networking, security, and database

Outcome
4. Exposure to one or more information technology areas

Outcome
5. Technical communication skills in written and oral forms

Outcome
6. The capacity to work as part of a team

Outcome
7. Awareness of the ethical and societal impact of developments in the field of information technology

Outcome
8. The ability to develop a business case for an organizational decision to pursue an IT project

[Sample 4-Year Curriculum Plan(s)]

Degree Map Name
Sample Curriculum for the Bachelor of Science Degree in Information Technology
Total Degree Map Credits
119
Degree Map Effective Catalog Year
2026 -

Year	Semester	Actual Credits
Year 1	Fall	17

Course
- MATH1510 - g2:Calculus I

Actual Credits 4

Course
- CSCI1001 - Intro Comp Sci & Info Tech

Actual Credits 2

Course
- CSCI1210 & CSCI1210L: Programming Fundamentals and Lab

Actual Credits 4

Course
- CHEM1215 & CHEM1215L: g:General Chemistry I and Lab

Actual Credits 4

Course
- ENGL1110 - g1:Composition I

Actual Credits 3

Year	Semester	Actual Credits
Year 1	Spring	14

Course
- MATH1520 - g2:Calculus II

Actual Credits 4

Course
- CSCI2220 - Data Structures & Algorithms

Actual Credits 3

Course
- CHEM1225 & CHEM1225L: g: General Chemistry II and Lab

Actual Credits 4

Course
- ENGL1120 - g1:Composition II

Actual Credits 3

Year	Semester	Actual Credits
Year 2	Fall	14

Course
- CSCI2230 - Assembly Lang & Mach Org

Actual Credits 3

Course
- CSCI2310 - Discrete Mathematics for CS

Actual Credits 3

Course
- PHYS1310 & PHYS1310L: g:Calculus-Physics I and Lab

Actual Credits 5

Course
- PSYC1110 - g4:Introduction to Psychology

Actual Credits 3

Year	Semester	Actual Credits
Year 2	Spring	17

Course
- CSCI2240 - Systems Programming

Actual Credits 3

Course
- CSCI2210 - Object Oriented Programming

Actual Credits 3

Course
- MATH2350 - Statistical Methods

Actual Credits 3

Course
- Humanities

Actual Credits 3

Course
- PHYS1320 & PHYS1320L: g:Calculus-Based Physics II and Lab

Actual Credits 5

Year	Semester	Actual Credits
Year 3	Fall	15

Course
- IT3021 - Internet & Web Programming

Actual Credits 3

Course
- IT3030 - Management & Organizational Behavior

Actual Credits 3

Course
- IT3053 - Introduct to Computer Networks

Actual Credits 3

Course
- IT3073 - Intro to Database Systems

Actual Credits 3

Course
- ENGL3041 - i1:Technical Writing

Actual Credits 3

Year	Semester	Actual Credits
Year 3	Spring	12

Course
- IT3026 - Software Engineering

Actual Credits 3

Course
- Technical Electives

Actual Credits 3

Course
- IT4062 - Systems, Risk, & Decision Analysis

Actual Credits 3

Course
- Social Sciences

Actual Credits 3

Year	Semester	Actual Credits
Year 4	Fall	15

Course
- IT3082 - Ethics of Computing and IT

Actual Credits 3

Course
- IT4081 - Senior IT Design Project

Actual Credits 3

Course
- IT3063 - Computer Security

Actual Credits 3

Course
- MGMT4072 - Production & Operations Management

Actual Credits 3

Course
- Humanities

Actual Credits 3

Year	Semester	Actual Credits
Year 4	Spring	15

Course
- Technical Electives

Actual Credits 3

Course
- IT4066 - Project Management

Actual Credits 3

Course
- IT4082 - Senior IT Design Project

Actual Credits 3

Course
- Area 6: Creative and Fine Arts (BS, BA, or BGS Degree) (3 credits)

Actual Credits 3

Course
- Humanities/Social Science

Actual Credits 3

Courses

IT311D - Human Info Process & Dec Mak

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Recent advances in knowledge about how people process and act upon information are presented. Models of human decision making are analyzed in the context of secure information systems and used to assess ways to best manage the people and technology associated with secure information systems.

No Requirements

Chemical Engineering Department

CONTACT US
Office: Jones Hall 259, 801 Leroy Place
State & Zip: NM 87801
Phone: 575-835-5442
website: https://www.nmt.edu/academics/chemeng/index.php

Chemical Engineering

(www.nmt.edu/academics/chemeng)

The Chemical Engineering Department at NMT is among the fastest growing departments. A degree in chemical engineering is a highly flexible and adaptable education. Graduates work in virtually every field and command the highest wages.

The chemical engineering program at New Mexico Tech is accredited by the engineering accreditation commission of ABET.

- ***Professor*** *- Choudhury (Chair of the Department), Leclerc (Dean of Engineering)*
- ***Associate Professors****—Chowdhury, Tartis*
- ***Assistant Professor*** *- Lee*
- ***Adjunct Faculty*** *- Bickel, Guillette, McCoy*
- ***Laboratory Associate*** *- Price*

Degree Offered: B.S. in Chemical Engineering

M.S. in Chemical Engineering, M.Eng. in Chemical Engineering, Ph.D. in Chemical Engineering

Chemical engineering is one of the most fundamental engineering disciplines that impacts nearly every facet of life. The efficient production of food, pharmaceuticals, fuels, semiconductors, polymers, and various chemicals, as well as research in sustainable environment and energy, biomedical technology and nanotechnology are driven by the ingenuity of chemical engineers.

Graduates from the Chemical Engineering department will find employment in a variety of industry and research facilities, as well as government, medicine, patent law, technical marketing and other such fields. Students have worked in food production, pharmaceuticals, energetic materials, semiconductor processing, biofuels, and have also pursued research at the national laboratories. Throughout the Chemical Engineering curriculum, students will be able to foster innovation and champion ideas through effective communication. They learn how to design solutions to answer the questions, such as “how can this process be made safer?”, “how can this process be made more efficient?” and so on. This is accomplished through a combination of insightful teaching, challenging laboratory experiences, unique research opportunities and internships. Furthermore, the program is reviewed by an external advisory board of industry and research professionals to ensure that students are well-prepared for successful careers in the modern scientific world To learn more, the Student Handbook of the Chemical Engineering website (***www.nmt.edu/academics/chemeng***) is an excellent resource with quick links and great insights to taking advantage of the outstanding educational opportunities at New Mexico Tech.

Program Educational Objectives

The following objectives have been established by the program faculty in conjunction with our students and advisors from industry. They describe the characteristics and expected accomplishments of our future alumni.

1. Our graduates will be engaged in careers in academia, national labs and industry that cover a spectrum of fields, which require a command of the principles of Chemical Engineering, or in pursuit of/complete post graduate degrees in fields such as engineering, the sciences, business, law, or medicine.

2.Our graduates will be active in the professional community by participating in professional societies, obtaining licensure, and other related activities.

Graduate Programs

The chemical engineering department offers a Master of Science and a Master of Engineering in Chemical Engineering, and Doctor of Philosophy in Chemical Engineering.

Students in the graduate program in chemical engineering will develop a deep understanding of core chemical engineering concepts, including interfacial transport phenomena, thermodynamics, and kinetics.

Upon completion of a graduate degree in chemical engineering, students will demonstrate the ability to:

1. Apply experimental and/or calculation based techniques in order to solve a research question in the field of chemical engineering

2. Apply science and basic engineering to the field of chemical engineering in order to solve upper level problems

3. Effectively present their research through oral presentations, posters, and publications

The following courses are considered core courses:

1. ChE 5051 Advanced mathematical modeling
2. ChE 5052 Surface characterization techniques
3. ChE 5053 Advanced Separation Processes
4. ChE 5063 Design and Analysis of Experiments
5. ChE 5066 Heterogeneous Catalysis
6. ChE 5068 Surfaces, Interfaces, and Colloids
7. ChE 5072 Interfacial Transport Phenomena

Accelerated Masters

Qualified undergraduate students may apply for admission to the Accelerated Masters program in Chemical Engineering. In fulfillment of the requirements for both B.S and M.S. degrees, as outlined in their respective sections, accepted students may apply nine credits of 5000-level courses to both degrees.

Programs

Accelerated M.S. in Chemical Engineering (pathway)

[Program Overview]

Program Title
Accelerated Masters in Chemical Engineering

Department(s)
Chemical Engineering

Program Description
Qualified undergraduate students may apply for admission to the Accelerated Masters program in Chemical Engineering. In fulfillment of the requirements for both B.S and M.S. degrees, as outlined in their respective sections, accepted students may apply nine credits of 5000-level courses to both degrees.

Chemical Engineering (minor)

[Program Overview]

Program Title
Minor in Chemical Engineering

Department(s)
Chemical Engineering

Program Description
Minimum credit hours required—22

Simple Requisites

Program Requirements
The following courses are required:

Minor in Chemical Engineering Requirements
Type
Completion Requirement

Complete one of the following options

Complete at least 1 of the following courses:
- CH E3051 - Chemical Process Kinetics
- CH E3052 - Separation Process
- CH E4077 - Bioprocess Engineering

Complete one of the following options

Complete at least 1 of the following courses:
- CHEM3011 - Quantitative Analysis
  AND CHEM3011L - Quantitative Analysis Lab
- CHEM3031 - Physical Chemistry I
  AND CHEM3031L - Physical Chemistry I Lab
- CHEM3033 - Organic Chemistry I
  AND CHEM3033L - Organic Chemistry I Lab

Complete all of the following courses

Complete ALL of the following Courses:
- CH E3026 - Principles of Chemical Engineering I
- ES216 - Engineering Fluid Mechanics
- ES3047 - Thermodynamics
- ES3050 - Heat & Mass Transfer
- CH E3049 - Chemical Engineering Thermodynamics

Additional Comments:

Institute General Requirements

No Requirement Level

Polymer Science (minor)

[Program Overview]

Program Title
Minor in Polymer Science

Department(s)
Chemical Engineering, Materials Engineering

Program Description
Minimum credit hours required—19

Simple Requisites

Program Requirements
The following courses are required:

Minor in Materials Engineering
Type
Completion Requirement

Chemistry Required Courses

Complete ALL of the following Courses:
- CHEM3034 - Organic Chemistry II
- CHEM4046 - Polymer Chemistry

Materials Engineering Required Courses

Complete at least 1 of the following courses:
- MTLS202 - Materials Engineering I
  AND MTLS202L - Materials Engineering I Lab
- MTLS235 - Materials Engineering II
  AND MTLS235L - Materials Engineering II Lab
- MTLS3051 - Introduction to Polymeric Materials

Earn at least 6 credits from the following list

Earn at least 6 credits from the following:
- Technical Electives

Additional Comments:

Institute General Requirements

See the **Institute General Education Core Requirements**.

No Requirement Level

BS-CH E - B.S. in Chemical Engineering

[Program Overview]

Program Title
BS-CH E

Department(s)
Chemical Engineering

Degree & Program Code
BS-CH E

Program Description
Chemical engineering is one of the most fundamental engineering disciplines that impacts nearly every facet of life. The efficient production of food, pharmaceuticals, fuels, semiconductors, polymers, and various chemicals, as well as research in sustainable environment and energy, biomedical technology and nanotechnology are driven by the ingenuity of chemical engineers.

Graduates from the Chemical Engineering department will find employment in a

variety of industry and research facilities, as well as government, medicine, patent law, technical marketing and other such fields. Students have worked in food production, pharmaceuticals, energetic materials, semiconductor processing, biofuels, and have also pursued research at the national laboratories.

Throughout the Chemical Engineering curriculum, students will be able to foster innovation and champion ideas through effective communication. They learn how to design solutions to answer questions such as “how can this process be made safer?”, “how can this process be made more efficient?” and so on. This is accomplished through a combination of insightful teaching, challenging laboratory experiences, unique research opportunities and internships. Furthermore, the program is reviewed by an external advisory board of industry and research professionals to ensure that students are well-prepared for successful careers in the modern scientific world

To learn more, the Student Handbook of the Chemical Engineering website (www.nmt.edu/academics/chemeng) is an excellent resource with quick links and great insights to taking advantage of the outstanding educational opportunities at New Mexico Tech.

Simple Requisites

Program Requirements
Minimum credit hours required—136

In addition to the General Education and Institute Core Curriculum, the following courses are required:

Course Requirements
Type
Completion Requirement

Chemical Engineering Required Courses

Complete ALL of the following Courses:

- CH E1010 - Intro to Chemical Engineering
- CH E3026 - Principles of Chemical Engineering I
- CH E3027 - Principles of Chemical Engineering II
- CH E3045L - Chemical Engineering Design Lab
- CH E3049 - Chemical Engineering Thermodynamics
- CH E3051 - Chemical Process Kinetics
- CH E3052 - Separation Process
- CH E3071 - Solution Methods for Chemical Engineering
- CH E4043 - Process Dynamics & Control
  AND CH E4043L - Process Dynamics & Control Lab
- CH E4045L - Unit Operations Lab
- CH E4061 - Plant Design, Economics, and Management I
- CH E4062 - Plant Design, Economics, & Management II
- CH E4085 - Process Safety Seminar

Chemistry Required Courses

Complete ALL of the following Courses:

- CHEM3011 - Quantitative Analysis
  AND CHEM3011L - Quantitative Analysis Lab
- CHEM3031 - Physical Chemistry I
  AND CHEM3031L - Physical Chemistry I Lab
- CHEM3033 - Organic Chemistry I
  AND CHEM3033L - Organic Chemistry I Lab

Engineering Science Required Courses

Complete ALL of the following Courses:

- ES201 - Statics
- ES216 - Engineering Fluid Mechanics
- ES3002 - Mechanics of Materials
- ES3047 - Thermodynamics
- ES3050 - Heat & Mass Transfer
- ES4005L - Instrumentation, Measurements, & Processess Control Lab

Electrical Engineering Required Courses

Complete ALL of the following Courses:

- EE211 - Circuits & Signals I
- EE3032 - Electricity and Magnetism

Math Required Courses

Complete ALL of the following Courses:

- MATH2532 - Calculus III
- MATH3035 - Ordinary Differential Equation

Materials Engineering Required Courses

Complete ALL of the following Courses:

- MTLS202 - Materials Engineering I
  AND MTLS202L - Materials Engineering I Lab
- MTLS235 - Materials Engineering II
  AND MTLS235L - Materials Engineering II Lab

Additional Comments:
Engineering/Technical Electives (9) Upper-division engineering or other approved courses. These electives should be Chemical Engineering, other engineering, chemistry, biology, mathematics, physics or computer science courses at the 3000-, 400-, or 5000-level.

Chemical engineering majors must maintain a minimum GPA of 2.0 in required courses in order to graduate. Courses used for degree, including general degree requirements, may not be taken on an S/U basis.

Institute General Requirements

General Education Requirements for Bachelor of Science in Chemical Engineering
Type
Completion Requirement

Area 1: Communications Requirement for Bachelor of Science

Complete ALL of the following Course Sets:

- Area 1: Communications (BS Degree) (9 credits)

Area 2: Mathematics and Quantitative Reasoning Requirements for Bachelor of Science

Complete ALL of the following Course Sets:

- Area 2: Mathematics (BS Degree) (8 credits)

Area 3: Science Requirements for a Bachelor of Science

Complete ALL of the following Course Sets:

- Area 3: Science (BS Degree) (18 credits)

Area 4: Social and Behavioral Science Requirements for a Bachelor of Science

Earn at least 6 credits from the following:

- Area 4: Social and Behavioral Science (BS or BGS Degree) (6 credits)

Area 5: Humanities Course Requirements for a Bachelor of Science

Earn at least 6 credits from the following:

- Area 5: Humanities (BS or BGS Degree) (6 credits)

Area 6: Creative & Fine Art Requirement for a Bachelor of Science

Earn at least 3 credits from the following:

- Area 6: Creative and Fine Arts (BS, BA, or BGS Degree) (3 credits)

Area 7: Additional Humanities/Social Science Requirement for a Bachelor of Science

Earn at least 3 credits from the following:

- Area 7: Additional Courses from Areas 4, 5, 6 (BS, BA, or BGS Degree) (3 credits)

Additional Comments:

No Requirement Level

[Learning Outcomes]

Outcome
1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics

Outcome
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors

Outcome
3. An ability to communicate effectively with a range of audiences

Outcome
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

Outcome
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives

Outcome
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions

Outcome
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

[Sample 4-Year Curriculum Plan(s)]

Degree Map Name
Sample Curriculum for the Bachelor of Science in Chemical Engineering
Total Degree Map Credits
137
Degree Map Effective Catalog Year
2025 -

Year	Semester	Actual Credits
Year 1	Fall	16

Course

- CH E1010 - Intro to Chemical Engineering
- **AND** CH E1010L - Introduction to Chemical Engineering Lab

Actual Credits 2

Course

- ENGL1110 - g1:Composition I

Actual Credits 3

Course

- MATH1510 - g2:Calculus I

Actual Credits 4

Course

- CHEM1215 & CHEM1215L: g:General Chemistry I and Lab

Actual Credits 4

Course

- Social Sciences

Actual Credits 3

Year	Semester	Actual Credits

Year	Spring	16

Course
- ENGL1120 - g1:Composition II

Actual Credits 3

Course
- MATH1520 - g2:Calculus II

Actual Credits 4

Course
- CHEM1225 & CHEM1225L: g: General Chemistry II and Lab

Actual Credits 4

Course
- PHYS1310 & PHYS1310L: g:Calculus-Physics I and Lab

Actual Credits 5

Year	Semester	Actual Credits
Year 2	Fall	17

Course
- CH E3026 - Principles of Chemical Engineering I

Actual Credits 3

Course
- MATH2532 - Calculus III

Actual Credits 4

Course
- ES201 - Statics

Actual Credits 3

Course
- CHEM3011 & CHEM3011L: Quantitative Analysis and Lab

Actual Credits 4

Course
- Social Sciences

Actual Credits 3

Year	Semester	Actual Credits
Year 2	Spring	17

Course
- ES216 - Engineering Fluid Mechanics

Actual Credits 3

Course
- ES3047 - Thermodynamics

Actual Credits 3

Course
- MATH3035 - Ordinary Differential Equation

Actual Credits 3

Course
- PHYS1320 & PHYS1320L: g:Calculus-Based Physics II and Lab

Actual Credits 5

Course
- CH E3027 - Principles of Chemical Engineering II

Actual Credits 3

Year	Semester	Actual Credits
Year 3	Fall	17

Course
- CH E3049 - Chemical Engineering Thermodynamics

Actual Credits 3

Course
- ES3002 - Mechanics of Materials

Actual Credits 3

Course
- ES3050 - Heat & Mass Transfer

Actual Credits 3

Course
- ES4005L - Instrumentation, Measurements, & Processess Control Lab

Actual Credits 1

Course
- CHEM3031 & CHEM3031L: Physical Chemistry I and Lab

Actual Credits 4

Course
- Social Sciences

Actual Credits 3

Year	Semester	Actual Credits
Year 3	Spring	17

Course
- CH E3045L - Chemical Engineering Design Lab

Actual Credits 1

Course
- CH E3051 - Chemical Process Kinetics

Actual Credits 3

Course
- CH E3052 - Separation Process

Actual Credits 3

Course
- Technical Electives

Actual Credits 3

Course
- ENGL3041 - i1:Technical Writing

Actual Credits 3

Course
- MTLS202 & MTLS202L: Materials Engineering I and Lab
  OR
- MTLS235 & MTLS235L: Materials Engineering II and Lab

Actual Credits 4

Year	Semester	Actual Credits
Year 4	Fall	17

Course
- CH E4045L - Unit Operations Lab

Actual Credits 1

Course
- CH E4061 - Plant Design, Economics, and Management I

Actual Credits 3

Course
- Technical Electives

Actual Credits 3

Course
- CH E3071 - Solution Methods for Chemical Engineering

Actual Credits 3

Course
- CHEM3033 & CHEM3033L: Organic Chemistry I and Lab

Actual Credits 4

Course
- Social Science/Humanities/Fine & Creative Arts Requirements

Actual Credits 3

Year	Semester	Actual Credits
Year 4	Spring	20

Course
- CH E4062 - Plant Design, Economics, & Management II

Actual Credits 3

Course
- CHEM4043 & CHEM4043L: Intermediate Inorganic Chemistry and Lab

Actual Credits 4

Course
- ES3032 - Electrical Engineering

Actual Credits 3

Course
- Technical Electives

Actual Credits 3

Course
- Humanities

Actual Credits 3

Course
- Social Sciences

Actual Credits 3

Course
- CH E4085 - Process Safety Seminar

Actual Credits 1

ME-CH E - M.E. in Chemical Engineering

[Program Overview]

Program Title
Masters of Engineering in Chemical Engineering

Department(s)
Chemical Engineering

Degree & Program Code
ME-CH E

Program Description
Students in the graduate program in Chemical Engineering will develop a deep understanding of core chemical engineering concepts, including interfacial transport phenomena, thermodynamics, and kinetics. Students will also have the opportunity to explore applications in chemical engineering through coursework and research.

Simple Requisites

Program Requirements

In addition to meeting the general graduate degree requirements, the program has the following requirements:

1. The Master of Engineering degree requires 30 credit hours beyond the B.S. with the following requirements:
    - a minimum of 12 hours of 5000-level in chemical engineering, which must include at least 9 hours of core courses
    - a minimum of 6 hours outside of chemical engineering
    - maximum of 3 hours of directed study
    - all courses need to be 3000-level or above
2. Students must take CHE5085: Graduate Seminar each semester offered up to two times. CHE5085 cannot be used towards the credit coursework requirement for the degree.

Core Courses
Type
Completion Requirement

Any three of the following course are required:

Complete at least 3 of the following courses:

- CH E5051 - Advanced Mathematical Modeling
- CH E5068 - Surfaces, Interfaces, and Colloids
- CH E5072 - Interfacial Transport Phenomenon
- CH E5086 - Adv. Reaction Engineering

Additional Comments:

Institute General Requirements
See the Master of Science information found in the Graduate section of the catalog at Master of Science Degree.

No Requirement Level

[Learning Outcomes]

Outcome
1. The ability to apply experimental and/or calculation based techniques in order to solve a research question in the field of chemical engineering

Outcome
2. Apply science and basic engineering to the field of chemical engineering in order to solve upper level problems

Outcome
3. Effectively present their research through oral presentations, posters, and publications

MS-CH E - M.S. in Chemical Engineering

[Program Overview]

Program Title
Master of Science in Chemical Engineering

Department(s)
Chemical Engineering

Degree & Program Code
MS-CH E

Program Description
Students in the graduate program in chemical engineering will develop a deep understanding of core chemical engineering concepts, including interfacial transport phenomena, thermodynamics, and kinetics. Students will also have the opportunity to explore applications in chemical engineering through coursework and research.

Simple Requisites

Program Requirements
In addition to meeting the general graduate degree requirements, the M.S. Program has the following requirements:

1. The student must select a thesis committee of at least three faculty with the majority of the faculty members being from inside the department. The committee must include the student's research advisor and academic advisor, which may be the same faculty member.
2. The MS degree requires 3 credit hours beyond the B.S. with the following requirements:
    - A minimum of 6 hours of thesis
    - A maximum of 3 hours of directed study
    - A minimum of 12 hours of 5000-level or above in Chemical Engineering, which must include at least 9 hours of core courses
    - A minimum of 6 hours of upper-division or graduate-level courses outside of chemical engineering
    - All courses need to be 3000-level or above
3. The student's graduate thesis committee, the department chair, and the graduate dean must approve the course work used for the degree.
4. The student must successfully pass a proposal defense, preferably at least one semester before the thesis defense.
5. The student must write and successfully defend a thesis of their research in an oral public defense before their graduate thesis committee.
6. Students must take ChE 5085: Graduate Seminar each semester offered, up to two times. ChE 5085 cannot be used towards the credit coursework requirement for the degree.

Core Courses
Type
Completion Requirement

Any 3 courses required

Complete at least 3 of the following courses:

- CH E5051 - Advanced Mathematical Modeling
- CH E5068 - Surfaces, Interfaces, and Colloids
- CH E5072 - Interfacial Transport Phenomenon
- CH E5086 - Adv. Reaction Engineering

Additional Comments:

Institute General Requirements
See the Master of Science information found in the Graduate section of the catalog at Master of Science Degree.

No Requirement Level

[Learning Outcomes]

Outcome
1. The ability to apply experimental and/or calculation based techniques in order to solve a research question in the field of chemical engineering

Outcome
2. Apply science and basic engineering to the field of chemical engineering in order to solve upper level problems

Outcome
3. Effectively present their research through oral presentations, posters, and publications

PHD-CH E - Ph.D. in Chemical Engineering

[Program Overview]

Program Title
Doctor of Philosophy in Chemical Engineering

Department(s)
Chemical Engineering

Degree & Program Code
PHD-CH E

Program Description
Students in the graduate program in Chemical Engineering will develop a deep understanding of core chemical engineering concepts, including interfacial transport phenomena, thermodynamics, and kinetics. Students will also have the opportunity to explore applications in chemical engineering through coursework and research.

Simple Requisites

Program Requirements

Core Courses
Type
Completion Requirement

Complete ALL of the following Courses:
- CH E5051 - Advanced Mathematical Modeling
- CH E5068 - Surfaces, Interfaces, and Colloids
- CH E5072 - Interfacial Transport Phenomenon
- CH E5086 - Adv. Reaction Engineering

Additional Comments:

Institute General Requirements
See the Master of Science information found in the Graduate section of the catalog at **Graduate Degree Requirements.**

No Requirement Level

[Learning Outcomes]

Outcome
1. Gain the ability to apply experimental and/or calculation based techniques in order to solve a research question in field of surface engineering

Outcome
2. Apply science and basic engineering to the field of surface engineering in order to solve upper level problems

Outcome
3. Effectively present their research through oral presentations, posters, and publications

Courses

CH E1010 - Intro to Chemical Engineering

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Students will gain fundamental engineering skills that apply to all engineering disciplines through problem and cooperative based learning exercises and attain a clear understanding of what chemical engineers practice versus other engineering disciplines, in both traditional and contemporary work environments and careers. This course will introduce engineering calculations such as material and energy balances, cost analysis, and engineering software programs. The lab focuses on firsthand experience of engineering design, calculations, and simulations using Chem CAD, Lab VIEW, and Excel. Additionally, data acquisition and analysis will be introduced. Small teams will design, build, and test a system, resulting in a written report, oral presentation, and design competition.

Equivalent Courses: Previous & Current Courses
CH E110

Simple Requisites

Course Requisite Requirements

Required Corequisite Enrollment
Type
Corequisite

Corequisite of CH E 1010L

Enroll in the following Courses:
- CH E1010L - Introduction to Chemical Engineering Lab

Additional Comments:

No Requirement Level

CH E1010L - Introduction to Chemical Engineering Lab

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Equivalent Courses: Previous & Current Courses
CH E110L

Simple Requisites

Course Requisite Requirements

Required Corequisite Enrollment
Type
Corequisite

Corequisite of CH E 1010

Enroll in the following Courses:
- CH E1010 - Intro to Chemical Engineering

Additional Comments:

No Requirement Level

CH E3026 - Principles of Chemical Engineering I

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Introduction to stoichiometric computations. Calculations of energy and material balance for non-reactive and reactive processes. Elementary process analysis and phase equilibria. Single and multi-phase systems

Equivalent Courses: Previous & Current Courses
CH E326

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisite: CHEM 1215

Offered fall semester

Complete ALL of the following Courses:
- CHEM1215 - g3:General Chemistry I

Additional Comments:

Corequisite
Type
Corequisite

Corequisite

Corequisite: MATH 1520

Offered fall semester

Complete ALL of the following Courses:
- MATH1520 - g2:Calculus II

Additional Comments:

No Requirement Level

CH E3027 - Principles of Chemical Engineering II

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Students formulate and solve non-steady state/transient material and energy balances on chemical processes. Students will learn to apply appropriate solution techniques using logic programming (e.g. MATLAB) to a range of problems in various chemical engineering systems.

Equivalent Courses: Previous & Current Courses
CH E327

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisite: ChE 3026

Offered spring semester

Complete ALL of the following Courses:
- CH E3026 - Principles of Chemical Engineering I

Additional Comments:

Corequisite
Type
Corequisite

Corequisite

Corequisite: MATH 2532

Offered spring semester

Complete ALL of the following Courses:
- MATH2532 - Calculus III

Additional Comments:

No Requirement Level

CH E3045L - Chemical Engineering Design Lab

General

Credit Hrs

Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Team-oriented project design. Introduction to design fundamentals, creative problem-solving techniques, design criteria and constraints, project scheduling, instrumentation, data analysis, and project documentation. Written and oral presentations summarizing team progress.

Equivalent Courses: Previous & Current Courses
CH E345L

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisites: ES 3047, ChE 3026

Offered spring semester

Complete ALL of the following Courses:
- ES3047 - Thermodynamics
  AND CH E3026 - Principles of Chemical Engineering I

Additional Comments:

Corequisite
Type
Corequisite

Corequisite

Corequisite: ES 3050

Offered spring semester

Complete ALL of the following Courses:
- ES3050 - Heat & Mass Transfer

Additional Comments:

No Requirement Level

CH E3049 - Chemical Engineering Thermodynamics

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
The theory and engineering applications of the properties of mixtures, phase and chemical reaction equilibria. (Same as MTLS 3050)

Equivalent Courses: Previous & Current Courses
CH E349

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisites: MATH 2532; CHEM 1215, PHYS 1310; ES 3047 is recommended

Offered fall semester

Complete ALL of the following Courses:

- MATH2532 - Calculus III
- CHEM1215 - g3:General Chemistry I
- PHYS1310 - g3:Calculus-based Physics I
  AND ES3047 - Thermodynamics

Additional Comments:

No Requirement Level

CH E3051 - Chemical Process Kinetics

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Team-oriented project design. Introduction to design fundamentals, creative problem-solving techniques, design criteria and constraints, project scheduling, instrumentation, data analysis, and project documentation. Written and oral presentations summarizing team progress.

Equivalent Courses: Previous & Current Courses
CH E351

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisites: ChE 3026, 3049, MATH 3035

Offered spring semester

Complete ALL of the following Courses:

- CH E3026 - Principles of Chemical Engineering I
  AND CH E3049 - Chemical Engineering Thermodynamics
- MATH3035 - Ordinary Differential Equation

Additional Comments:

Corequisite
Type
Corequisite

Corequisite

Corequisite: ES 3050

Offered spring semester

Complete ALL of the following Courses:

- ES3050 - Heat & Mass Transfer

Additional Comments:

No Requirement Level

CH E3052 - Separation Process

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
The process approach to solving problems that involve equilibrium in binary and multicomponent mixtures. Phase equilibrium, absorption, distillation (binary and multicomponent), liquid-liquid extraction, leaching. Design of staged operations for separating gas-liquid, liquid-liquid, solid-liquid, and gas-solid mixtures.

Equivalent Courses: Previous & Current Courses
CH E52

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisites: ChE 3026, 3049

Offered spring semester

Complete ALL of the following Courses:

- CH E3026 - Principles of Chemical Engineering I
  AND CH E3049 - Chemical Engineering Thermodynamics

Additional Comments:

Corequisite
Type
Corequisite

Corequisite

Corequisite: ES 3050

Offered spring semester

Complete ALL of the following Courses:

- ES3050 - Heat & Mass Transfer

Additional Comments:

No Requirement Level

CH E3071 - Solution Methods for Chemical Engineering

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Application of analytic and numeric solution techniques to problems in chemical engineering thermodynamics, fluid transport, heat transfer, mass transfer, kinetics and process control. Topics covered include solution of sets of linear and nonlinear algebraic equations, ordinary differential equations, and partial differential equations. Emphasis will be on solving problems the student will encounter in the field of chemical engineering.

Equivalent Courses: Previous & Current Courses
CH E371

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisites: ChE 3027, ChE 3051, ChE 3052

Offered fall semester

Complete ALL of the following Courses:
- CH E3027 - Principles of Chemical Engineering II
- CH E3051 - Chemical Process Kinetics
  AND CH E3052 - Separation Process

Additional Comments:

No Requirement Level

CH E3089F - First Responder Special Topics

General

Credit Hrs
Credit Hrs:
2

Grade Modes
Audit, Pass/Fail, Standard Letter

No Requirements

CH E4043 - Process Dynamics & Control

General

Credit Hrs
Credit Hrs:
2

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Process dynamics and control theory applied to chemical, mechanical, and other engineering processes. Design of control systems.

When Offered
Spring

Equivalent Courses: Previous & Current Courses
CH E443

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisites: MATH 3035

Complete ALL of the following Courses:
- MATH3035 - Ordinary Differential Equation

Additional Comments:

Corequisite
Type
Corequisite

Corequisite

Corequisites: ChE 3071

Complete ALL of the following Courses:
- CH E3071 - Solution Methods for Chemical Engineering

Additional Comments:

No Requirement Level

CH E4043L - Process Dynamics & Control Lab

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Experimental characterization and computer modeling of system dynamics. Design, implementation, and tuning of process control systems for chemical processes.

Equivalent Courses: Previous & Current Courses
CH E443L

Simple Requisites

Course Requisite Requirements

Corequisite
Type
Corequisite

Corequisite

Complete ALL of the following Courses:

- CH E4043 - Process Dynamics & Control

Additional Comments:

No Requirement Level

CH E4045L - Unit Operations Lab

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Laboratory exercises to illustrate heat exchange, fluid flow, and mass transport phenomena in common unit operations found in the chemical process industries.

Equivalent Courses: Previous & Current Courses
CH E445L

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisite: ChE 3051, 3052

Offered fall semester

Complete ALL of the following Courses:

- CH E3051 - Chemical Process Kinetics
  AND CH E3052 - Separation Process

Additional Comments:

No Requirement Level

CH E4049 - Nanostructures & Nanotech

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
An introduction to different properties of nanosystems and their applications. Electron transport in nanosystems, optical properties, electrical properties and magnetic properties. Semiconductor nanostructures and metallic nanostructures, characterization of nanostructures. Different types of nanostructure synthesis and fabrication and characterizations. Shares lecture with Ch E 5049.

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- CH E3051 - Chemical Process Kinetics
  OR CHEM3031 - Physical Chemistry I

Additional Comments:

No Requirement Level

CH E4053 - Advanced Separation Processes

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Applications of interfacial mass transfer including liquid-liquid, gas-solid, and liquid-solid separation based techniques. Processes include adsorption, crystallization, liquid-liquid extraction, chromatography, and membrane based separations. Shares lecture with Ch E 5053.

Equivalent Courses: Previous & Current Courses
CH E453

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- CH E3052 - Separation Process

Additional Comments:

No Requirement Level

CH E4061 - Plant Design, Economics, and Management I

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
A two-semester sequence of courses in which a design project is used to illustrate principles and processes of chemical plant design, economics, and management. Lecture topics include intellectual property, capital and operating cost estimation, energy conservation, design optimization and scaling of chemical processes. Use of commercially available process simulation software emphasized.

Equivalent Courses: Previous & Current Courses
CH E461

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisites: ChE 3051 and ChE 3052

Offered fall semester

Complete ALL of the following Courses:
- CH E3051 - Chemical Process Kinetics
  AND CH E3052 - Separation Process

Additional Comments:

No Requirement Level

CH E4062 - Plant Design, Economics, & Management II

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Continuation of Ch E 4061.

Equivalent Courses: Previous & Current Courses
CH E462

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisite: ChE 4061.

Offered spring semester

Complete ALL of the following Courses:
- CH E4061 - Plant Design, Economics, and Management I

Additional Comments:

Corequisite
Type
Corequisite

Corequisite

Corequisite: ChE 4085

Offered spring semester

Complete ALL of the following Courses:
- CH E4085 - Process Safety Seminar

Additional Comments:

No Requirement Level

CH E4063 - Design/Analysis of Experiments

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Learn how to plan, design, and conduct experiments efficiently and effectively, and data analysis to draw conclusions. Both design and statistical analysis issues are discussed. Students will learn how to utilize standard statistical software packages for design and analysis of experiments.

Equivalent Courses: Previous & Current Courses
CH E463

Simple Requisites

Course Requisite Requirements

Prerequisite: Senior standing

No Requirement Level

CH E4065 - Catalyst Charactrzn Techniques

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
The course provides an overview of techniques used to characterize catalytic materials including data analysis and linking physical and chemical properties to catalytic activity at the laboratory and process level. Topics include x-ray methods, neutron scattering methods, physical adsorption, chemical adsorption, temperature programmed techniques, photoelectron spectroscopy, vibrational spectroscopy, and electron microscopy.

Equivalent Courses: Previous & Current Courses
CH E465

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisite: ChE 3049 or MTLS 350 or CHEM 3032 or instructor's consent

Complete ALL of the following Courses:

- CH E3049 - Chemical Engineering Thermodynamics
  OR MTLS3050 - Materials Thermodynamics
  OR CHEM3032 - Physical Chemistry II

Additional Comments:

No Requirement Level

CH E4068 - Surfaces, Interfaces, &Colloids

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Standard Letter

Course Description
Kinetics and thermodynamics of nano-scale particle interactions with emphasis on colloidal phenomena, surfactants, electrostatic, London, and Van der Waals interactions, gas adsorption, sedimentation and diffusion, osmotic and Donnan equilibrium, rheology, surface tension, and the electrical double layer. Relevant instrumentation will be discussed for various topics.

Equivalent Courses: Previous & Current Courses
CH E468

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisites: ChE 3049, MTLS 3050, or CHEM 3031

Complete ALL of the following Courses:

- CH E3049 - Chemical Engineering Thermodynamics
  OR MTLS3050 - Materials Thermodynamics
  OR CHEM3031 - Physical Chemistry I

Additional Comments:

No Requirement Level

CH E4070 - Fuel Cell Technology

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
The principles of fuel cell technology, including classification of fuel cells and operating mechanisms. Analysis of the underlying thermodynamics and physical factors which govern fuel cell performance and efficiency. Cell components and integrative cell design.

Equivalent Courses: Previous & Current Courses
CH E470

Simple Requisites

Course Requisite Requirements

Prerequisite: Consent of instructor

No Requirement Level

CH E4072 - Advanced Transport Phenomena

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Advanced topics in momentum, heat, and mass transfer. Newtonian and non-Newtonian fluid behavior and laminar flow problems, elementary turbulent flow concepts, energy balance applications in incompressible fluid flow, flow and vacuum production. Fourier's law and thermal conductivity of materials, steady state and time dependent heat conduction, application in solidification, elementary convective heat transfer. Diffusivity of Materials, diffusion in gases, liquids and solids and through porous media, time dependent diffusion, and interphase mass transfer.

Equivalent Courses: Previous & Current Courses
CH E472, CH E472D

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisite: ES 216 and 3050 or MTLS 3014 or consent of instructor and advisor

Complete ALL of the following Courses:

- ES216 - Engineering Fluid Mechanics
  AND ES3050 - Heat & Mass Transfer
- MTLS3014 - Transport Processes

Additional Comments:

No Requirement Level

CH E4073 - Polymer Materials Engineering

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Introduction to classes and performance properties of polymeric materials. Methods of polymer synthesis and processing. Special emphasis on structure, viscoelasticity, and mechanical properties.

Equivalent Courses: Previous & Current Courses
CH E473

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisite: MTLS 202 or consent of instructor and advisor

Offered every fall semester

Complete ALL of the following Courses:

- MTLS202 - Materials Engineering I

Additional Comments:

No Requirement Level

CH E4074 - Polymer Processing & Character

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
The basics of rheology, calorimetry and mechanical testing are covered. A specific polymer is used (e.g., an epoxy) throughout the course and the processing of this polymer is covered. Students are expected to acquire a working knowledge of the instrumentation and analysis tools used in the course. These include rheometers, calorimeters, and mechanical testing. The primary analysis tool is Kaleidagraph software.

Equivalent Courses: Previous & Current Courses
CH E474

Simple Requisites

Course Requisite Requirements

Prerequisite: Consent of instructor

No Requirement Level

CH E4075 - Explosives Surety

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
An introduction to explosives and other energetic materials. The basic chemical compositions, properties and environmental effects of commercial, military, and improvised (terrorist) explosives and some pyrotechnics will be compared. The basic physics of shock waves and detonation. Explosive effects, blast detection, tagging and environmental issues. Case studies or recent bombings will be used to describe a variety of terrorist approaches. Safety in handling of explosive materials and classifications for transportation and storage. (Same as EXPL 4014.)

Equivalent Courses: Previous & Current Courses
CH E475, CH E475D

Simple Requisites

Course Requisite Requirements

Prerequisite: Upper-class standing or consent of instructor and advisor

Offered spring semester

No Requirement Level

CH E4076 - Drug Delivery Techniques

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Focus is on current developments in drug delivery techniques, with only a brief discussion of common clinical techniques. The first portion of the class focuses on various delivery mechanisms and the tools needed to validate successful targeted drug delivery (both in vitro, in vivo and diagnostic tools). The second part of the course focuses on current developments in drug delivery based on published research articles. Students will read, digest, and critically analyze scientific work from leading research laboratories. Students will also gain valuable communication tools, as each student will present an article of interest to the class. Finally, the third part of the course focuses on important Materials characterization methods such as biological sample prep, SEM, TEM, DSC, Flow Cytometry, Fluorescence Microscopy, ELISA Assays. Shares lecture with MTLS 576 with additional expectations for graduate credit.

Equivalent Courses: Previous & Current Courses
CH E476

Simple Requisites

Course Requisite Requirements

Prerequisite: Senior standing or consent of instructor and advisor

No Requirement Level

CH E4077 - Bioprocess Engineering

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Fermentation processes for the production of biopolymers, biofuels, pharmaceuticals, stem cells, hormones etc. Enzyme kinetics, microbial and animal cell growth kinetics, metabolic engineering, bioreactors, separation and purification of products. Examples of industrial processes.

Equivalent Courses: Previous & Current Courses
CH E477

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- CH E3026 - Principles of Chemical Engineering I

Additional Comments:

No Requirement Level

CH E4078 - Transport Process Modeling

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Applications of mathematical modeling of various physical transport processes, specially, momentum, mass, thermal and electrophoretic transport processes. Transport processes relevant to various chemical and biomedical processes such as drug delivery, thermal therapy, chemical separations, etc. Hands-on computer labs to set up and run simulations and visualize & analyze the simulation results. Shares lecture with Ch E 5078.

Simple Requisites

Course Requisite Requirements

Prerequisite: Consent of instructor

No Requirement Level

CH E4081 - Modeling in Advanced Materials

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Overview of several contemporary research topics pertaining to nanomaterials for energy, environment and electronics. Lectures are focused on general modeling approaches to characterize the nanomaterials, which can have a significant impact on our quality of life. Relevant physical concepts, computational methods, and simulations on parallel computers are also introduced. Special attention are given to point out how methods learned during this course are applied in current frontier research in nano Materials for various applications. Along with the lectures, the course also includes in- class implementation workshops of some of the computational methods using relevant software packages.

Equivalent Courses: Previous & Current Courses
CH E481

Simple Requisites

Course Requisite Requirements

Prerequisite: Consent of instructor

No Requirement Level

CH E4085 - Process Safety Seminar

General

Credit Hrs

Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Coverage of chemical process safety including historical safety incidents, hazard and operability analysis (HAZOP), layer of protection analysis, NFPA chemical diamonds, safety data sheets, job hazard analysis, chemical compatibility, material compatibility and selection, and flammability.

Equivalent Courses: Previous & Current Courses
CH E485

Simple Requisites

Course Requisite Requirements

Corequisite Type
Corequisite

Corequisite

Corequisite: ChE 4062

Offered spring semester

Complete ALL of the following Courses:
- CH E4062 - Plant Design, Economics, & Management II

Additional Comments:

No Requirement Level

CH E4086 - Adv. Reaction Engineering

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

No Requirements

CH E4091 - Directed Study

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
6

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Individual study of chemical engineering problems of special interest.

Equivalent Courses: Previous & Current Courses
CH E491

Simple Requisites

Course Requisite Requirements

Prerequisite: Consent of instructor

No Requirement Level

CH E5000 - Directed Research

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
12

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, No Report

Course Description
This course may not be used to fulfill graduate degree requirements. This course is mainly for PhD students who have not passed their candidacy exam yet. Research under the guidance of a faculty member. May Be Repeated.

No Requirements

CH E5049 - Nanostructures & Nanotechnology

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
An introduction to different properties of nanosystems and their applications. Electron transport in nanosystems, optical properties, electrical properties and magnetic properties. Semiconductor nanostructures and metallic nanostructures, characterization of nanostructures. Different types of nanostructure synthesis and fabrication and characterizations. Shares lecture with Ch E 4049.

Simple Requisites

Course Requisite Requirements

Prerequisite: Graduate Standing in Chemical Engineering or Consent of Instructor.

No Requirement Level

CH E5051 - Advanced Mathematical Modeling

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Integrated approach to solving linear mathematical problems. Linear algebraic equations. Linear ordinary and partial differential equations using theoretical/ numerical analysis based on linear operator theory. Introduction to numerical solutions to partial differential equations and non-linear systems.

Equivalent Courses: Previous & Current Courses
CH E551

Simple Requisites

Course Requisite Requirements

Prerequisites: Graduate Standing in Chemical Engineering or consent of instructor

No Requirement Level

CH E5052 - Surface Character Techniques

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Standard Letter

Course Description
The course covers scientific principles, instrumentation, and data analysis for several surface characterization techniques for chemical engineering systems. This course also addresses recent research papers regarding their applications. The techniques to be covered include surface topography (profilometers, atomic force microscopy, etc.), spectroscopy (UV-Vis absorption spectroscopy, Fourier transform infrared spectroscopy, Raman spectroscopy, etc.), microscopy (scanning electron microscopy and transmission electron microscopy), X-ray scattering (grazing incidence X-ray scattering, near edge X-ray absorption fine structure, etc.), and relevant advanced techniques.

Equivalent Courses: Previous & Current Courses
CH E552

Simple Requisites

Course Requisite Requirements

Prerequisites: Graduate Standing in Chemical Engineering or consent of instructor

No Requirement Level

CH E5053 - Advanced Separation Processes

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Applications of interfacial mass transfer including liquid-liquid, gas-solid, and liquid-solid separation based techniques. Processes include adsorption, crystallization, chromatography, and membrane based separations.

Equivalent Courses: Previous & Current Courses
CH E553

Simple Requisites

Course Requisite Requirements

Prerequisites: Graduate Standing in Chemical Engineering or consent of instructor

No Requirement Level

CH E5063 - Design and Analysis of Experiments

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Learn how to plan, design and conduct experiments efficiently and effectively, and data analysis to draw conclusions. Both design and statistical analysis issues are discussed. Students will learn how to utilize standard statistical software packages for design and analysis of experiments.

Equivalent Courses: Previous & Current Courses
CH E563

Simple Requisites

Course Requisite Requirements

Prerequisites: Graduate Standing in Chemical Engineering or consent of instructor

No Requirement Level

CH E5065 - Catalyst Characterization Technology

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
.The course provides an overview of techniques used to characterize catalytic Materials including data analysis and linking physical and chemical properties to catalytic activity at the laboratory and process level. Topics include x-ray methods, neutron scattering methods, physical adsorption, chemical adsorption,

temperature programmed techniques, photoelectron spectroscopy, vibrational spectroscopy, and electron microscopy. The use of information sources, such as Materials safety data sheets (MSDS). Shares lecture with Ch E 4065, with additional expectations for graduate credit.

Equivalent Courses: Previous & Current Courses
CH E565

Simple Requisites

Course Requisite Requirements

Prerequisites: Graduate Standing in Chemical Engineering or consent of instructor

No Requirement Level

CH E5066 - Heterogeneous Catalysis

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Overview of properties important for catalysts, catalyst synthesis techniques, and structured catalysts. Catalytic reactor design and operation including external mass transfer, pore diffusion, and methods to determine mass transfer limitations including boundary layer models. Surface kinetic mechanisms including Langmuir-Hinshelwood and Eley-Rideal kinetics. Surface reaction thermodynamics.

Equivalent Courses: Previous & Current Courses
CH E566

Simple Requisites

Course Requisite Requirements

Prerequisites: Graduate Standing in Chemical Engineering or consent of instructor

No Requirement Level

CH E5068 - Surfaces, Interfaces, and Colloids

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Standard Letter

Course Description
Kinetics and thermodynamics of nano-scale particle interactions with emphasis on colloidal phenomena, surfactants, electrostatic, London, and Van der Waals interactions, gas adsorption, sedimentation and diffusion, osmotic and Donnan equilibrium, rheology, surface tension, and the electrical double layer. Relevant instrumentation will be discussed for various topics. Shares lecture with Ch E 4068, with additional expectations for graduate credit.

Equivalent Courses: Previous & Current Courses
CH E568

Simple Requisites

Course Requisite Requirements

Prerequisite: Graduate Standing in Chemical Engineering or consent of instructor

No Requirement Level

CH E5071 - Modeling in Advanced Materials

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Standard Letter

Simple Requisites

Course Requisite Requirements

Prerequisite: Consent of instructor

Prerequisite: Graduate standing or consent of instructor

No Requirement Level

CH E5072 - Interfacial Transport Phenomenon

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Advanced topics in momentum, heat, and mass transfer applied to interfacial transport processes. Newtonian and non-Newtonian fluid behavior and laminar flow problems, elementary turbulent flow concepts, energy balance applications in incompressible fluid flow, flow and vacuum production. Fourier's law and thermal conductivity of Materials, steady state and time dependent heat conduction, application in solidification, elementary convective heat transfer. Diffusivity of Materials, diffusion in gases, liquids and solids and through porous media, time dependent diffusion, and interphase mass transfer. The use of information sources, such as Materials safety data sheets (MSDS). Shares lecture with Ch E 4072, with additional expectations for graduate credit.

Equivalent Courses: Previous & Current Courses
CH E572

Simple Requisites

Course Requisite Requirements

Prerequisite: Graduate Standing in Chemical Engineering or consent of instructor

No Requirement Level

CH E5076 - Drug Delivery Techniques

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Focus is on current developments in drug delivery techniques, with only a brief discussion of common clinical techniques. The first portion of the class focuses on various delivery mechanisms and the tools needed to validate successful targeted drug delivery (both in vitro, in vivo and diagnostic tools). The second part of the course focuses on current developments in drug delivery based on published research articles. Students will read, digest, and critically analyze scientific work from leading research laboratories. Students will also gain valuable communication tools, as each student will present an article of interest to the class. Finally, the third part of the course focuses on important Materials characterization methods such as biological sample prep, SEM, TEM, DSC, Flow Cytometry, Fluorescence Microscopy, ELISA Assays. The use of information sources, such as Materials safety data sheets (MSDS). Shares lecture with Ch E 4076, with additional expectations for graduate credit.

Equivalent Courses: Previous & Current Courses
CH E576

Simple Requisites

Course Requisite Requirements

Prerequisites: Graduate Standing in Chemical Engineering or consent of instructor

No Requirement Level

CH E5077 - Conjugated Polymers

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Conjugated polymers are characterized by alternating carbon-carbon single- and double-bonds. Due to this conjugated backbone, conjugated polymers have unique semiconducting properties different from insulating commodity polymers. This course is designed to develop comprehensive knowledge in conjugated polymers from textbooks and recent journal articles. Topics include introduction to polymers, synthesis and characterization of conjugated polymers, and applications for conjugated polymers such as organic electronics and sensors.

Equivalent Courses: Previous & Current Courses
CH E5089, CH E589

No Requirements

CH E5078 - Transport Process Modeling

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Applications of mathematical modeling of various physical transport processes, specially, momentum, mass, thermal and electrophoretic transport processes. Transport processes relevant to various chemical and biomedical processes such as drug delivery, thermal therapy, chemical separations, etc. Hands-on computer labs to set up and run simulations and visualize & analyze the simulation results. Shares lecture with Ch E 4078, with additional expectations for graduate credit..

Simple Requisites

Course Requisite Requirements

Prerequisite: Consent of instructor

No Requirement Level

CH E5081 - Directed Study

General

Credit Hrs
Credit Hrs:
1

Credit Hours Max:
12

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Study under the guidance of a member of the department. In general, subject matter will supplement that available in the other graduate course offerings in Metallurgy or Materials Engineering.

Equivalent Courses: Previous & Current Courses
CH E581

Simple Requisites

Course Requisite Requirements

Prerequisites: Graduate Standing in Chemical Engineering or consent of instructor

No Requirement Level

CH E5085 - Graduate Seminar

General

Credit Hrs

Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Credit Hours Operator:
TO

Course Description
Presentation and discussion of research ideas. Review of recently published papers/new concepts.

Equivalent Courses: Previous & Current Courses
CH E585

Simple Requisites

Course Requisite Requirements

Prerequisite: Graduate standing

No Requirement Level

Simple Requisites

Course Requisite Requirements

Prerequisites: Successful completion of PhD candidacy exam and Academic Advisor recommendation for candidacy

No Requirement Level

CH E5086 - Adv. Reaction Engineering

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

No Requirements

CH E5091 - Thesis

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
12

Credit Hours Operator:
TO

Grade Modes
No Report

Equivalent Courses: Previous & Current Courses
CH E591

No Requirements

CH E5095 - Dissertation

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
12

Grade Modes
Pass/Fail, No Report

Chemistry Department

CONTACT US		
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Phone: 575-835-5263		
website: **https://www.nmt.edu/academics/chemistry/people/index.php**		

- **Associate Professors:** Altig, Patidar, Pias, Piyasena (Chair), Rubasinghege
- **Assistant Professors**: Ams, Holubowitch, Khandelwal
- **Assistant Teaching Professor:** Madduma-Bandarage

Degrees Offered: *B.S. in Chemistry, B.S. in Chemistry with Environmental Science Option, and B.S. in Chemistry with Biochemistry Option, B.A in Chemistry; M.S. in Chemistry and M.S. in Chemistry with Specialization in Biochemistry; Ph.D. in Chemistry*

The fundamental mission of the Department of Chemistry is to provide students with:

1. The skills necessary for critical and analytical thinking
2. An understanding of the basic concepts of chemistry
3. An appreciation of chemistry and its central place among the sciences
4. A feeling for the joys and frustrations of original research
5. The ability to communicate observations and discoveries

The Department of Chemistry offers a balance between pure and applied chemistry and presents science as part of a liberal education. The faculty is qualified in the major divisions of chemistry—inorganic, organic, analytical, physical, and biochemical. The undergraduate program emphasizes development of a strong foundation in the fundamental areas of chemistry in order to prepare students for the diverse career opportunities available to chemists. Laboratory facilities support research in all major areas of chemistry, with a focus on environmental and biomedical topics. Interdisciplinary work is encouraged.

The department maintains a full complement of modern analytical instrumentation. Most undergraduate students participate in departmental research. Career possibilities range from industrial process control through scientific research in academic and government laboratories. More than 60 percent of Tech chemistry graduates continue their education in graduate school.

Many have become teachers, medical doctors, or research scientists. The student has freedom to select courses to meet individual interests and objectives, such as preparation for graduate school or industry or simply a superior education. B.S. graduates receive a degree accredited by the American Chemical Society, and the chemistry B.S. curriculum is approved by the Committee on Professional Training of the American Chemical Society.

Programs

Accelerated M.S. in Chemistry (pathway)

[Program Overview]

Program Title
Accelerated Master of Science in Chemistry Program

Department(s)
Chemistry

Program Description
Qualified undergraduate students may apply for admission to the Accelerated Master's Program in Chemistry. In fulfillment of the requirements for both B.S and M.S. degrees, as outlined in their respective sections, accepted students may apply nine (9) credits of 5000-Level courses to both degrees.

Program Information & Policies
The M.S. degree requires completion of a master's thesis. A portion of the master's project may be presented to fulfill the undergraduate senior thesis requirement; however, the master's thesis must go substantially beyond the senior thesis work. The suitability of the proposed master's level research will be evaluated by the student's graduate advisory committee.

Chemistry (minor)

[Program Overview]

Program Title
Minor in Chemistry

Department(s)
Chemistry

Program Description
Minimum of 19 credit hours required to obtain a minor in Chemistry

Simple Requisites

Program Requirements

Minor in Chemistry
Type
Completion Requirement

Minor Requirements

Complete ALL of the following Course Sets:

- CHEM3011 & CHEM3011L: Quantitative Analysis and Lab

Three of the following courses with the associated labs:

Complete at least 3 courses in the following course sets:

- CHEM3031 & CHEM3031L: Physical Chemistry I and Lab
- CHEM3032 & CHEM3032L: Physical Chemistry II and Lab
- CHEM3033 & CHEM3033L: Organic Chemistry I and Lab
- CHEM3034 & CHEM3034L: Organic Chemistry II and Lab

Additional Chemistry

One chemistry course numbered 4000 or above (3-4)

Additional Comments:

Institute General Requirements

See the Institute **General Education Core Requirements.**

No Requirement Level

BA-CHEMISTRY - B.A. in Chemistry

[Program Overview]

Program Title
Bachelor of Arts in Chemistry

Department(s)
Chemistry

Degree & Program Code
BA-CHEMISTRY

Program Description
This degree program is designed to give students a solid foundation in chemistry and biochemistry, while also exploring the "liberal arts" (natural sciences, social sciences, arts, and humanities). Students are able to pursue individualized programs of study that accommodate their interests and enable them to prepare for a variety of future endeavors. This program may be a good option for students planning careers that apply scientific knowledge within a broader professional context, such as medicine, education, law, or government.

Program Information & Policies
Minimum credit hours required—120

In addition to the Institute Requirements for the Bachelor of Arts Degree, the following courses are required.

Simple Requisites

Program Requirements

Chemistry Requirements
Type
Completion Requirement

Chemistry Requirements

Complete ALL of the following Courses:

- CHEM1215 - g3:General Chemistry I
- CHEM1215L - g3:General Chemistry I Lab
- CHEM1225 - g3:General Chemistry II
- CHEM1225L - g3:General Chemistry II Lab
- CHEM0130 - Issues in Chem and Biochem (Inactive)
- CHEM3001 - The Chemistry Toolbox
- CHEM3011 - Quantitative Analysis
  AND CHEM3011L - Quantitative Analysis Lab
- CHEM3031 - Physical Chemistry I
  AND CHEM3031L - Physical Chemistry I Lab
- CHEM3033 - Organic Chemistry I
  AND CHEM3033L - Organic Chemistry I Lab
- CHEM3034 - Organic Chemistry II
  AND CHEM3034L - Organic Chemistry II Lab
- CHEM3043 - Descriptive Inorganic Chemistry
  AND CHEM3043L - Descriptive Inorganic Chemistry Lab
- CHEM4030 - Chemistry and Biochemistry Seminar
- CHEM4041 - Biochemistry I
  AND CHEM4041L - Biochemistry I Lab
- CHEM4093 - Senior Research & Thesis I
- CHEM4094 - Senior Research & Thesis II

Mathematics Requirements

Complete ALL of the following Courses:

- MATH1510 - g2:Calculus I
  AND MATH1510L - g2:Calculus I Lab
- MATH1520 - g2:Calculus II

Programing

Complete ALL of the following Courses:

- CSCI1220 - Programming Fund Python
  AND CSCI1210L - Programming Fundamentals

Physics

Complete ALL of the following Courses:

- PHYS1310 - g3:Calculus-based Physics I
  AND PHYS1310L - g3:Calculus-based Physics I Lab
- PHYS1320 - g3:Calculus-based Physics II
  AND PHYS1320L - g3:Calculus-based Physics II Lab

Psychology

and one additional three-credit course in Psychology

Complete ALL of the following Courses:

- PSYC1110 - g4:Introduction to Psychology

Management Requirement

Complete ALL of the following Courses:

- MGMT3030 - Management Behavior & Organization

Additional Comments:

Recommended Electives
Type
Completion Requirement

Additional Biology

Additional Biology, Especially BIOL 3031

Chemistry

Complete ALL of the following Courses:

- CHEM4011 - Advanced Instrumental Methods
  AND CHEM4011L - Advanced Instrumental Lab

Valuable for students seeking employment in industry

Ethics

Complete ANY of the following Courses:

- PHIL130 - Ethics in Science & Engineerin (Inactive)
  OR PHIL3021 - g:Professional Ethics (Inactive)
  OR PHIL3042 - g5:Philosophy of Bioethics

Statistics

Complete ANY of the following Courses:

- MATH2350 - Statistical Methods
  OR MATH3082 - Probability and Statistics
  OR MATH3083 - Introduction to Biostatistics

Economics

Complete ANY of the following Courses:

- ECON2110 - Macroeconomic Principles
  OR ECON2120 - Microeconomic Principles

Additional Comments:
The probable sequence of electives should be discussed with the student's advisor during the first year. Students interested in admission to medical school (or other professional schools) should see Pre-professional Programs in the catalog for advice on choosing electives.

Institute General Requirements

Bachelor of Arts General Education Requirements
Type
Completion Requirement

Area 1: Communications

Complete ALL of the following Course Sets:

- Area 1: Communications (BA Degree) (9 credits)

Area 2: Mathematics

Complete ALL of the following Course Sets:

- Area 2: Mathematics (BA Degree) (6 credits)

Area 3: Science

Complete ALL of the following Course Sets:

- Area 3: Science (BA Degree) (12 credits)

Area 4a: Social and Behavioral Science, Policy and Technology

Earn at least 3 credits from the following:

- Area 4a: Social Sciences: Policy and Technology (BA Degree) (3 credits)

Area 4b: Other Social Sciences

Earn at least 6 credits from the following:

- Area 4b: Other Social Sciences (BA Degree) (6 credits)

Area 5a: Ethics and Technology

Earn at least 3 credits from the following:

- Area 5a: Humanities: Ethics and Technology (BA Degree) (3 credits)

Area 5b: Other Humanities

Earn at least 6 credits from the following:

- Area 5b: Other Humanities (BA Degree) (6 credits)

Area 6: Creative and Fine Arts

Earn at least 3 credits from the following:

- Area 6: Creative and Fine Arts (BS, BA, or BGS Degree) (3 credits)

Area 7: Additional Humanities/Social Science Requirement for Bachelor of Arts

Earn at least 3 credits from the following:

- Area 7: Additional Courses from Areas 4, 5, 6 (BS, BA, or BGS Degree) (3 credits)

Additional Comments:

No Requirement Level

[Learning Outcomes]

Outcome
Demonstrate the Skills Necessary for Critical and Analytical Thinking

Outcome
Demonstrate Professional Level Knowledge of Chemistry

Outcome
Demonstrate the Ability to Conduct Original Research

Outcome
Demonstrate the Ability to Communicate Observations and Discoveries

[Sample 4-Year Curriculum Plan(s)]

Degree Map Name
Sample Curriculum for Bachelor of Arts in Chemistry
Total Degree Map Credits
129
Degree Map Effective Catalog Year
2026 -
Degree Map Description
The curriculum below assumes a reasonably strong high school background. Where possible, CHEM 311, 333, and 334 should be completed by the end of the sophomore year. This is only an example. Students should consult their advisor to design programs that fit their individual backgrounds, math placement, and interests.

Year	Semester	Actual Credits
Year 1	Fall	16

Course
- CHEM1215 & CHEM1215L: g:General Chemistry I and Lab

Actual Credits 4

Course
- CHEM0130 - Issues in Chem and Biochem (Inactive)

Actual Credits 1

Course
- ENGL1110 - g1:Composition I

Actual Credits 3

Course
- MATH1510 & MATH1510L: g:Calculus I & Lab

Actual Credits 4

Course
- BIOL2110 & BIOL2110L: Principles of Biology I and Lab

Actual Credits 4

Year	Semester	Actual Credits
Year 1	Spring	17

Course
- CHEM1225 & CHEM1225L: g: General Chemistry II and Lab

Actual Credits 4

Course
- CHEM0130 - Issues in Chem and Biochem (Inactive)

Actual Credits 1

Course
- ENGL1120 - g1:Composition II

Actual Credits 3

Course
- MATH1520 - g2:Calculus II

Actual Credits 4

Course
- PHYS1310 & PHYS1310L: g:Calculus-Physics I and Lab

Actual Credits 5

Year	Semester	Actual Credits
Year 2	Fall	17

Course
- CHEM3011 & CHEM3011L: Quantitative Analysis and Lab

Actual Credits 4

Course
- CHEM3033 & CHEM3033L: Organic Chemistry I and Lab

Actual Credits 4

Course
- GEOL1110 & GEOL1110L: Physical Geology and Lab

Actual Credits 4

Course
- PHYS1320 & PHYS1320L: g:Calculus-Based Physics II and Lab

Actual Credits 5

Year	Semester	Actual Credits
Year 2	Spring	17

Course
- CHEM3034 & CHEM3034L: Organic Chemistry II and Lab

Actual Credits 4

Course
- CSCI1220 & CSCI1220L: Computer ProgramFundmntls: Python and Lab

Actual Credits 4

Course
- Area 5a: Humanities: Ethics and Technology (BA Degree) (3 credits)

Actual Credits 3

Course
- Area 6: Creative and Fine Arts (BS, BA, or BGS Degree) (3 credits)

Actual Credits 3

Course
- PSYC1110 - g4:Introduction to Psychology

Actual Credits 3

Year	Semester	Actual Credits
Year 3	Fall	15

Course
- CHEM3031 - Physical Chemistry I

Actual Credits 3

Course
- ENGL3041 - i1:Technical Writing

Actual Credits 3

Course
- Foreign Language I (Generic)

Actual Credits 3

Course
- Psychology (Generic)

Actual Credits 3

Course
- Elective: Consider BIOL 3031 (Cell) (Generic)

Actual Credits 3

Year	Semester	Actual Credits
Year 3	Spring	16

Course
- CHEM4030 - Chemistry and Biochemistry Seminar

Actual Credits 1

Course
- CHEM3001 - The Chemistry Toolbox

Actual Credits 1

Course
- CHEM3043 & CHEM3043L: Descriptive Inorganic Chemistry and Lab

Actual Credits 4

Course
- Philosophy (Generic)

Actual Credits 3

Course
- Foreign Language II (Generic)

Actual Credits 3

Course
- Elective: Statistics recommended (Generic)

Actual Credits 3

Course
- General Elective (art/music/recreation) (Generic)

Actual Credits 1

Year	Semester	Actual Credits
Year 4	Fall	16

Course
- CHEM4093 - Senior Research & Thesis I

Actual Credits 1

Course
- CHEM4030 - Chemistry and Biochemistry Seminar

Actual Credits 1

Course
- CHEM4041 & CHEM4041L: Biochemistry I and Lab

Actual Credits 4

Course
- MGMT3030 - Management Behavior & Organization

Actual Credits 3

Course
- Area 4a: Social Sciences: Policy and Technology (BA Degree) (3 credits)

Actual Credits 3

Course
- Elective: consider CHEM 4011 & 4011L (Advanced Instrumental Methods & Lab)) (Generic)

Actual Credits 4

Year	Semester	Actual Credits
Year 4	Spring	15

Course
- CHEM4094 - Senior Research & Thesis II

Actual Credits 2

Course
- CHEM4030 - Chemistry and Biochemistry Seminar

Actual Credits 1

Course
- Elective: Creative/Fine arts recommended (Generic)

Actual Credits 3

Course
- Elective: Economics Recommended (Generic)

Actual Credits 3

Course
- Elective: Humanities recommended (Generic)

Actual Credits 3

Course
- Elective: Social science recommended (Generic)

Actual Credits 3

BS-CHEMISTRY - B.S. in Chemistry

[Program Overview]

Program Title
Bachelor of Science in Chemistry

Department(s)
Chemistry

Degree & Program Code
BS-CHEMISTRY

Optional Specialization/Concentration(s)
Biochemistry Option, Environmental Science Option

Program Description
The fundamental mission of the Department of Chemistry is to provide students with: (1) the skills necessary for critical and analytical thinking; (2) an understanding of the basic concepts of chemistry; (3) an appreciation of chemistry and its central place among the sciences; (4) a feeling for the joys and frustrations of original research; and (5) the ability to communicate observations and discoveries.

Program Information & Policies
Minimum credit hours required—120

In addition to the General Education and Institute Core Curriculum Requirements, the following courses are required:

Simple Requisites

Program Requirements

Required Courses
Type
Completion Requirement

Mathematics & Programming Requirement

Fulfill ALL of the following requirements:

Mathematics Requirement

Complete ALL of the following Courses:
- MATH2532 - Calculus III

AND

Programming Requirement

Complete ANY of the following Courses:
- ES111 - Computer Programming for Engineers
  OR CSCI1210 - Programming Fundamentals
  OR CSCI1220 - Programming Fund Python

Required Chemistry Core Courses

Complete ALL of the following Courses:
- CHEM3001 - The Chemistry Toolbox
- CHEM3011 - Quantitative Analysis
  AND CHEM3011L - Quantitative Analysis Lab
- CHEM3031 - Physical Chemistry I
  AND CHEM3031L - Physical Chemistry I Lab
- CHEM3032 - Physical Chemistry II
  AND CHEM3032L - Physical Chemistry II Lab
- CHEM3033 - Organic Chemistry I
  AND CHEM3033L - Organic Chemistry I Lab
- CHEM3034 - Organic Chemistry II
  AND CHEM3034L - Organic Chemistry II Lab
- CHEM3043 - Descriptive Inorganic Chemistry
  AND CHEM3043L - Descriptive Inorganic Chemistry Lab
- CHEM4011 - Advanced Instrumental Methods
  AND CHEM4011L - Advanced Instrumental Lab
- CHEM4041 - Biochemistry I
  AND CHEM4041L - Biochemistry I Lab
- CHEM4046 - Polymer Chemistry
- CHEM4093 - Senior Research & Thesis I
- CHEM4094 - Senior Research & Thesis II

Advanced Chemistry courses

Six (6) credit hours from 4000 or 5000 level Chemistry courses not required above (excluding CHEM 3000, 4000, 4081, 4089).

Earn at least 6 credits from the following:
- 4000 & 5000-Level Chemistry Courses

Additional Comments:

The above curriculum leaves a minimum of 14 credit hours of general electives. In addition to the above requirements, the Chemistry Department strongly recommends the following courses for be taken by students seeking a majoring in Chemistry.

Recommended Electives

•CHEM4042 Biochemistry II (3),

•CHEM4042L Biochemistry II Lab (1)

•One or more of MATH2420 Applied Linear Algebra (3), MATH2350 Statistical Methods (3) or MATH3082 Probability and Statistics (3), MATH3035 Ordinary Differential Equation (3)

•One or more of MGMT3030 Management Behavior & Org. (3),MGMT462 Systems, Risk & Analy (3), MGMT476 Project Management (3)

•BIOL2110 Prin of Bio: Cell & Molecular (3), BIOL2110L Prin of Bio: Cell & Molec Lab (1)

The probable sequence of electives should be discussed with the student's advisor during the freshman year. Students interested in admission to medical school (or other professional schools) should see Pre-professional Programs for advice on choosing electives.

Institute General Requirements

Bachelor of Science General Education Requirements
Type
Completion Requirement

Area 1: Communications Requirement for Bachelor of Science

Complete ALL of the following Course Sets:

- Area 1: Communications (BS Degree) (9 credits)

Area 2: Mathematics and Quantitative Reasoning Requirements for Bachelor of Science

Complete ALL of the following Course Sets:

- Area 2: Mathematics (BS Degree) (8 credits)

Area 3: Science Requirements for a Bachelor of Science

Complete ALL of the following Course Sets:

- Area 3: Science (BS Degree) (18 credits)

Area 4: Social and Behavioral Science Requirements for a Bachelor of Science

Earn at least 6 credits from the following:

- Area 4: Social and Behavioral Science (BS or BGS Degree) (6 credits)

Area 5: Humanities Course Requirements for a Bachelor of Science

Earn at least 6 credits from the following:

- Area 5: Humanities (BS or BGS Degree) (6 credits)

Area 6: Creative & Fine Art Requirement for a Bachelor of Science

Earn at least 3 credits from the following:

- Area 6: Creative and Fine Arts (BS, BA, or BGS Degree) (3 credits)

Area 7: Additional Humanities/Social Science Requirement for a Bachelor of Science

Earn at least 3 credits from the following:

- Area 7: Additional Courses from Areas 4, 5, 6 (BS, BA, or BGS Degree) (3 credits)

Additional Comments:

No Requirement Level

[Science Options]

Program Science Option (must be declared with the Registrar Office)

Science Option 1: Title
Bachelor of Science in Chemistry with Environmental Science Option

Requirements
Minimum credit hours required—124

In addition to the General Education and Institute Core Curriculum Requirements, requirements include the courses listed for the Bachelor of Science in Chemistry (only 6 credit hours of electives required) and the following courses:

- CHEM 4022 and CHEM 4022L plus
- Eight (8) credit hours from the following: CHEM 4031, 4032, or 4033; BIOL 3043, 3044, 4046, and 4055; GEOL 1170, 130L, 140, 140L, 200, 201, 202, 3040, 3090, and 4005
- In addition to the above requirements, strongly recommended courses include: CHEM 3043; one or more of MATH 2420, 283, 3035; and one or more of MGT 3030, 4062, 4076

Program Science Option (must be declared with the Registrar Office)

Science Option 2: Title
Bachelor of Science in Chemistry with Biochemistry Option

Requirements
Minimum credit hours required—122

In addition to the General Education and Institute Core Curriculum Requirements, requirements include the courses listed for the Bachelor of Science in Chemistry (only 6 credit hours of electives required) and the following courses:

- CHEM 4042 (3), 4042L (1)
- Six (6) credit hours from the following: CHEM 4047; BIOL 3011, 3031, 3033, 3041, 3043, 3051, 3052, 4011, 4031, 4035, 4037, 4071, 4086, 4087, and 4088; ChE 4076; and any associated laboratory courses
- In addition to the above requirements, strongly recommended courses include: CHEM 3043; one or more of MATH 2420, 3083, 3035; and one or more of MGT 3030, 4062, 4076

[Learning Outcomes]

Outcome
Demonstrate the Skills Necessary for Critical and Analytical Thinking

Outcome
Demonstrate Professional Level Knowledge of Chemistry

Outcome
Demonstrate the Ability to Conduct Original Research

Outcome
Demonstrate the Ability to Communicate Observations and Discoveries

[Sample 4-Year Curriculum Plan(s)]

Degree Map Name
BS Chemistry Sample Curriculum
Total Degree Map Credits
133
Degree Map Effective Catalog Year
2026 -

Year	Semester	Actual Credits
Year 1	Fall	16

Course
- CHEM1215 & CHEM1215L: g:General Chemistry I and Lab

Actual Credits 4

Course
- CHEM0130 - Issues in Chem and Biochem (Inactive)

Actual Credits 1

Course
- ENGL1110 - g1:Composition I

Actual Credits 3

Course
- MATH1510 & MATH1510L: g:Calculus I & Lab

Actual Credits 4

Course
- BIOL2110 & BIOL2110L: Principles of Biology I and Lab

Actual Credits 4

Year	Semester	Actual Credits
Year 1	Spring	16

Course
- CHEM1225 & CHEM1225L: g: General Chemistry II and Lab

Actual Credits 4

Course
- MATH1520 - g2:Calculus II

Actual Credits 4

Course
- ENGL1120 - g1:Composition II

Actual Credits 3

Course
- PHYS1310 & PHYS1310L: g:Calculus-Physics I and Lab

Actual Credits 5

Year	Semester	Actual Credits
Year 2	Fall	18

Course
- CHEM3011 & CHEM3011L: Quantitative Analysis and Lab

Actual Credits 4

Course
- CHEM3033 & CHEM3033L: Organic Chemistry I and Lab

Actual Credits 4

Course
- CHEM0130 - Issues in Chem and Biochem (Inactive)

Actual Credits 1

Course
- MATH2532 - Calculus III

Actual Credits 4

Course
- PHYS1320 & PHYS1320L: g:Calculus-Based Physics II and Lab

Actual Credits 5

Year	Semester	Actual Credits
Year 2	Spring	19

Course
- CHEM3034 & CHEM3034L: Organic Chemistry II and Lab

Actual Credits 4

Course
- CHEM0130 - Issues in Chem and Biochem (Inactive)

Actual Credits 1

Course
- CSCI1220 & CSCI1220L: Computer ProgramFundmntls: Python and Lab

Actual Credits 4

Course
- Area 5: Humanities (BS or BGS Degree) (6 credits)

Actual Credits 3

Course
- Area 4: Social and Behavioral Science (BS or BGS Degree) (6 credits)

Actual Credits 3

Course
- CHEM3043 & CHEM3043L: Descriptive Inorganic Chemistry and Lab

Actual Credits 4

Year	Semester	Actual Credits
Year 3	Fall	18

Course
- CHEM3031 & CHEM3031L: Physical Chemistry I and Lab

Actual Credits 4

Course
- CHEM4030 - Chemistry and Biochemistry Seminar

Actual Credits 1

Course
- Area 5: Humanities (BS or BGS Degree) (6 credits)

Actual Credits 3

Course
- Area 4: Social and Behavioral Science (BS or BGS Degree) (6 credits)

Actual Credits 3

Course
- CHEM4041 & CHEM4041L: Biochemistry I and Lab

Actual Credits 4

Course
- Math recommended (Generic)

Actual Credits 3

Year	Semester	Actual Credits
Year 3	Spring	16

Course
- CHEM3032 & CHEM3032L: Physical Chemistry II and Lab

Actual Credits 4

Course
- CHEM4030 - Chemistry and Biochemistry Seminar

Actual Credits 1

Course
- ENGL3041 - i1:Technical Writing

Actual Credits 3

Course
- Area 7: Additional Courses from Areas 4, 5, 6 (BS, BA, or BGS Degree) (3 credits)

Actual Credits 3

Course
- CHEM4042 & CHEM4042 L: Biochemistry II and Lab

Actual Credits 4

Course
- CHEM3001 - The Chemistry Toolbox

Actual Credits 1

Year	Semester	Actual Credits
Year 4	Fall	15

Course
- CHEM4011 & CHEM4011L: Advanced Instrumental Methods and Lab

Actual Credits 4

Course
- CHEM4000 - Directed Research

Actual Credits 3

Course
- CHEM4046 - Polymer Chemistry

Actual Credits 3

Course
- CHEM4093 - Senior Research & Thesis I

Actual Credits 1

Course
- CHEM4030 - Chemistry and Biochemistry Seminar

Actual Credits 1

Course
- Area 4: Social and Behavioral Science (BS or BGS Degree) (6 credits)

Actual Credits 3

Year	Semester	Actual Credits
Year 4	Spring	15

Course
- CHEM4043 & CHEM4043L: Intermediate Inorganic Chemistry and Lab

Actual Credits 4

Course
- CHEM 4000/5000 Directed Research (Generic)

Actual Credits 3

Course
- CHEM4046 - Polymer Chemistry

Actual Credits 3

Course
- CHEM4093 - Senior Research & Thesis I

Actual Credits 1

Course
- CHEM4030 - Chemistry and Biochemistry Seminar

Actual Credits 1

Course
- Area 5: Humanities (BS or BGS Degree) (6 credits)

Actual Credits 3

MS-CHEMISTRY - M.S. in Chemistry

[Program Overview]

Program Title
Master of Science in Chemistry

Department(s)
Chemistry

Degree & Program Code
MS-CHEMISTRY

Optional Specialization/Concentration(s)
Specialization in Biochemistry

Program Description
Students entering any chemistry graduate program must take placement examinations within a week after their first registration. If deficiencies are determined, appropriate remedial undergraduate coursework will be required. Students are encouraged to consult the chemistry graduate handbook for details. Remedial coursework does not count toward degree requirements. The individualized course of study must be approved by the student's graduate advisory committee and must fulfill the general degree requirements for their respective advanced degree.

Program Information & Policies
Master of Science in Chemistry

M.S. students must meet the general degree requirements for the Master of Science degree at New Mexico Tech. In addition, a minimum of 12 credit hours of 5000-Level chemistry courses is required. CHEM 5029 and 5030 do not count toward this requirement. Additionally students must take six (6) credit hours at the 3000, 4000, or 5000-Level and above from other departments. Student should consult with their graduate advisory committee and advisor when developing a course plan.

All M.S students must register for Graduate seminar (CHEM 5029/530) every fall and spring semester that they are enrolled full-time in the graduate program.

Simple Requisites

Program Requirements

Master of Science in Chemistry
Type
Completion Requirement

Additional Comments:
M.S. students must meet the general degree requirements for the Master of Science degree at New Mexico Tech. In addition, a minimum of 12 credit hours of 5000-Level chemistry courses is required. CHEM 5029 and 5030 do not count toward this requirement. Additionally students must take six (6) credit hours at the 3000, 4000, or 5000-Level and above from other departments. Student should consult with their graduate advisory committee and advisor when developing a course plan.

All M.S students must register for Graduate seminar (CHEM 5029/530) every fall and spring semester that they are enrolled full-time in the graduate program.

Institute General Requirements

No Requirement Level

[Specializations/Dissertation Concentration Options]

Specialization/Dissertation Options

Specialization/Dissertation Title
Master of Science in Chemistry with Specialization in Biochemistry

Specialization/Dissertation Requirements
Students earning a Master of Science degree in chemistry can receive a specialization in Biochemistry. The requirements for the specialization in biochemistry are the same as those for a Master of Science in Chemistry, except that:

· Six (6) credit hours of the 12 credit hours minimum of 5000-Level chemistry classes must be from CHEM 5061 and 5047.

· A maximum of three (3) credit hours of CHEM 5081 or BIOL 5081 (directed study) may be used toward the degree.

· A minimum of six (6) credit hours of courses in biology, selected from the following, must be completed: BIOL 3031, 3033, 3051, 3052, 3056, 4088, 5001, 5052, 5088.

[Learning Outcomes]

Outcome
1. Become independent researchers

Outcome
2. Become effective teachers

Outcome
3. Demonstrate deep understanding in their area of specialization and general knowledge in the 5 major areas of chemistry

Outcome
4. Demonstrate professional-level communication

PHD-CHEM - Ph.D. in Chemistry

[Program Overview]

Program Title
Doctor of Philosophy in Chemistry

Department(s)
Chemistry

Degree & Program Code
PHD-CHEM

Program Description
Students of exceptional ability may pursue a program leading to the doctoral degree. The prospective doctoral candidate will develop a broad background in chemistry and related fields and prove his or her ability to do independent research. An early assessment of the student's ability is achieved in the candidacy examination to be completed by the end of the third year. Research within the Chemistry department generally emphasizes environmental and human health related topics. Interdisciplinary research with other departments, such as Physics, Biology, Chemical Engineering, or Earth and Environmental Science can be pursued. Ph.D. students must meet the general degree requirements for the Doctor of Philosophy degree at New Mexico Tech as well as the requirements listed below.

All Ph.d student must register for Graduate Seminar(CHEM 5029/5030) every fall and spring semester that they are enrolled full-time in the graduate program

Simple Requisites

Program Requirements

Requirements for Doctor of Philosophy in Chemistry
Type
Completion Requirement

No Prior Master's Degree in Chemistry. A minimum of 52 credit hours is required. These hours are distributed as follows:

- 5000-Level chemistry courses 21 cr hrs minimum
- CHEM 5029, 530 (Seminar) 2 cr hrs
- COMM 5075 and CHEM 5055 (Proposal Writing) 5 cr hrs
- CHEM 5095 (Dissertation) 24 cr hrs

Substitutions
Students may substitute up to six 6 credit hours of courses at the 3000-level and above from other departments. Additional 5000-Level courses from other departments may be used in place of 500- level chemistry courses, upon approval of student's advisory committee

Prior Master's Degree in Chemistry. A minimum of 40 credit hours is required. These hours are distributed as follows:

- 5000-Level chemistry courses 9 cr hrs minimum
- CHEM 5029, 530 (Seminar) 2 cr hrs
- COMM 5075 and CHEM 5055 (Proposal Writing) 5 cr hrs
- CHEM 5095 (Dissertation) 24 cr hrs

Substitutions
Students may substitute up to three 3 credit hours of courses at the 3000-level and above from other departments. Additional 5000-Level courses from other departments maybe used in place of 5000-Level chemistry courses, upon approval of student's advisory committee.

Additional Comments:

Institute General Requirements
Check out the General Requirements for PhD Programs for institute general requirements.

No Requirement Level

[Learning Outcomes]

Outcome
Become independent researchers

Outcome
Become effective teachers

Outcome
Demonstrate deep understanding in their area of specialization and general knowledge in the 5 major areas of chemistry

Outcome
Demonstrate professional-level communication

Courses

CHEM530 - Graduate Seminar

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Simple Requisites

Course Requisite Requirements

Prerequisite and Corequisite Requirements
Type
Prerequisite

Graduate Requirement

Graduate standing in chemistry or consent of instructor

Additional Comments:

No Requirement Level

CHEM1120 - Introduction to Chemistry

General

Credit Hrs
Credit Hrs:
4

Grade Modes
Audit, Pass/Fail, Standard Letter, Transfer

Course Description
An overview of the fundamental concepts in chemistry. Topics will include a discussion of the classification of matter, the fundamental laws of chemical combination, the atomic theory and chemical bonding. The stoichiometry of chemical reactions will be presented. Several types of chemical reactions will be discussed, including precipitation reactions, oxidation-reduction reactions and acid-base reactions. Topics in organic and biochemistry will also be considered. Lectures will include numerous examples and demonstrations of chemical principles. Extensive laboratory exercises will further illustrate concepts discussed during the lecture hours.

When Offered
Fall

Equivalent Courses: Previous & Current Courses
CHEM109

Simple Requisites

Course Requisite Requirements

Math 1220 Corequisite
Type

Corequisite

Math 1220 Corequisite

Complete ALL of the following Courses:
- MATH1220 - College Algebra

Additional Comments:

No Requirement Level

CHEM1215 - g3:General Chemistry I

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course is intended to serve as an introduction to General Chemistry for students enrolled in science, engineering, and certain preprofessional programs. Students will be introduced to several fundamental concepts, including mole, concentration, heat, atomic and molecular structure, periodicity, bonding, physical states, stoichiometry, and reactions.

When Offered
Fall, Spring

Equivalent Courses: Previous & Current Courses
CHEM121, CHEM1215D, CHEM151

Simple Requisites

Course Requisite Requirements

Math 1220 Prerequisite
Type
Prerequisite

Math 1220 Prerequisite

Earn a minimum C- of undefined in the following:
- MATH1220 - College Algebra
  OR CHEM1120 - Introduction to Chemistry

must be completed with a C- or better

Corequisite

Enroll in the following Courses:
- CHEM1215L - g3:General Chemistry I Lab

Additional Comments:

No Requirement Level

CHEM1215L - g3:General Chemistry I Lab

General

Credit Hrs

Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Laboratory for Science Majors is the first semester laboratory course designed to complement the theory and concepts presented in General Chemistry I lecture. The laboratory component will introduce students to techniques for obtaining and analyzing experimental observations pertaining to chemistry using diverse methods and equipment.

When Offered
Fall, Spring

Equivalent Courses: Previous & Current Courses
CHEM121L, CHEM151L

Simple Requisites

Course Requisite Requirements

Corequisite
Type
Corequisite

Corequisite

Corequisite: CHEM 1215; a lab usage fee is charged

Complete ALL of the following Courses:
- CHEM1215 - g3:General Chemistry I

Additional Comments:

No Requirement Level

CHEM1225 - g3:General Chemistry II

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course is intended to serve as a continuation of general chemistry principles for students enrolled in science, engineering, and certain preprofessional programs. The course includes, but is not limited to a theoretical and quantitative coverage of solutions and their properties, kinetics, chemical equilibrium, acids and bases, entropy and free energy, electrochemistry, and nuclear chemistry. Additional topics may include (as time permits) organic, polymer, atmospheric, and biochemistry.

Equivalent Courses: Previous & Current Courses
CHEM122, CHEM152

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisites: CHEM 1215 and 1215L and MATH 1220 (passed with grade C- or better)

Complete ALL of the following Courses:
- CHEM1215 - g3:General Chemistry I
- CHEM1215L - g3:General Chemistry I Lab
- MATH1220 - College Algebra

Additional Comments:

Corequisite
Type
Corequisite

Corequisite

Complete ALL of the following Courses:
- CHEM1225L - g3:General Chemistry II Lab

Additional Comments:

No Requirement Level

CHEM1225L - g3:General Chemistry II Lab

General

Credit Hrs

Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
General Chemistry II Laboratory for STEM Majors is the second of a two-semester sequence of laboratory courses designed to complement the theory and concepts presented in General Chemistry II lecture. The laboratory component will introduce students to techniques for obtaining and analyzing experimental observations pertaining to chemistry using diverse methods and equipment.

When Offered
Fall, Spring

Equivalent Courses: Previous & Current Courses
CHEM122L, CHEM152L

Simple Requisites

Course Requisite Requirements

Corequisite
Type
Corequisite

Corequisite

Corequisite: CHEM 1225; a lab usage fee is charged

Complete ALL of the following Courses:

- CHEM1225 - g3:General Chemistry II

Additional Comments:

No Requirement Level

CHEM3000 - Directed Research

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
12

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail

Course Description
Research under the guidance of a faculty member.

Equivalent Courses: Previous & Current Courses
CHEM300

No Requirements

CHEM3001 - The Chemistry Toolbox

General

Credit Hrs

Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Topics to include lab safety, literature searches, citation management, data management, and ethics.

When Offered
Spring

Equivalent Courses: Previous & Current Courses
CHEM301

Simple Requisites

Course Requisite Requirements

Chemistry Prerequisites
Type
Prerequisite

Class Prerequisite

Prerequisite: CHEM 1225 passed with grade C- or better

Complete ALL of the following Courses:

- CHEM1225 - g3:General Chemistry II

Additional Comments:

No Requirement Level

CHEM3011 - Quantitative Analysis

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Fundamental theory and techniques in traditional chemical analysis. Emphasizes sampling and separation methods, measurement, statistics, volumetric and gravimetric analysis, equilibrium and pH studies, basic electrochemical techniques, and introduction to instrumentation.

When Offered
Fall

Equivalent Courses: Previous & Current Courses
CHEM311

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

Course Requirements

Passed with grade C- or better

Complete ALL of the following Courses:

- CHEM1225 - g3:General Chemistry II

Additional Comments:

No Requirement Level

CHEM3011L - Quantitative Analysis Lab

General

Credit Hrs

Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Laboratory experiments and techniques emphasizing the principles from CHEM 3011.

When Offered
Fall

Equivalent Courses: Previous & Current Courses
CHEM311L

Simple Requisites

Course Requisite Requirements

Corequisite

Type
Corequisite

Corequisite

Corequisite: CHEM 3011; a lab usage fee is charged.

Complete ALL of the following Courses:

- CHEM3011 - Quantitative Analysis

Additional Comments:

No Requirement Level

CHEM3031 - Physical Chemistry I

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Study of the fundamental principles of thermodynamics applied to equilibria, physical states, electromotive force, solution phenomena, and reaction kinetics. Study of physical state properties.

When Offered
Fall

Equivalent Courses: Previous & Current Courses
CHEM331

Simple Requisites

Course Requisite Requirements

Chemistry Prerequisites
Type
Prerequisite

Course Requirements

Prerequisites: CHEM 1225 passed with grade C- or better; MATH 1520; PHYS 1320

Complete ALL of the following Courses:

- CHEM1225 - g3:General Chemistry II
- MATH1520 - g2:Calculus II
- PHYS1320 - g3:Calculus-based Physics II

Additional Comments:

No Requirement Level

CHEM3031L - Physical Chemistry I Lab

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Laboratory experiments and techniques emphasizing principles from CHEM 3031.

When Offered
Fall

Equivalent Courses: Previous & Current Courses
CHEM331L

Simple Requisites

Course Requisite Requirements

Corequisite
Type
Corequisite

Corequisite

Corequisite: CHEM 3031; a lab usage fee is charged

Complete ALL of the following Courses:

- CHEM3031 - Physical Chemistry I

Additional Comments:

No Requirement Level

CHEM3032 - Physical Chemistry II

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Atomic and molecular quantum theory, group theory, spectroscopy, and statistical mechanics. Offered spring semester.

When Offered
Spring

Equivalent Courses: Previous & Current Courses
CHEM332

Simple Requisites

Course Requisite Requirements

Chemistry Prerequisites
Type
Prerequisite

Course Requirements

Complete ALL of the following Courses:

- CHEM3031 - Physical Chemistry I

Additional Comments:

No Requirement Level

CHEM3032L - Physical Chemistry II Lab

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Laboratory experiments and techniques emphasizing principles from CHEM 3032.

When Offered
Spring

Equivalent Courses: Previous & Current Courses
CHEM332L

Simple Requisites

Course Requisite Requirements

Corequisite
Type
Corequisite

Corequisite

Corequisite: CHEM 3032; a lab usage fee is charged

Complete ALL of the following Courses:
- CHEM3032 - Physical Chemistry II

Additional Comments:

No Requirement Level

CHEM3033 - Organic Chemistry I

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Nomenclature, properties, structure, reactions, and synthesis of carbon compounds. Offered fall semester; offered spring semester if sufficient demand

When Offered
Fall

Equivalent Courses: Previous & Current Courses
CHEM333

Simple Requisites

Course Requisite Requirements

Chemistry Prerequisites
Type
Completion Requirement

Course Requirements

Passed with a C- or better.

Complete ALL of the following Courses:
- CHEM1225 - g3:General Chemistry II

Additional Comments:

No Requirement Level

CHEM3033L - Organic Chemistry I Lab

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Offered fall semester; offered spring semester if sufficient demand.

When Offered
Fall

Equivalent Courses: Previous & Current Courses
CHEM333L

Simple Requisites

Course Requisite Requirements

Corequisite
Type
Corequisite

Corequisite

Corequisite: CHEM 3033; a lab usage fee is charged

Complete ALL of the following Courses:
- CHEM3033 - Organic Chemistry I

Additional Comments:

No Requirement Level

CHEM3034 - Organic Chemistry II

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Continuation of CHEM 3033.

When Offered
Spring

Equivalent Courses: Previous & Current Courses
CHEM334

Simple Requisites

Course Requisite Requirements

Chemistry Requirements
Type
Prerequisite

Course Requirements

Complete ALL of the following Courses:

- CHEM3033 - Organic Chemistry I

Additional Comments:

No Requirement Level

CHEM3034L - Organic Chemistry II Lab

General

Credit Hrs

Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Offered spring semester.

When Offered
Spring

Equivalent Courses: Previous & Current Courses
CHEM334L

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- CHEM3033L - Organic Chemistry I Lab

Additional Comments:

Corequisite
Type
Corequisite

Corequisite

a lab usage fee is charged

Complete ALL of the following Courses:

- CHEM3034 - Organic Chemistry II

Additional Comments:

No Requirement Level

CHEM3041 - Survey of Biochemistry

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Foundational course in biochemistry. Topics include the chemical basis of life; organizational complexity of biological systems; structure, nomenclature, and reactions of biomolecules (carbohydrates, lipids, proteins, nucleic acids, and enzymes); and an overview of metabolic pathways, regulatory mechanisms, and driving forces.

When Offered
Spring

Equivalent Courses: Previous & Current Courses
CHEM341

Simple Requisites

Course Requisite Requirements

Chemistry Requirements
Type
Prerequisite

Prerequisite Requirements

Fulfill ANY of the following requirements:

Course Requirements

Complete ALL of the following Courses:

- CHEM3033 - Organic Chemistry I

OR

Instructor Approval

or consent of instructor

Additional Comments:

No Requirement Level

CHEM3043 - Descriptive Inorganic Chemistry

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Introduction to inorganic chemistry with a focus on fundamentals of atomic/molecular structure and descriptive inorganic chemistry. The course explores the structures and geometries of small molecules, including their symmetry, as well as bonding theories for both inorganic molecules and the solid state. Survey of main group and transition metal chemistry.

When Offered
Spring

Equivalent Courses: Previous & Current Courses
CHEM343

Simple Requisites

Course Requisite Requirements

Chemistry Requirements
Type
Prerequisite

Course Requirements

Passed with a C- or better.

Complete ALL of the following Courses:

- CHEM1225 - g3:General Chemistry II

Additional Comments:

No Requirement Level

CHEM3043L - Descriptive Inorganic Chemistry Lab

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Pass/Fail, Standard Letter

Course Description
Offered spring semester; offered fall semester if sufficient demand.

When Offered
Spring

Equivalent Courses: Previous & Current Courses
CHEM343L

Simple Requisites

Course Requisite Requirements

Corequisite
Type
Corequisite

Corequisite

Corequisite: CHEM 3043; a lab usage fee is charged

Complete ALL of the following Courses:

- CHEM3043 - Descriptive Inorganic Chemistry

Additional Comments:

No Requirement Level

CHEM4000 - Directed Research

General

Credit Hrs
Credit Hrs:
1

Credit Hours Max:
12

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail

Course Description
Research under the guidance of a faculty member.

Equivalent Courses: Previous & Current Courses
CHEM400

No Requirements

CHEM4011 - Advanced Instrumental Methods

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Advanced techniques of chemical analysis. Emphasizes gas and liquid chromatography; electrochemistry; atomic spectrometry; ultraviolet, visible, and infrared spectroscopy; nuclear magnetic resonance spectroscopy; mass spectroscopy, etc. Offered fall semester.

Equivalent Courses: Previous & Current Courses
CHEM411

No Requirements

CHEM4011L - Advanced Instrumental Lab

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Laboratory experiments and instrumental techniques emphasizing principles from CHEM 4011.Offered fall semester.

When Offered
Fall

Equivalent Courses: Previous & Current Courses
CHEM411L

Simple Requisites

Course Requisite Requirements

Corequisite
Type
Corequisite

Corequisite

a lab usage fee is charged

Complete ALL of the following Courses:

- CHEM4011 - Advanced Instrumental Methods

Additional Comments:

No Requirement Level

CHEM4012 - Advanced Topics in Analytical Chemistry

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Study of special topics not otherwise treated in analytical chemistry. The graduate and undergraduate versions of the course will differ in the assignments and exams, while sharing the same lectures. Shares lecture with CHEM 5012, with additional expectations for graduate credit. Offered on sufficient demand.

Equivalent Courses: Previous & Current Courses
CHEM412, CHEM512

Simple Requisites

Course Requisite Requirements

Chemistry Requirements
Type
Prerequisite

Prerequisite Requirements

Fulfill ANY of the following requirements:

Course Requirements

Complete ALL of the following Courses:

- CHEM3011 - Quantitative Analysis
- CHEM4011 - Advanced Instrumental Methods

OR

Instructor Approval

or consent of instructor and advisor

Additional Comments:

No Requirement Level

CHEM4013 - Separation Science

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Theory and practice of separation science. Topics include selective mass transport, extraction, chromatography, and electrophoresis. The graduate and undergraduate versions of the course will differ in the assignments and exams, while sharing the same lectures. Shares lecture with CHEM 5013, with additional expectations for graduate credit. Offered on sufficient demand.

Equivalent Courses: Previous & Current Courses
CHEM413, CHEM513

Simple Requisites

Course Requisite Requirements

Chemistry Requirements
Type
Prerequisite

Prerequisite Requirements

Fulfill ANY of the following requirements:

Course Requirements

Complete ALL of the following Courses:

- CHEM3031 - Physical Chemistry I
- CHEM4011 - Advanced Instrumental Methods

OR

Instructor Approval

or consent of instructor and advisor

Additional Comments:

No Requirement Level

CHEM4022 - Environmental Chemistry

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Application of chemical principles to the study of the environment. Includes natural processes and pollution problems related to water, air, and soil. The graduate and undergraduate versions of the course will differ in the assignments and exams, while sharing the same lectures. Shares lecture with CHEM 5022, with additional expectations for graduate credit. Offered Spring semester, even years.

Equivalent Courses: Previous & Current Courses
CHEM422, CHEM522

Simple Requisites

Course Requisite Requirements

Chemistry Requirement
Type
Prerequisite

Prerequisite Requirements

Fulfill ANY of the following requirements:

Course Requirements

Complete at least 2 of the following courses:

- CHEM3011 - Quantitative Analysis
- CHEM3031 - Physical Chemistry I
- CHEM3033 - Organic Chemistry I

OR

Instructor Approval

or consent of instructor and advisor

Additional Comments:

No Requirement Level

CHEM4022L - Environmental Chemistry Lab

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Laboratory experiments related to the principles in CHEM 4022/5022. The graduate and undergraduate versions of the course will differ in the assignments and exams. Shares lab with CHEM 5022L, with additional expectations for graduate credit. Offered spring semester, even years.

Equivalent Courses: Previous & Current Courses
CHEM422L, CHEM522L

Simple Requisites

Course Requisite Requirements

Corequisites
Type
Corequisite

Corequisites

a lab usage fee is charged

Complete ALL of the following Courses:

- CHEM4022 - Environmental Chemistry
  OR CHEM5022 - Environmental Chemistry

Additional Comments:

No Requirement Level

CHEM4023 - Applied Spectroscopy

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Discussions of mass spectrometry, fluorescence, Nuclear Magnetic Resonance (NMR), X-ray (XPS, X-ray diffraction, solid state spectroscopy), Infrared (IR), Ultraviolet/Visible spectroscopic methods and techniques, as applied to chemical and biological problems, including structure elucidation, medical diagnostics, molecular sensors. The graduate and undergraduate versions of the course will differ in the assignments and exams, while sharing the same lectures. Shares lecture with CHEM 5023, with additional expectations for graduate credit. Offered on sufficient demand.

Equivalent Courses: Previous & Current Courses
CHEM423, CHEM523

Simple Requisites

Course Requisite Requirements

Chemistry Requirements
Type
Prerequisite

Prerequisite Requirements

Fulfill ANY of the following requirements:

Course Requirements

Complete ALL of the following Courses:

- CHEM3032 - Physical Chemistry II

OR

Instructor Approval

or consent of instructor and advisor

Additional Comments:

No Requirement Level

CHEM4025 - Molecular Quantum Mechanics

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Molecular structure; theories of the chemical bond; perturbation and variation methods; electronic and magnetic properties of molecules. The graduate and undergraduate versions of the course will differ in the assignments and exams, while sharing the same lectures. Shares lecture with CHEM 5025, with additional expectations for graduate credit. Offered on sufficient demand.

Equivalent Courses: Previous & Current Courses
CHEM425, CHEM525

Simple Requisites

Course Requisite Requirements

Chemistry Requirements
Type
Prerequisite

Prerequisite Requirements

Fulfill ANY of the following requirements:

Course Requirements

Complete ALL of the following Courses:

- CHEM3032 - Physical Chemistry II

OR

Instructor Approval

or consent of instructor and advisor

Additional Comments:

No Requirement Level

CHEM4026 - Chemical Spectroscopy

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Principles and applications of electronic, molecular, and spin spectroscopies, laser spectroscopy; transitions; elements of group theory; quantitative correlations and analytical chemistry. The graduate and undergraduate versions of the course will differ in the assignments and exams, while sharing the same lectures. Shares lecture with CHEM 5023, with additional expectations for graduate credit. Offered on sufficient demand.

Equivalent Courses: Previous & Current Courses
CHEM426, CHEM523

Simple Requisites

Course Requisite Requirements

Chemistry Requirements
Type
Prerequisite

Prerequisite Requirements

Fulfill ANY of the following requirements:

Course Requirements

Complete ALL of the following Courses:

- CHEM3032 - Physical Chemistry II

OR

Instructor Approval

or consent of instructor and advisor

Additional Comments:

No Requirement Level

CHEM4027 - Molecular Reaction Dynamics

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Techniques in studies of chemical reaction rates. Topics commonly include: rate laws, collision theory, mechanistic studies, transition state theory, fast reactions, chemical oscillations, transport theory, and transport coefficients. The graduate and undergraduate versions of the course will differ in the assignments and exams, while sharing the same lectures. Shares lecture with CHEM 5027, with additional expectations for graduate credit. Offered on sufficient demand.

Equivalent Courses: Previous & Current Courses
CHEM427, CHEM527

Simple Requisites

Course Requisite Requirements

Chemistry Requirements
Type
Prerequisite

Prerequisite Requirements

Fulfill ANY of the following requirements:

Course Requirements

Complete ALL of the following Courses:

- CHEM3032 - Physical Chemistry II

OR

Instructor Approval

or consent of instructor and advisor

Additional Comments:

No Requirement Level

CHEM4028 - Advanced Topics in Physical Chemistry

General

Credit Hrs
Credit Hrs:
1

Credit Hours Max:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Credit Hours Operator:
TO

Course Description
Study of special topics not otherwise covered in physical chemistry. Shares lecture with CHEM 5028, with additional expectations for graduate credit. Offered on sufficient demand.

Equivalent Courses: Previous & Current Courses
CHEM428, CHEM528

Simple Requisites

Course Requisite Requirements

Chemistry Requirements
Type
Prerequisite

Prerequisite Requirements

Fulfill ANY of the following requirements:

Course Requirements

Complete ALL of the following Courses:

- CHEM3032 - Physical Chemistry II

OR

Instructor Approval

or consent of instructor and advisor

Additional Comments:

No Requirement Level

CHEM4030 - Chemistry and Biochemistry Seminar

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail

Course Description
Current topics in chemistry and biochemistry. May be repeated for credit. Offered fall and spring semesters. Graded S/U

When Offered
Fall, Spring

Equivalent Courses: Previous & Current Courses
CHEM430

No Requirements

CHEM4031 - Chemistry of Aquatic Systems

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
The thermodynamics and aqueous chemistry of natural waters, with emphasis on groundwater. Chemical equilibrium concepts, surface chemistry, redox reactions, and biochemistry. The interaction of water with the atmosphere and geologic Materials. Basic concepts applied to problems of groundwater quality evolution, water use, and groundwater contamination. Shares lecture with CHEM 5031, HYD 5007 and GEOC 5007 with additional expectations for graduate credit. (Same as GEOL 4007.) Offered on sufficient demand.

Equivalent Courses: Previous & Current Courses
CHEM431, CHEM531, GEOC507, GEOL407, HYD507

Simple Requisites

Course Requisite Requirements

Chemistry Requirements
Type
Prerequisite

Prerequisite Requirements

Fulfill ANY of the following requirements:

Course Requirements

Complete ALL of the following Courses:

- CHEM3011 - Quantitative Analysis

OR

Instructor Approval

or consent of instructor and advisor

Additional Comments:

No Requirement Level

CHEM4032 - Atmospheric Chemistry

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Chemistry of the atmosphere. Important chemical reactions and their effects on air, soil, and surface waters. Effects of anthropogenic inputs on the atmosphere, climate change. Distribution of chemical species in the atmosphere, etc. The graduate and undergraduate versions of the course will differ in the assignments and exams, while sharing the same lectures. Shares lecture with CHEM 5032, with additional expectations for graduate credit.

Equivalent Courses: Previous & Current Courses
CHEM432, CHEM532

Simple Requisites

Course Requisite Requirements

Chemistry Requirements
Type
Prerequisite

Prerequisite Requirements

Fulfill ANY of the following requirements:

Course Requirements

Complete ALL of the following Courses:

- CHEM3031 - Physical Chemistry I

OR

Instructor Approval

or consent of instructor and advisor

Additional Comments:

No Requirement Level

CHEM4033 - Global Biogeochemical Cycles

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Human activity is increasing the rate of addition of Materials to the environment, resulting in changes to the earth's climate. The transformation and movement of natural and anthropogenic sources of chemical substances between reservoirs in a global context. The graduate and undergraduate versions of the course will differ in the assignments and exams, while sharing the same lectures. Shares lecture with CHEM 5033, with additional expectations for graduate credit. Offered on sufficient demand.

Equivalent Courses: Previous & Current Courses
CHEM433, CHEM533

Simple Requisites

Course Requisite Requirements

Chemistry Requirements
Type
Prerequisite

Prerequisite Requirements

Fulfill ANY of the following requirements:

Course Requirements

Complete ANY of the following Courses:

- CHEM3011 - Quantitative Analysis
- CHEM3031 - Physical Chemistry I

OR

Instructor Approval

or consent of instructor and advisor

Additional Comments:

No Requirement Level

CHEM4041 - Biochemistry I

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Overview of basic biochemistry. Emphasizes structure, nomenclature, and reactions of biologically active compounds such as carbohydrates, lipids, proteins, nucleic acids, and enzymes. Introduction to metabolic pathways. Offered fall semester.

When Offered
Fall

Equivalent Courses: Previous & Current Courses
CHEM441

Simple Requisites

Course Requisite Requirements

Chemistry Requirements
Type
Prerequisite

Prerequisite Requirements

Fulfill ANY of the following requirements:

Course Requirements

Complete ALL of the following Courses:

- CHEM3034 - Organic Chemistry II

OR

Instructor Approval

or consent of instructor and advisor

Additional Comments:

No Requirement Level

CHEM4041L - Biochemistry I Lab

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Experiments related to CHEM 4041. Offered fall semester

When Offered
Fall

Equivalent Courses: Previous & Current Courses
CHEM441L

Simple Requisites

Course Requisite Requirements

Corequisite
Type
Corequisite

Corequisite

a lab usage fee is charged

Complete ALL of the following Courses:
- CHEM4041 - Biochemistry I

Additional Comments:

No Requirement Level

CHEM4042 - Biochemistry II

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Continuation of CHEM 4041. Emphasizes vertebrate biochemistry and the study of vitamins, hormones, biochemical genetics, and nutrition. Introduction to photosynthesis. Offered spring semester

When Offered
Spring

Equivalent Courses: Previous & Current Courses
CHEM442

Simple Requisites

Course Requisite Requirements

Chemistry Requirements
Type
Prerequisite

Course Requirements

Complete ALL of the following Courses:
- CHEM4041 - Biochemistry I

Additional Comments:

No Requirement Level

CHEM4042L - Biochemistry II Lab

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Topics related to CHEM 4042. Offered spring semester.

When Offered
Spring

Equivalent Courses: Previous & Current Courses
CHEM442L

Simple Requisites

Course Requisite Requirements

Corequisite
Type
Corequisite

Corequisite

a lab usage fee is charged

Complete ALL of the following Courses:
- CHEM4042 - Biochemistry II

Additional Comments:

No Requirement Level

CHEM4043 - Intermediate Inorganic Chemistry

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Advanced bonding theories as applied to inorganic compounds; elements of group theory; acid/base and donor/acceptor chemistry; chemistry in nonaqueous solvents; coordination chemistry; ligand field theory; organometallic chemistry. Offered spring semester.

When Offered
Spring

Equivalent Courses: Previous & Current Courses
CHEM443

Simple Requisites

Course Requisite Requirements

Chemistry Requirements
Type
Prerequisite

Course Requirements

Complete ALL of the following Courses:

- CHEM3032 - Physical Chemistry II
- CHEM3043 - Descriptive Inorganic Chemistry

Additional Comments:

No Requirement Level

CHEM4043L - Intermediate Inorganic Chemistry Lab

General

Credit Hrs

Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Offered spring semester.

When Offered
Spring

Equivalent Courses: Previous & Current Courses
CHEM443L

Simple Requisites

Course Requisite Requirements

Corequisite
Type
Corequisite

Corequisite

a lab usage fee is charged

Complete ALL of the following Courses:

- CHEM4043 - Intermediate Inorganic Chemistry

Additional Comments:

No Requirement Level

CHEM4044 - Advanced Topics in Organic Chemistry

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
3

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Study of special topics not otherwise covered in organic chemistry. The graduate and undergraduate versions of the course will differ in the assignments and exams, while sharing the same lectures. Shares lecture with CHEM 5044, with additional expectations for graduate credit. Offered on sufficient demand.

Equivalent Courses: Previous & Current Courses
CHEM444, CHEM544

Simple Requisites

Course Requisite Requirements

Chemistry Requirements
Type
Prerequisite

Prerequisite Requirements

Fulfill ANY of the following requirements:

Course Requirements

Complete ALL of the following Courses:

- CHEM3033 - Organic Chemistry I
- CHEM3034 - Organic Chemistry II

OR

Instructor Approval

or consent of instructor and advisor

Additional Comments:

No Requirement Level

CHEM4045 - Intermediate Organic Chemistry

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
The determination of the structure of organic compounds by chemical and physical means. Offered on sufficient demand.

Equivalent Courses: Previous & Current Courses
CHEM445

Simple Requisites

Course Requisite Requirements

Chemistry Prerequisites
Type
Prerequisite

Course Requirements

Complete ALL of the following Courses:

- CHEM3034 - Organic Chemistry II

Additional Comments:

Chemistry Corequisites
Type
Corequisite

Lab Requirement

Enroll in the following Courses:

- CHEM4045L - Intermediate Organic Chemistry Lab

Additional Comments:

No Requirement Level

CHEM4045L - Intermediate Organic Chemistry Lab

General

Credit Hrs

Credit Hrs:
2

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Offered on sufficient demand.

Equivalent Courses: Previous & Current Courses
CHEM445L

Simple Requisites

Course Requisite Requirements

Corequisite
Type
Corequisite

Corequisite

a lab usage fee is charged

Complete ALL of the following Courses:

- CHEM4045 - Intermediate Organic Chemistry

Additional Comments:

No Requirement Level

CHEM4046 - Polymer Chemistry

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Study of the preparation, properties, and uses of macromolecules. The graduate and undergraduate versions of the course will differ in the assignments and exams, while sharing the same lectures. Shares lecture with CHEM 5046, with additional expectations for graduate credit. Offered Fall semesters, even years.

When Offered
Fall

Equivalent Courses: Previous & Current Courses
CHEM446, CHEM546

Simple Requisites

Course Requisite Requirements

Chemistry Requirements
Type
Prerequisite

Prerequisite Requirements

Fulfill ANY of the following requirements:

Course Requirements

Complete ALL of the following Courses:

- CHEM3032 - Physical Chemistry II
- CHEM3034 - Organic Chemistry II

OR

Instructor Approval

or consent of instructor and advisor

Additional Comments:

No Requirement Level

CHEM4047 - Medicinal Chemistry

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Molecular-level mechanisms of drug action and rational drug design. Material is drawn from the recent primary literature. The graduate and undergraduate versions of the course will differ in the assignments and exams, while sharing the same lectures. Shares lecture with CHEM 5047, with additional expectations for graduate credit.

Equivalent Courses: Previous & Current Courses
CHEM447, CHEM547

Simple Requisites

Course Requisite Requirements

Chemistry Requirements
Type
Prerequisite

Prerequisite Requirements

Fulfill ANY of the following requirements:

Course Requirements

Complete ALL of the following Courses:

- CHEM334 - Organic Chemistry II (Inactive)

OR CHEM3034 - Organic Chemistry II

OR

Instructor Approval

or consent of instructor and advisor

Additional Comments:

No Requirement Level

CHEM4049 - Organometallic Chemistry

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Organometallic chemistry of the main group and transition elements. Ligand classification and molecular orbital description of bonding in organometallic complexes. Structure, bonding, synthesis, and properties of transition metal compounds and their derivatives. Organometallic complexes as catalysts. The graduate and undergraduate versions of the course will differ in the assignments and exams, while sharing the same lectures. Shares lecture with CHEM 5049, with additional expectations for graduate credit.

Equivalent Courses: Previous & Current Courses
CHEM449, CHEM549

Simple Requisites

Course Requisite Requirements

Chemistry Requirements
Type
Completion Requirement

Prerequisite Requirements

Fulfill ANY of the following requirements:

Course Requirements

Complete ALL of the following Courses:

- CHEM3034 - Organic Chemistry II
  OR CHEM334 - Organic Chemistry II (Inactive)

OR

Instructor Approval

or consent of instructor and advisor

Additional Comments:

No Requirement Level

CHEM4050 - Physical Organic Chemistry

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Physical aspects of organic chemistry. Emphasizes reaction mechanisms, reaction kinetics, and electronic theories. The graduate and undergraduate versions of the course will differ in the assignments and exams, while sharing the same lectures. Shares lecture with CHEM 5050, with additional expectations for graduate credit.

Equivalent Courses: Previous & Current Courses
CHEM450, CHEM550

Simple Requisites

Course Requisite Requirements

Chemistry Requirement
Type
Prerequisite

Prerequisite Requirements

Fulfill ANY of the following requirements:

Course Requirements

Complete ALL of the following Courses:

- CHEM3034 - Organic Chemistry II
  OR CHEM334 - Organic Chemistry II (Inactive)

OR

Instructor Approval

or consent of instructor and advisor

Additional Comments:

No Requirement Level

CHEM4051 - Advanced Topics in Inorganic Chemistry

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Study of special topics otherwise not covered in inorganic. The graduate and undergraduate versions of the course will differ in the assignments and exams, while sharing the same lecture. Shares lectures with CHEM 5051, with additional expectations for graduate credit.

Equivalent Courses: Previous & Current Courses
CHEM451, CHEM551

Simple Requisites

Course Requisite Requirements

Chemistry Requirements
Type
Prerequisite

Prerequisite Requirements

Fulfill ANY of the following requirements:

Course Requirements

Complete ALL of the following Courses:

- CHEM4043 - Intermediate Inorganic Chemistry
  OR CHEM443 - Intermediate Inorganic Chem (Inactive)

OR

Instructor Approval

or consent of instructor and advisor

Additional Comments:

No Requirement Level

CHEM4061 - Advanced Topics in Biochemistry

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Study of special topics otherwise not covered in biochemistry. The graduate and undergraduate versions of the course will differ in the assignments and exams, while sharing the same lecture. Shares lectures with CHEM 5061, with additional expectations for graduate credit.

Equivalent Courses: Previous & Current Courses
CHEM461, CHEM561

Simple Requisites

Course Requisite Requirements

Chemistry Requirements
Type
Prerequisite

Prerequisite Requirements

Fulfill ANY of the following requirements:

Course Requirements

Complete ALL of the following Courses:

- CHEM4042 - Biochemistry II
  OR CHEM442 - Biochemistry II (Inactive)

OR

Instructor Approval

or consent of instructor and advisor

Additional Comments:

No Requirement Level

CHEM4091 - Directed Study

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
3

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Study under the guidance of a member of the faculty. A topic and schedule of meetings is arranged between Instructor and student early in the semester.

Equivalent Courses: Previous & Current Courses
CHEM491

No Requirements

CHEM4093 - Senior Research & Thesis I

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
3

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Problem-oriented research under the direction of a faculty member. Students should consult with Chemistry faculty to find a Senior Thesis advisor. In the first semester, students will research a topic and begin work on the research project. Students are required to give a presentation and write a paper on the research topic. Offered fall semester or on demand.

Equivalent Courses: Previous & Current Courses
CHEM493

No Requirements

CHEM4094 - Senior Research & Thesis II

General

Credit Hrs

Credit Hrs:
2

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Continuation the research begun in CHEM 4093. Students are required to give a presentation and write a paper on their research project. Offered spring semester or on demand.

Equivalent Courses: Previous & Current Courses
CHEM494

Simple Requisites

Course Requisite Requirements

Chemistry Requirements
Type
Prerequisite

Course Requirements

Complete ALL of the following Courses:
- CHEM4093 - Senior Research & Thesis I
  OR CHEM493 - Senior Research & Thesis I (Inactive)

Additional Comments:

No Requirement Level

CHEM5000 - Directed Research

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
12

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, No Report

Equivalent Courses: Previous & Current Courses
CHEM500

No Requirements

CHEM5001 - Applied Molecular Quantum Mechanics

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Application of molecular theory to contemporary problems in organic chemistry (e.g. EHMO, frontier orbital theory), inorganic chemistry (e.g. ligand field theory, Jahn-Teller effect) and analytical chemistry (e.g. photo physicochemical processes).

Equivalent Courses: Previous & Current Courses
CHEM501

Simple Requisites

Course Requisite Requirements

Chemistry Requirements
Type
Prerequisite

Graduate Requirement

Graduate standing in chemistry or consent of instructor.

Additional Comments:

No Requirement Level

CHEM5012 - Advanced Topics in Analytical Chemistry

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Study of special topics not otherwise treated in analytical chemistry. The graduate and undergraduate versions of the course will differ in the assignments and exams, while sharing the same lectures. Shares lecture with CHEM 4012, with additional expectations for graduate credit.

Equivalent Courses: Previous & Current Courses
CHEM412, CHEM512

Simple Requisites

Course Requisite Requirements

Chemistry Requirements
Type
Prerequisite

Graduate Requirement

Graduate standing in chemistry or consent of instructor.

Additional Comments:

No Requirement Level

CHEM5013 - Separation Science

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Theory and practice of separation science. Topics include selective mass transport, extraction, chromatography, and electrophoresis. The graduate and undergraduate versions of the course will differ in the assignments and exams, while sharing the same lectures. Shares lecture with CHEM 4013, with additional expectations for graduate credit.

Equivalent Courses: Previous & Current Courses
CHEM413, CHEM513

Simple Requisites

Course Requisite Requirements

Chemistry Requirements
Type
Prerequisite

Graduate Requirement

Graduate standing in chemistry or consent of instructor

Additional Comments:

No Requirement Level

CHEM5022 - Environmental Chemistry

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Application of chemical principles to the study of the environment. Includes natural processes and pollution problems related to water, air, and soil. The graduate and undergraduate versions of the course will differ in the assignments and exams, while sharing the same lectures. Shares lecture with CHEM 4022, with additional expectations for graduate credit.

Equivalent Courses: Previous & Current Courses
CHEM522

Simple Requisites

Course Requisite Requirements

Chemistry Requirements
Type
Prerequisite

Graduate Requirement

Graduate standing in chemistry or consent of instructor

Additional Comments:

No Requirement Level

CHEM5022L - Environmental Chemistry Lab

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Laboratory experiments related to the principles in CHEM 4022/5022. The graduate and undergraduate versions of the course will differ in the assignments and exams. Shares lab with CHEM 4022L, with additional expectations for graduate credit. Offered spring semester, even years.

Equivalent Courses: Previous & Current Courses
CHEM422L, CHEM522L

Simple Requisites

Course Requisite Requirements

Corequisites
Type
Corequisite

Corequisites

Complete ALL of the following Courses:

- CHEM4022 - Environmental Chemistry
  OR CHEM5022 - Environmental Chemistry

Additional Comments:

Prerequisites: Graduate standing in chemistry or consent of instructor: a lab usage fee is charged

No Requirement Level

CHEM5023 - Applied Spectroscopy

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Discussions of mass spectrometry, fluorescence, Nuclear Magnetic Resonance (NMR), X-ray (XPS, X-ray diffraction, solid state spectroscopy), Infrared (IR), Ultraviolet/Visible spectroscopic methods and techniques, as applied to chemical and biological problems, including structure elucidation, medical diagnostics, molecular sensors. The graduate and undergraduate versions of the course will differ in the assignments and exams, while sharing the same lectures. Shares lecture with CHEM 4023, with additional expectations for graduate credit.

Equivalent Courses: Previous & Current Courses
CHEM423, CHEM523

Simple Requisites

Course Requisite Requirements

Chemistry Requirements
Type
Prerequisite

Graduate Requirement

Graduate standing in chemistry or consent of instructor

Additional Comments:

No Requirement Level

CHEM5024 - Statistical Thermodynamics

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, No Report, Standard Letter

Course Description
Entropy, randomness, the Boltzmann distribution, and the chemical potential. Translational, rotational, vibrational, and electronic contributions to the partition function. Calculation of mean energies, heat capacities, and equilibrium constants. Stability. The influence of wave function symmetry: Bose-Einstein and Fermi-Dirac statistics. The quantum statistical operator. Coherence and the Pauli principle. (Same as Phys 5008)

Equivalent Courses: Previous & Current Courses
CHEM524, PHYS508

Simple Requisites

Course Requisite Requirements

Graduate Requirements
Type
Prerequisite

Graduate Requirement

Graduate standing in chemistry or consent of instructor

Additional Comments:

No Requirement Level

CHEM5025 - Molecular Quantum Mechanics

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Molecular structure; theories of the chemical bond; perturbation and variation methods; electronic and magnetic properties of molecules. The graduate and undergraduate versions of the course will differ in the assignments and exams, while sharing the same lectures. Shares lecture with CHEM 4025, with additional expectations for graduate credit.

Equivalent Courses: Previous & Current Courses
CHEM425, CHEM525

Simple Requisites

Course Requisite Requirements

Graduate Requirement
Type
Prerequisite

Graduate Requirement

Graduate standing in chemistry or consent of instructor

Additional Comments:

No Requirement Level

CHEM5026 - Chemical Spectroscopy

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Principles and applications of electronic, molecular, and spin spectroscopies, laser spectroscopy; transitions; elements of group theory; quantitative correlations and analytical chemistry. The graduate and undergraduate versions of the course will differ in the assignments and exams, while sharing the same lectures. Shares lecture with CHEM 4026, with additional expectations for graduate credit

Equivalent Courses: Previous & Current Courses
CHEM426, CHEM526

Simple Requisites

Course Requisite Requirements

Chemistry Requirement
Type
Prerequisite

Graduate Requirement

Graduate standing in chemistry or consent of instructor

Additional Comments:

No Requirement Level

CHEM5027 - Molecular Reaction Dynamics

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Techniques in studies of chemical reaction rates. Topics commonly include: rate laws, collision theory, mechanistic studies, transition state theory, fast reactions, chemical oscillations, transport theory, and transport coefficients. The graduate and undergraduate versions of the course will differ in the assignments and exams, while sharing the same lectures. Shares lecture with CHEM 4027, with additional expectations for graduate credit.

Equivalent Courses: Previous & Current Courses
CHEM427, CHEM527

Simple Requisites

Course Requisite Requirements

Chemistry Requirement
Type
Prerequisite

Graduate Requirement

Graduate standing in chemistry or consent of instructor

Additional Comments:

No Requirement Level

CHEM5028 - Advanced Topics in Physical Chemistry

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
12

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Study of special topics not otherwise covered in physical chemistry. Shares lecture with CHEM 4028, with additional expectations for graduate credit.

Equivalent Courses: Previous & Current Courses
CHEM528

Simple Requisites

Course Requisite Requirements

Chemistry Requirement
Type
Prerequisite

Graduate Requirement

Graduate standing in chemistry or consent of instructor

Additional Comments:

No Requirement Level

CHEM5029 - Graduate Seminar

General

Credit Hrs

Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
All full time Chemistry graduate students must enroll in this course every fall and spring semester. Students giving a presentation must enroll for a letter grade. Other students should enroll using the S/U option.

When Offered
Fall, Spring

Equivalent Courses: Previous & Current Courses
CHEM529

Simple Requisites

Course Requisite Requirements

Chemistry Requirements
Type
Prerequisite

Graduate Requirement

Graduate standing in chemistry or consent of instructor

Additional Comments:

No Requirement Level

CHEM5030 - Graduate Seminar

General

Credit Hrs

Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

No Requirements

CHEM5031 - Chemistry of Aquatic Systems

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
The thermodynamics and aqueous chemistry of natural waters, with emphasis on groundwater. Chemical equilibrium concepts, surface chemistry, redox reactions, and biochemistry. The interaction of water with the atmosphere and geologic Materials. Basic concepts applied to problems of groundwater quality evolution, water use, and groundwater contamination. The graduate and

undergraduate versions of the course will differ in the assignments and exams, while sharing the same lectures. Shares lecture with CHEM 4031, with additional expectations for graduate credit. (Same as GEOC 5007 and HYD 5007.)

Equivalent Courses: Previous & Current Courses
CHEM431, CHEM531, GEOC507, HYD507

Simple Requisites

Course Requisite Requirements

Chemistry Prerequisites
Type
Prerequisite

Graduate Requirement

Graduate standing in chemistry or consent of instructor

Additional Comments:

No Requirement Level

CHEM5032 - Atmospheric Chemistry

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Chemistry of the atmosphere. Important chemical reactions and their effects on air, soil, and surface waters. Effects of anthropogenic inputs on the atmosphere, climate change. Distribution of chemical species in the atmosphere, etc. The graduate and undergraduate versions of the course will differ in the assignments and exams, while sharing the same lectures. Shares lecture with CHEM 4032, with additional expectations for graduate credit.

Equivalent Courses: Previous & Current Courses
CHEM432, CHEM532

Simple Requisites

Course Requisite Requirements

Chemistry Requirement
Type
Prerequisite

Graduate Requirement

Graduate standing in chemistry or consent of instructor

Additional Comments:

No Requirement Level

CHEM5033 - Global Biogeochemical Cycles

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Human activity is increasing the rate of addition of Materials to the environment, resulting in changes to the earth's climate. The transformation and movement of natural and anthropogenic sources of chemical substances between reservoirs in a global context. The graduate and undergraduate versions of the course will differ in the assignments and exams, while sharing the same lectures. Shares lecture with CHEM 4033, with additional expectations for graduate credit.

Equivalent Courses: Previous & Current Courses
CHEM433, CHEM533

Simple Requisites

Course Requisite Requirements

Chemistry Requirement
Type
Prerequisite

Graduate Requirement

Graduate standing in chemistry or consent of instructor

Additional Comments:

No Requirement Level

CHEM5040 - Chem of Energetic Materials

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
The chemistry of propellants, pyrotechnics, and explosives. Material to be covered will include history, oxidation/reduction reactivity, kinetics of decomposition, analytical characterization techniques, performance evaluation, hazards analysis, safety testing, and structure property relationships.

Equivalent Courses: Previous & Current Courses
CHEM540

Simple Requisites

Course Requisite Requirements

Chemistry Requirements
Type
Prerequisite

Graduate Requirements

Graduate standing in chemistry or consent of instructor

Additional Comments:

No Requirement Level

CHEM5044 - Advanced Topics in Organic Chemistry

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Study of special topics not otherwise covered in organic chemistry. The graduate and undergraduate versions of the course will differ in the assignments and exams, while sharing the same lectures. Shares lecture with CHEM 4044, with additional expectations for graduate credit.

Equivalent Courses: Previous & Current Courses
CHEM444, CHEM544

Simple Requisites

Course Requisite Requirements

Chemistry Requirements
Type
Prerequisite

Graduate Requirement
Graduate standing in chemistry or consent of instructor

Additional Comments:

No Requirement Level

CHEM5045 - Advanced Organic Synthesis

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Principles and practices of organic synthesis.

Equivalent Courses: Previous & Current Courses
CHEM545

Simple Requisites

Course Requisite Requirements

Chemistry Requirements
Type
Prerequisite

Graduates Requirement
Graduate standing in chemistry or consent of instructor

Additional Comments:

No Requirement Level

CHEM5046 - Polymer Chemistry

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Study of the preparation, properties, and uses of macromolecules. The graduate and undergraduate versions of the course will differ in the assignments and exams, while sharing the same lectures. Shares lecture with CHEM 4046, with additional expectations for graduate credit.

Equivalent Courses: Previous & Current Courses
CHEM446, CHEM546

Simple Requisites

Course Requisite Requirements

Chemistry Requirements
Type
Prerequisite

Graduates Requirement
Graduate standing in chemistry or consent of instructor

Additional Comments:

No Requirement Level

CHEM5047 - Medicinal Chemistry

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Molecular-level mechanisms of drug action and rational drug design. Material is drawn from the recent primary literature. The graduate and undergraduate versions of the course will differ in the assignments and exams, while sharing the same lectures. Shares lecture with CHEM 4047, with additional expectations for graduate credit.

Equivalent Courses: Previous & Current Courses
CHEM4047, CHEM547

Simple Requisites

Course Requisite Requirements

Chemistry Requirements
Type
Prerequisite

Graduates Requirement
Graduate standing in chemistry or consent of instructor

Additional Comments:

No Requirement Level

CHEM5048 - Experimental Nuclear Magnetic Resonance Spectroscopy

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Introduction to NMR instrumentation, data-acquisition, and processing.

Equivalent Courses: Previous & Current Courses
CHEM548

Simple Requisites

Course Requisite Requirements

Chemistry Requirements
Type
Prerequisite

Graduates Requirement

Graduate standing in chemistry or consent of instructor

Additional Comments:

No Requirement Level

CHEM5049 - Organometallic Chemistry

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Organometallic chemistry of the main group and transition elements. Ligand classification and molecular orbital description of bonding in organometallic complexes. Structure, bonding, synthesis, and properties of transition metal compounds and their derivatives. Organometallic complexes as catalysts. The graduate and undergraduate versions of the course will differ in the assignments and exams, while sharing the same lectures. Shares lecture with CHEM 4049, with additional expectations for graduate credit.

Equivalent Courses: Previous & Current Courses
CHEM449, CHEM549

Simple Requisites

Course Requisite Requirements

Chemistry Requirements
Type
Prerequisite

Graduates Requirement

Prerequisite: Graduate standing in chemistry or consent of instructor: A lab usage fee is charged

Additional Comments:

No Requirement Level

CHEM5050 - Physical Organic Chemistry

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Physical aspects of organic chemistry. Emphasizes reaction mechanisms, reaction kinetics, and electronic theories. The graduate and undergraduate versions of the course will differ in the assignments and exams, while sharing the same lectures. Shares lecture with CHEM 4050, with additional expectations for graduate credit.

Equivalent Courses: Previous & Current Courses
CHEM450, CHEM550

Simple Requisites

Course Requisite Requirements

Chemistry Requirements
Type
Prerequisite

Graduates Requirement

Graduate standing in chemistry or consent of instructor

Additional Comments:

No Requirement Level

CHEM5051 - Advanced Topics in Inorganic Chemistry

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Study of special topics otherwise not covered in inorganic. The graduate and undergraduate versions of the course will differ in the assignment and exams, while sharing the same lectures. Shares lectures with CHEM 4051, with additional expectations for graduate credit.

Equivalent Courses: Previous & Current Courses
CHEM451, CHEM551

Simple Requisites

Course Requisite Requirements

Chemistry Requirements
Type
Prerequisite

Graduates Requirement

Graduate standing in chemistry or consent of instructor

Additional Comments:

No Requirement Level

CHEM5055 - Research Proposal Writing

General

Credit Hrs
Credit Hrs:
2

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Students will develop an original research proposal required for their candidacy examination. The written research proposal should involve a topic, which is distinct from the student's dissertation research problem. As a partial fulfillment of CHEM 5055, students are required to present a 45-minute public seminar on the original proposal. Proposal seminar will not satisfy the graduate seminar requirement (CHEM 5029/5030). Following the seminar, the student will defend the proposal to his or her dissertation or thesis committee. CHEM 5055 will be offered in Fall and Spring semesters. Students are recommended to consult the graduate handbook for details.

Equivalent Courses: Previous & Current Courses
CHEM555

Simple Requisites

Course Requisite Requirements

Chemistry Requirements
Type
Prerequisite

Prerequisite Requirements

Fulfill ANY of the following requirements:

Requirements (A)

Fulfill ALL of the following requirements:

Course Requirements

Complete ALL of the following Courses:

- COMM5075 - Communication in the Sciences

AND

Graduates Requirement

Graduate standing in chemistry

OR

Instructor Approval

or consent of instructor

Additional Comments:

No Requirement Level

CHEM5061 - Advanced Topics in Biochemistry

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Study of special topics otherwise not covered in biochemistry. Knowledge of the material covered in CHEM 4041 and 442 is assumed. The graduate and undergraduate versions of the course will differ in the assignments and exams, while sharing the same lectures. Shares lectures with CHEM 4061, with additional expectations for graduate credit.

Equivalent Courses: Previous & Current Courses
BIOT589, CHEM461, CHEM561

Simple Requisites

Course Requisite Requirements

Chemistry Requirements
Type
Prerequisite

Graduates Requirement

Graduate standing in chemistry or consent of instructor

Additional Comments:

No Requirement Level

CHEM5081 - Directed Study

General

Credit Hrs
Credit Hrs:
1

Credit Hours Max:
12

Credit Hours Operator:
TO

Grade Modes
Pass/Fail, Standard Letter

Course Description
Study under the guidance of a member of the faculty. A topic and schedule of meetings is arranged between Instructor and student early in the semester.

Equivalent Courses: Previous & Current Courses
CHEM581

Simple Requisites

Course Requisite Requirements

Chemistry Requirements
Type
Prerequisite

Prerequisite Requirements

Fulfill ANY of the following requirements:

Requirements (A)

Fulfill ALL of the following requirements:

Course Requirements

Complete ALL of the following Courses:

- CHEM4042 - Biochemistry II

AND

Graduates Requirement

Graduate standing in chemistry

OR

Instructor Approval

or consent of instructor

Additional Comments:

No Requirement Level

CHEM5091 - Thesis

General

Credit Hrs

Credit Hrs:	Credit Hours Max:
1	12

Credit Hours Operator:
TO

Grade Modes
Pass/Fail, No Report

Equivalent Courses: Previous & Current Courses
CHEM591

Simple Requisites

Course Requisite Requirements

Chemistry Requirements
Type
Prerequisite

Graduates' Requirement

Graduate standing in chemistry or consent of instructor

Additional Comments:

No Requirement Level

CHEM5095 - Dissertation

General

Credit Hrs

Credit Hrs:	Credit Hours Max:
1	12

Credit Hours Operator:
TO

Grade Modes
Pass/Fail, No Report

Equivalent Courses: Previous & Current Courses
CHEM595

Simple Requisites

Course Requisite Requirements

Chemistry Requirements
Type
Prerequisite

Doctoral Requirement

Successful completion of PhD candidacy exam and academic advisor recommendation for candidacy

Additional Comments:

No Requirement Level

Community Education Department

New Mexico Tech Community Education

www.nmt.edu/ce

The New Mexico Tech Community Education Program provides credit and non-credit enrichment courses in Physical Recreation, Studio Arts , Lifestyle Activities, general Community Education, and Certification programs. Courses are open to New Mexico Tech students, faculty, staff, and the surrounding community. No degrees are offered through the Community Education Program.

Community Education courses may be found on Banweb class schedules with the following prefixes:

- CONC (Community Education Non-Credit)
- CERT (Certification programs non-credit)
- CEFA (Studio Art Enrichment courses)
- LIFE (Lifestyle non-credit)
- MUSV (Music Performance enrichment courses)
- CEPR (Physical Recreation enrichment courses)

Community Education classes, which are signified by a "C" following the course number, are graded on an satisfactory/unsatisfactory (S/U also known as pass/fail) basis and can be used as elective credit in most majors. Community Education credit classes do not count towards Core General Education requirements. The Community Education Program also offers non-credit courses such as Wine Tasting and cooking classes.

Full-time undergraduate students do not pay extra tuition when these courses are part of their 12-18 hour course load. Full-time graduate students may enroll for 1 credit of Community Education coursework beyond their 12 hour credit limit, at no extra charge (see graduate catalog for restrictions).

Students who are not pursuing a degree program, such as community members or staff, are classified as non-degree seeking students. They are limited to a maximum of six credit hours per semester. Non-degree students who have never taken a class at Tech need to complete an Application for Admission Form and can do this application through the office of Community Education. After being admitted, students will be able to register for courses and can do so through the Office of the Registrar or Community Education.

A great deal of information may be found at the department website at www.nmt.edu/ce including downloadable catalogs with course descriptions. To speak with someone about the Community Education program, please visit the offices in Speare 138 or call 575.835.6581

Courses

CEFA1000C - Art Design

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail

No Requirements

CEFA1010C - Weaving I

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail

Course Description
Weaving is a celebrated art in the Southwest. Based on a binary system, it has deep roots in the history of technology, making it an exceptionally well-placed subject at New Mexico Tech. In this class, you will learn the fundamentals of how handwoven cloth is made, including: yarn selection, setting up the loom, weaving, finishing, project planning, and regional history. Students have the opportunity to weave three class projects and an optional final project of their own design. By the end of the class students will have an understanding of basic weaving vocabulary, methodology, and design.

No Requirements

CEFA1020C - Drawing Studio

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail

Course Description
This course covers in-depth various approaches to drawing and aims to teach you to draw from observation.

No Requirements

CEFA1030C - Intro to Digital Photography

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail

Course Description
This course aims to provide the student with the fundamentals of photography using their digital camera. After completing this course, the student will — at the very minimum — know how to use their digital cameras in Auto mode to take photographs. Ideally, by the end of the semester, the student will use their camera in Manual mode and decide about setting aperture (f-stop), shutter speed, ISO, and white balance to affect exposure. Note that this class covers physical, independent cameras and not cell phone cameras; use of cell phone cameras is prohibited for turning in assignments. The mode of instruction for this class is face to face plus web videos & downloads. Content will be available

online from the class website and Google Drive as downloadable PDF and notes and a video of each presentation. Content will be online on the Saturday following class by midnight.

No Requirements

CEFA1031C - Fundamentals of Photography

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail

Course Description
Fundamentals tools and processes in creating traditional Hispanic folk art

No Requirements

CEFA1033C - Smartphone Photography

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail

No Requirements

CEFA1050C - Painting I

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail

Course Description
Survey of introductory skills and techniques using a variety of drawing and painting media.

No Requirements

CEFA1052C - Painting in Oils I

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail

Course Description
This course is designed to give the beginning oil painter a simple background on general working technique behind oil painting and constructive feedback on class work. In-class work aside from your painting(s) will consist of a set of color and tonal studies designed to assist creative understanding and a brief midterm/ finals activity. This is a beginning course and though you are encouraged to paint whatever YOU would like, I do request that you work from a reference.

No Requirements

CEFA1053C - Painting in Acrylics

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail

Course Description
Basic Skills in Acrylic painting, development of skills on technique. Students will be encouraged to tap into their creativity and produce art that is truly unique to themselves. In this environment, working in this medium, there is no wrong answer as the goal is to relax and produce art that conveys a personal perspective across a wide range of emotions and ideas. Painting should be therapeutic and relaxing, have fun and take joy in your new found talent.

No Requirements

CEFA1054C - Intro to Watercolor Painting

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail

Course Description
This is the introduction to the watercolor painting course to learn basic techniques, materials, and design elements. Also, students will get familiar with the history of watercolor painting.

No Requirements

CEFA1055C - Intermediate Painting in Oils

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail

Course Description
This course is designed to teach further techniques in oil painting with constructive feedback on classwork. This course is designed to teach further techniques in oil painting with constructive feedback on classwork.

No Requirements

CEFA1060C - Stained Glass & Moasics

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail

Course Description
Introduction to Materials and construction techniques of stained glass panels and mosaic objects.

No Requirements

CEFA1061C - Stained Glass

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail

Course Description
Investigation of tools and techniques in creating inspired stained glass compositions.

No Requirements

CEFA1062C - Glass Fusing

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail

Course Description
Fundamental tools and processes in creation of glass objects; mold making and slumping processes used in basic kiln forming.

No Requirements

CEFA1070C - Hand Building in Clay

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail

Course Description
This practical art of hand building with clay aims to give ceramic students a look and feel for the techniques to produce various forms and vessels using an age-old art method. This method connects us to earth materials and brings us to an understanding of our creativity in producing and crafting beautiful, functional or sculptural ware.

CEFA1071C - Wheel Thrown Ceramics I

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail

Course Description
Prerequisite: CEFA 1070C, Hand Building in Clay This practical art of wheel throwing aims to give ceramic students a look and feel for the techniques to produce various forms and vessels using an age-old art method. This method connects us to earth materials and brings us to understanding of our creativity in producing and crafting beautiful, functional ware.

No Requirements

CEFA1072C - Sculptural Ceramics

General

Credit Hrs
Credit Hrs:
2

Grade Modes
Audit, Pass/Fail

Course Description
Studio art class in three dimensional construction of abstract and figurative sculpture. Accommodates all skill levels.

No Requirements

CEFA1080C - Beginning Enameling

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail

Course Description
The art of fusing glass to metal, safe handling of equipment and chemicals in beginning techniques.

No Requirements

CEFA1082C - Beginning Metal Arts/Lapidary

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail

Course Description
Fabrication techniques in metal construction: cutting, shaping and soldering, lost wax casting, Lapidary works of cut stone may be incorporated into metal processes.

No Requirements

CEFA1084C - Precious Metal Clay

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail

Course Description
Prerequisites: CEFA 2810C Metal Arts/Lapidary II and consent of instructorThe art of kiln fired fused copper, bronze and silver metals in creating wearable art. Safe handling of kilns and equipment

No Requirements

CEFA1086C - Armor Making

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail

Course Description
Prerequisite: CEFA 1082C, Beginning Metal Arts/Lapidary Hot and cold working of steel and leather in historical design and construction of wearable medieval protective clothing.

No Requirements

CEFA1089C - CC Pilot Course

General

Credit Hrs
Credit Hrs:
0

Credit Hours Max:
2

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail

No Requirements

CEFA1090C - Leatherwork

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail

Course Description
An introduction to the art of leatherworking

No Requirements

CEFA1091C - Beginning Sewing

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail

Course Description
An intro class to sewing machine use and care, sewing pattern reading, hand sewing basics, and sewing terminology

No Requirements

CEFA2010C - Weaving II

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail

Course Description
Further work in the celebrated art of weaving.

No Requirements

CEFA2061C - Stained Glass II

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail

Course Description
Prerequisite: CEFA 1061 or consent of instructor Students will investigate more complex designs, tools and equipment in stained glass, including three dimensional and sculptural designs.

Simple Requisites

Course Requisite Requirements

Prerequisite Type
Prerequisite

Complete ALL of the following Courses:
- CEFA1061C - Stained Glass

Additional Comments:

No Requirement Level

CEFA2071C - Wheel Thrown Ceramics II

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail

Course Description
Prerequisite: CEFA 1070C, Hand Building in Clay, and CEFA 1071C, Wheel Thrown Ceramics I The practical arts of wheel throwing and hand building in clay give ceramic students a look and feel of techniques toproduce various forms and vessels using an age-old art method.

No Requirements

CEFA2080C - Enameling II

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail

Course Description
Prerequisite: CEFA 1080C, Beginning Enameling The art of fusing glass to metal using advanced techniques and methods

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Completion Requirement

Complete ALL of the following Courses:
- CEFA1080C - Beginning Enameling

Additional Comments:

No Requirement Level

CEFA2082C - Metal Arts/Lapidary II

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail

Course Description
Prerequisite: CEFA 1082C , Beginning Metal Arts/Lapidary Continued development of skills and processes in lapidary and metal work

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Additional Comments:

No Requirement Level

CEFA2084C - Precious Metal ClayII

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail

Course Description
Prerequisite: CEFA 1084C and consent of instructor Continued exploration of skills and techniques acquired in PMC I

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Complete ALL of the following Courses:
- CEFA1084C - Precious Metal Clay

Additional Comments:

No Requirement Level

CEFA2089C - CC Pilot Course

General

Credit Hrs
Credit Hrs:
0

Credit Hours Max:
2

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail

No Requirements

CEFR5081 - First Responder Grad Course

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Pass/Fail

No Requirements

CEPR1000C - Weight Lifting

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail

Course Description
This is an introductory course designed to help each student improve muscular strength, gain knowledge and understanding of weight training.

No Requirements

CEPR1001C - Weight Lifting for Women

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail

Course Description
Introduction to basic principles and techniques of weight training as related to women.

No Requirements

CEPR1002C - Fitness Bootcamp

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail

Course Description
Boot Camp is a type of physical training program that combines interval training and many other exercises using weights and/or body weight to lose body fat, increase cardiovascular fitness and strength. This class is designed to push the participant a little bit further than they would normally push themselves in the gym alone. The idea is that everyone involved works at their own pace as they team up and work towards one goal, either in pairs, small teams of three or four, or even two teams head on. This class will always be an adventure!

No Requirements

CEPR1003C - Spinning

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail

Course Description
The trademark name for Indoor Cycling designed to progressively build strength and endurance while improving cardio respiratory function.

No Requirements

CEPR1008C - Beginning Golf

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail

Course Description
Instruction in the basic skills, equipment, rules, etiquette and shot-making and use of irons and woods.

No Requirements

CEPR1009C - Archery

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail

Course Description
This course is designed to give students a basic understanding of the sport of archery.

No Requirements

CEPR1010C - Beginning Volleyball

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail

Course Description
Introduction to basic skills, rules and strategies.

No Requirements

CEPR1011C - Basketball

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail

Course Description
Instruction and practice of game skills in a team setting.

No Requirements

CEPR1012C - Indoor Soccer

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail

Course Description
Instruction and practice of basic skills in an indoor setting.

No Requirements

CEPR1014C - Rugby

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail

Course Description
An introductory class into Rugby Union. The class will cover aspects such as the laws of the game, position specific roles, attack, defense and conditioning

No Requirements

CEPR1020C - Beginning Yoga

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail

Course Description
Whether you are new to yoga or are familiar with the practice, Beginner Yoga will help develop balance, strength and flexibility without feeling overwhelmed or confused.

No Requirements

CEPR1021C - Gentle Yoga

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail

Course Description
Focus on stress reduction, bod/breath awareness and flexibility.

No Requirements

CEPR1022C - Slow Flow Yoga

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail

Course Description
Slow Flow Yoga is typically a more gentle form of yoga that emphasizes breath and mindful movement while still working on improving strength and flexibility.

No Requirements

CEPR1023C - Pilates Matwork

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail

Course Description
Designed exercise program involves the entire body while focusing on strengthening the core muscles of the torso. Exercises promote coordination, balance and strength.

No Requirements

CEPR1024C - Stretch and Relaxation

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail

Course Description
Instruction emphasizes stretch and relaxation techniques.

No Requirements

CEPR1025C - Massage/Thai Massage

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail

Course Description
This course teaches basic techniques to ease muscle pain, improve circulation and create a better sense of well being.

No Requirements

CEPR1030C - Aerobics

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail

Course Description
Instruction in continuous movement using basic steps for improved cardio respiratory endurance.

No Requirements

CEPR1031C - Salsa Aerobics

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail

Course Description
Instruction emphasizes exercise and cardiovascular endurance with the use of Latin music.

No Requirements

CEPR1032C - Zumba

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail

Course Description
The trademark name for Salsa Aerobics instruction emphasizing exercise and cardiovascular endurance with the use of Latin music.

No Requirements

CEPR1033C - Dance Fit

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail

No Requirements

CEPR1042C - Taijutsu

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Pass/Fail

Course Description
Instruction in the basic techniques of punching, falling, rolling and kicking in Taijutsu.

No Requirements

CEPR1043C - Tai Chi Chuan

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail

Course Description
Instruction and practice in techniques to enhance body awareness, reduces stress, improve balance and increase strength.

No Requirements

CEPR1044C - Self-Defense

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail

No Requirements

CEPR1050C - Beginning Belly Dance

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail

Course Description
Instruction in the basic moving steps and rhythms of the belly dance.

No Requirements

CEPR1052C - Ballroom Dance

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail

Course Description
Introduction to ballroom dance such as the lindy, foxtrot, waltz, tango, cha-cha and rumba.

No Requirements

CEPR1053C - Swing Dance

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail

Course Description
Introduction to swing dancing including East Coast Swing, Lindy Hop and Charleston.

No Requirements

CEPR1061C - Beginning Rock Climbing

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail

Course Description
Introduction to basic climbing technique with an emphasis on safety, safe knot and belay.

No Requirements

CEPR1062C - Bouldering

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail

Course Description
An introduction to bouldering techniques.

No Requirements

CEPR1080C - Stress Mgmt: Mindfulness

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail

No Requirements

CEPR1081C - Concepts of Pers Well-Being

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail

No Requirements

CEPR2008C - Intermediate Golf

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail

Course Description
Prerequisite: Beginning Golf or consent of instructor.Instruction emphasizing actual play

No Requirements

CEPR2010C - Intermediate Volleyball

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail

Course Description
Prerequisite: Beginning Volleyball or Instructor approval Improve individual skill levels and apply more tactics and strategies.

Simple Requisites

Course Requisite Requirements

Prerequisite: Prior experience is required.

No Requirement Level

CEPR2020C - Intermediate Yoga

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail

Course Description
Prerequisite: Beginning Yoga or consent of instructorIntermediate training and skill techniques in Yoga.

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Complete ALL of the following Courses:
- CEPR1020C - Beginning Yoga

Additional Comments:

No Requirement Level

CEPR2050C - Intermediate Belly Dance

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail

Course Description
Prerequisite: Beginning Belly Dancing or instructor approvalInstruction on the isolation and slow movements of Middle Eastern dance, including use of the veil and improvisation.

No Requirements

CEPR2061C - Intermediate Rock Climbing

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail

Course Description
Prerequisite: Beginning Rock Climbing or consent of instructor Continuation of safety, rope set-up, belaying lead climb, rappelling and anchor set-up.

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Completion Requirement

Complete ALL of the following Courses:
- CEPR1061C - Beginning Rock Climbing

Additional Comments:

No Requirement Level

CONC1001C - Piano I

General

Credit Hrs
Credit Hrs:
0

Grade Modes
Audit, Pass/Fail

No Requirements

CONC1002C - Vocal Studio

General

Credit Hrs
Credit Hrs:
0

Grade Modes
Pass/Fail

Course Description
Boot Camp is a type of physical training program that combines interval training and many otherexercises using weights and/or body weight to lose body fat, increase cardiovascular fitness and strength. This class is designed to push the participant a little bit further than they would normally push themselves in the gym alone. The idea is that everyone involved works at their own pace as they team up and work towards one goal, either in pairs, small teams of three or four, or even two teams head on. This class will always be an adventure!

No Requirements

CONC1003C - Group Voice

General

Credit Hrs
Credit Hrs:
0

Grade Modes
Audit, Pass/Fail

No Requirements

CONC1004C - Strings I

General

Credit Hrs
Credit Hrs:
0

Grade Modes
Audit, Pass/Fail

No Requirements

CONC1006C - Welding For HS

General

Credit Hrs
Credit Hrs:
0

Grade Modes
Audit, Pass/Fail

No Requirements

CONC1007C - Welding Adult

General

Credit Hrs
Credit Hrs:
0

Grade Modes
Audit, Pass/Fail

No Requirements

CONC1008C - Beginning Golf: Comm

General

Credit Hrs
Credit Hrs:
0

Grade Modes
Audit, Pass/Fail

Course Description
Instruction in the basic skills, equipment, rules, etiquette and shot-making and use of irons and woods. Designed for community member participation.

No Requirements

CONC1010C - Weaving I: Comm

General

Credit Hrs
Credit Hrs:
0

Grade Modes
Audit, Pass/Fail

Course Description
In this class, you will learn the fundamentals of how handwoven cloth is made, including: yarn selection, setting up the loom, weaving, finishing, project planning, and regional history. Students have the opportunity to weave three class projects. Designed for community member participation.

No Requirements

CONC1011C - HAM Radio

General

Credit Hrs
Credit Hrs:
0

Grade Modes
Pass/Fail

No Requirements

CONC1012C - Small Arms Reloading

General

Credit Hrs
Credit Hrs:
0

Grade Modes
Pass/Fail

No Requirements

CONC1013C - Jazz Ensemble: Community

General

Credit Hrs
Credit Hrs:
0

Grade Modes
Pass/Fail

No Requirements

CONC1015C - Fitness Bootcamp: Comm

General

Credit Hrs
Credit Hrs:
0

Grade Modes
Pass/Fail

Course Description
Boot Camp is a type of physical training program that combines interval training and many other exercises using weights and/or body weight to lose body fat, increase cardiovascular fitness and strength.

No Requirements

CONC1016C - Beginning Yoga: Comm

General

Credit Hrs
Credit Hrs:
0

Grade Modes
Pass/Fail

Course Description
Whether you are new to yoga or are familiar with the practice, Beginner Yoga will help develop balance, strength and flexibility without feeling overwhelmed or confused.

No Requirements

CONC1018C - Spinning: Comm

General

Credit Hrs
Credit Hrs:
0

Grade Modes
Pass/Fail

Course Description
The trademarked name for indoor cycling designed to progressively build strength and endurance while improving cardiorespiratory function

No Requirements

CONC1019C - Digital Photography: Community

General

Credit Hrs
Credit Hrs:
0

Grade Modes
Pass/Fail

No Requirements

CONC1020C - Drawing Studio I: Comm

General

Credit Hrs
Credit Hrs:
0

Grade Modes
Pass/Fail

Course Description
This course covers in-depth various approaches to drawing and aims to teach you to draw from observation.

No Requirements

CONC1021C - Gentle Yoga: Comm

General

Credit Hrs
Credit Hrs:
0

Grade Modes
Audit, Pass/Fail

Course Description
Focus on stress reduction, body/breath awareness and flexibility

No Requirements

CONC1022C - Slow Flow Yoga: Comm

General

Credit Hrs
Credit Hrs:
0

Grade Modes
Audit, Pass/Fail

Course Description
Slow Flow Yoga is typically a more gentle form of yoga that emphasizes breath and mindful movement while still working on improving strength and flexibility.

No Requirements

CONC1023C - Pilates Matwork: Comm

General

Credit Hrs
Credit Hrs:
0

Grade Modes
Audit, Pass/Fail

Course Description
Designed exercise program involves the entire body while focusing on strengthening the core muscles of the torso. Exercises promote coordination, balance and strength. Designed for community member participation.

No Requirements

CONC1042C - Taijutsu: Comm

General

Credit Hrs
Credit Hrs:
0

Grade Modes
Audit, Pass/Fail

Course Description
Instruction in the basic techniques of punching, falling, rolling and kicking in Taijutsu

No Requirements

CONC1043C - Tai Chi Chuan: Comm

General

Credit Hrs
Credit Hrs:
0

Grade Modes
Audit, Pass/Fail

Course Description
Instruction and practice in techniques to enhance body awareness, reduce stress, improve balance and increase strength.

No Requirements

CONC1050C - Beginning Belly Dancing: Comm

General

Credit Hrs
Credit Hrs:
0

Grade Modes
Pass/Fail

Course Description
Instruction in the basic moving steps and rhythms of the belly dance

No Requirements

CONC1052C - Painting in Oils: Comm

General

Credit Hrs
Credit Hrs:
0

Grade Modes
Audit, Pass/Fail

Course Description
This course is designed to give the beginning oil painter a simple background on general working technique behind oil painting and constructive feedback on class work.

No Requirements

CONC1053C - Painting in Acrylics: Comm

General

Credit Hrs
Credit Hrs:
0

Grade Modes
Audit, Pass/Fail

Course Description
Basic Skills in Acrylic painting, development of skills on technique. Students will be encouraged to tap into their creativity and produce art that is truly unique to themselves. In this environment, working in this medium, there is no wrong answer as the goal is to relax and produce art that conveys a personal perspective across a wide range of emotions and ideas. Painting should be therapeutic and relaxing, have fun and take joy in your new found talent.

No Requirements

CONC1054C - Intro to Watercolor Painting:

General

Credit Hrs
Credit Hrs:
0

Grade Modes
Audit, Pass/Fail

Course Description
This is the introduction to the watercolor painting course to learn basic techniques, materials, and design elements. Also, students will get familiar with the history of watercolor painting.

No Requirements

CONC1055C - Intermed. Paint Oils: Comm

General

Credit Hrs
Credit Hrs:
0

Grade Modes
Audit, Pass/Fail

Course Description
This course is designed to teach further techniques in oil painting with constructive feedback on classwork.

No Requirements

CONC1070C - Hand Building in Clay: Comm

General

Credit Hrs
Credit Hrs:
0

Grade Modes
Audit, Pass/Fail

Course Description
Studio arts survey of hand forming techniques used in creating diverse utilitarian and sculptural ceramics. Accommodates all skill levels

No Requirements

CONC1071C - Wheel Thrown Ceramics I: Comm

General

Credit Hrs
Credit Hrs:
0

Grade Modes
Audit, Pass/Fail

Course Description
Prerequisite: CONC 1070C, Hand Building in Clay This practical art of wheel throwing aims to give ceramic students a look and feel for the techniques to produce various forms and vessels using an age-old art method. Designed for community member participation.

No Requirements

CONC1089C - CONC Pilot Course

General

Credit Hrs
Credit Hrs:
0

Credit Hours Max:
2

Credit Hours Operator:
TO

Grade Modes
Pass/Fail

No Requirements

CONC1091C - Beginning Sewing: Comm

General

Credit Hrs
Credit Hrs:
0

Grade Modes
Audit, Pass/Fail

Course Description
An intro class to sewing machine use and care, sewing pattern reading, hand sewing basics, and sewing terminology. Designed for community member participation

No Requirements

CONC1189C - Rock, Blues, Folk Performance

General

Credit Hrs
Credit Hrs:
0

Grade Modes
Audit, Pass/Fail

No Requirements

CONC2008C - Intermediate Golf: Comm

General

Credit Hrs
Credit Hrs:
0

Grade Modes
Audit, Pass/Fail

Course Description
Prerequisite: Beginning Golf or consent of instructor.Instruction emphasizing actual play. Designed for community member participation.

No Requirements

CONC2010C - Weaving II: Comm

General

Credit Hrs
Credit Hrs:
0

Grade Modes
Audit, Pass/Fail

No Requirements

CONC2010C - Weaving II: Comm

General

Credit Hrs
Credit Hrs:
0

Grade Modes
Audit, Pass/Fail

No Requirements

CONC2050C - Intermediate Belly Dance: Comm

General

Credit Hrs

Credit Hrs:
0

Grade Modes
Audit, Pass/Fail

No Requirements

CONC2050C - Intermediate Belly Dance: Comm

General

Credit Hrs

Credit Hrs:
0

Grade Modes
Audit, Pass/Fail

Course Description
Prerequisite: Beginning Belly Dancing or instructor approvalInstruction on the isolation and slow movements of Middle Eastern dance, including use of the veil and improvisation.

No Requirements

CONC2071C - Wheel Thrown Ceramics II: Comm

General

Credit Hrs

Credit Hrs:
0

Grade Modes
Audit, Pass/Fail

Course Description
Prerequisite: CEFA 1070C, Hand Building in Clay, and CEFA 1071C, Wheel Thrown Ceramics I Students will learn and practice advanced wheel and decorative techniques. Designed for community members.

No Requirements

CONC3089C - Live Entertainment

General

Credit Hrs

Credit Hrs:
0

Grade Modes
Pass/Fail

No Requirements

Cybersecurity (program) Department

- Program Director - Liebrock
- Adjunct – Burnham, Pierson, Quist, Reitz, Tietjen
- CLASS – ChoGlueck, Elliott, Thompson
- Computer Science & Engineering – Jeffery, Liebrock, Mazumdar, Ramyaa, Shin, Soliman, Zheng
- Electrical Engineering – El Osery, Roy, Shao, Teare
- Business & Technology Management – Wang
- Materials & Metallurgical Engineering - Majumdar
- Mechanical Engineering – Ghosh, Lee

Degrees Offered: *Master of Science, Professional Masters, and Doctor of Philosophy in Transdisciplinary Cybersecurity*

Cybersecurity Program mission:

Addressing many of the greatest challenges to society requires understanding and integration of the methods, theories, techniques, and perspectives of multiple disciplines to develop new approaches to solve complex, real-world challenges. The mission of the Transdisciplinary Cybersecurity graduate programs is to prepare students with a broad understanding of cybersecurity from the foundational documents that have guided the development of the discipline to the ethical, legal, and psychological challenges that cybersecurity professionals face. Students further engage in hands-on cybersecurity risk analysis, data analysis, and policy development. In addition, technical electives provide technical expertise that students will need to solve real-world challenges in cybersecurity.

These programs are designed to:

engage students with diverse backgrounds in cutting edge cybersecurity research and prepare them for high demand, high pay cybersecurity careers; and enhance cybersecurity innovation leading to improvement in the cybersecurity stance of the state of New Mexico, the nation, and the world.

Faculty:

- Program Director - Liebrock
- Adjunct – Burnham, Pierson, Quist, Reitz, Tietjen
- CLASS – ChoGlueck, Elliott, Thompson
- Computer Science & Engineering – Jeffery, Liebrock, Mazumdar, Ramyaa, Shin, Soliman, Zheng
- Electrical Engineering – El Osery, Roy, Shao, Teare
- Business & Technology Management – Wang
- Materials & Metallurgical Engineering - Majumdar
- Mechanical Engineering – Ghosh, Lee

Programs

G.C. in Cybersecurity

[Program Overview]

Program Title
Graduate Certificate in Cybersecurity

Department(s)
Cybersecurity (program)

Program Description
The Cybersecurity Graduate Certificate offers graduate students and post-baccalaureate professionals an opportunity to build and strengthen their capabilities in cybersecurity for academic and professional work. The 12 credit hours of coursework required for the certificate include the foundational overview of cybersecurity and in addition allow the student to focus on cybersecurity course that are of particular interest.

Simple Requisites

Program Requirements

Graduate Certificate in Cybersecurity
Type
Completion Requirement

Required Course

Complete ALL of the following Courses:

- CSE5061 - Foundations of Information Security

Elective Courses

Earn at least 9 credits from the following:

- CSE5054 - Computer Network Security
- CSE5057 - Hardware-Based Network Security
- CSE5063 - Access Countrol & System Security
- CSE5064 - Secure Systems Administration
- CSE5070 - Privacy in Mobile Environments
- EMGT5009 - Systems Risk & Decision Analysis

Additional Comments:

Institute General Requirements

No Requirement Level

Cybersecurity (minor)

[Program Overview]

Program Title
Minor in Cybersecurity

Department(s)
Cybersecurity (program)

Simple Requisites

Program Requirements
Minimum credit hours required: 22

Minor in Cybersecurity Requirements
Type
Completion Requirement

Required Courses

Complete ALL of the following Courses:

- CSCI1210 - Programming Fundamentals
- CSCI2220 - Data Structures & Algorithms
- CSCI2230 - Assembly Lang & Mach Org
- CSCI2240 - Systems Programming
- CSE3053 - Introduction to Computer Networks
- CSE3063 - Computer Security
- CSE4041 - Cryptography and Applications
- CSE5061 - Foundations of Information Security

Additional Comments:

Institute General Requirements

See the Institute General Education Requirements.

No Requirement Level

MS-CYBS - M.S. in Transdisciplinary Cybersecurity

[Program Overview]

Program Title
Master of Science in Transdisciplinary Cybersecurity

Department(s)
Cybersecurity (program)

Degree & Program Code
MS-CYBS

Program Description

Simple Requisites

Program Requirements
The MSTC program requires a minimum of 30 graduate credits in cybersecurity including a research project.

Students in the MSTC program must take all of the required core courses listed, a minimum three credits of technical electives from the approved list, and at least three additional credits in the following cybersecurity areas: cybersecurity policy, psychology of cybersecurity, cybersecurity data science, or cybersecurity technical electives; other cybersecurity courses may be substituted for the approved list only with prior written approval from the advisor and the program chair, which must be filed with the Center for Graduate Studies prior to taking the course.

Research projects may be either a thesis (6 credits) or an independent study (3 credits). A thesis is to be of a high quality to make a contribution to the discipline and should be submitted for publication. Students who complete an independent study must also complete an additional cybersecurity area course.

Course Requirements for Master of Science in Transdisciplinary Cybersecurity
Type
Completion Requirement

Core Courses

Complete ALL of the following Courses:

- CYBS5002 - Cybersecurity Ethics and Law
- CYBS5003 - Cybersecurity Policy
- CYBS5004 - Psychology of Cybersecurity
- CYBS5005 - Data Science for Cybersecurity
- CYBS5009 - Cybersecurity Risk Analysis & Management
- CYBS5061 - Foundations of Cybersecurity

Technical Electives

Earn at least 3 credits from the following:

- CYBS5041 - Advanced Cryptography
- CYBS5054 - Computer Network Security
- CYBS5057 - Hardware-Based Network Security
- CYBS5063 - Access Control and System Security
- CYBS5064 - Secure Systems Administration
- CYBS5014 - Computer Security & Incident Response
- CYBS5015 - Reverse Engineering Malware
- EE5060 - Electronic Warfare
- EE5065 - Position, Navigation,Timing

Additional Comments:

- 3 credits of cybersecurity area course
- AND 6 credits of thesis or 3 credits of independent study and 3 credits of cybersecurity area courses

Institute General Requirements

No Requirement Level

[Learning Outcomes]

Outcome
1. Communicate effectively both orally and in writing to a variety of audiences.

Outcome
2. Analyze and evaluate the cybersecurity needs of an organization to conduct a cybersecurity risk assessment.

Outcome
3. Design operational and strategic cybersecurity approaches and policies.

Outcome
4. Understand and appreciate the legal, ethical, technical, and psychological environment impacting individuals and business organizations to determine the implications and risks associated with cybersecurity decisions.

Outcome
5. Carry out research that demonstrates critical thinking by analyzing situations, integrating acquired knowledge, and developing solutions to real world cybersecurity challenges.

PHD-CYBS - Ph.D. in Transdisciplinary Cybersecurity

[Program Overview]

Program Title
Doctor of Philosophy in Transdisciplinary Cybersecurity

Department(s)
Cybersecurity (program)

Degree & Program Code
PHD-CYBS

Program Description
Students of exceptional ability, as demonstrated in previous courses, in a master's degree program, or in professional research experience, may pursue a program leading to the doctoral degree.
The prospective doctoral candidate in Transdisciplinary Cybersecurity should develop a strong background in the core of cybersecurity. Additionally, students must achieve a high level of competence in the field of specialization defined by their dissertation research. Additional information is found in the Graduate Program section of the catalog.
Research fields appropriate for the transdisciplinary cybersecurity candidate include attack and defense, communications security, computer security, cyberprivacy, cybersecurity data science, cybersecurity policy, cyberspace security, electronic warfare, enterprise-wide cybersecurity, forensics, incident response, information assurance, hardware security, network security, psychology of cybersecurity, reverse engineering, threat analysis, and vulnerability analysis. Transdisciplinary projects integrating theory, metrics, and methods from multiple disciplines are strongly encouraged.

Simple Requisites

Program Requirements
PhD Degree Minimum Requirements Summary

A minimum of 68 credits total, and up to 30 graded credit hours from an appropriate master's degree, may be included.

44 hours of graded coursework approved by the student's advisory committee must include:

- All core courses listed below (18 cr), including
  - 9 credits of technical electives
  - 12 credits of cybersecurity area courses
- Up to 12 graded research credits (CYBS 5081) may be used toward the required graded coursework credits.
- Dissertation (24 credit hours): CYBS 5095

PHD Requirements
Type
Completion Requirement

Qualifying Examination

The paper critique is the program's qualifying examination. The critique is the first examination that a PhD student must pass within 24 months of enrolling in the program. The paper for critique must be agreed on by the doctoral committee. Student must conduct a successful written and public oral critique of a paper published in a high-quality professional journal on a cybersecurity topic. During the paper critique presentation, the student may be asked questions relating to background knowledge gained from taking regular coursework in cybersecurity subjects. The paper critique must be completed within 24 months of enrolling in the PhD program. The committee may determine that the student has a pass, a conditional pass, or a fail on the critique. Students with an unconditional pass proceed to the dissertation proposal. Students with a conditional pass, will be required to overcome deficiencies, which may require additional courses, individual reading/research, and/or a subsequent critique before advancing to the dissertation proposal. Students who fail to pass the critique will be dismissed from the program. The committee will document the outcome of the critique and the reasons for its decision with a copy sent to the student, the program chair, and the Center for Graduate Studies.

Dissertation Proposal (Candidacy Exam)

The dissertation proposal is the program's candidacy examination, which cannot be done before the qualifying exam has been passed without condition or the conditions have been met. The student must write a research proposal and defend that proposal in a public oral defense at a minimum of two full semesters before the final dissertation defense. The proposal must include the rationale for the research, the preliminary research that has been done, and the plan for completion. The committee may determine that the student has a pass, a conditional

pass, or a fail on the dissertation proposal. Students with an unconditional pass will be recommended for candidacy beginning in the subsequent semester, when they may register for dissertation credits. Students with a conditional pass, will be required to overcome deficiencies, which may require additional courses, individual reading/ research, and/or a subsequent dissertation proposal before advancing to candidacy. Students who fail to pass the dissertation proposal will be dismissed from the program. The committee will document the outcome of the dissertation proposal and the reasons for its decision with a copy sent to the student, the program chair, and the Center for Graduate Studies.

Dissertation

Students may proceed with dissertation research after advancing to candidacy. Students must enroll in a minimum of 24 credits of dissertation (CYBS 5095). Students should be aware that research typically takes significantly longer than two semesters and should plan accordingly. During dissertation registration, the student completes the research project approved by the committee via the dissertation proposal approval process. The dissertation is the documentation of research that advances the state of the science for transdisciplinary cybersecurity.

The student must write a dissertation and defend it in a public oral defense. The committee may determine that the student has a pass, a conditional pass, or a fail on the dissertation defense. Students with an unconditional pass will graduate with the doctoral degree. Students with a conditional pass, will be required to overcome deficiencies, which may require research and/or a subsequent public dissertation defense before graduation. Students who fail to pass the dissertation defense will be dismissed from the program. The committee will document the outcome of the dissertation defense and the reasons for its decision with a copy sent to the student, the program chair, and the Center for Graduate Studies.

Publication Requirement

Students are required to publish a minimum of three high-quality papers in reputable, refereed journals or conference proceedings. The journals and conferences selected must be approved in writing by the committee, which will be documented with a copy sent to the student, the program chair, and the Center for Graduate Studies. At least one paper must be published after the dissertation proposal defense; others may be published on work completed earlier in the program, but that work must be an integral part of the final dissertation.

Admission Requirement

Completion of a bachelor's degree in a relevant field (e.g., information technology, computer science, cybersecurity, electrical engineering, mathematics, etc.) or the expectation of completing such a degree before the beginning of the first semester of graduate study. Students are expected to have competencies in mathematics equivalent to those required for completion of a B.S. degree at New Mexico Tech. Students who are deficient in mathematics will be required by their advisory committee to complete undergraduate coursework in the area of deficiency. Students should have an academic record that indicates a good potential for success in a graduate program. An undergraduate GPA of 3.0 or higher is used as a general guideline in New Mexico Tech's Graduate School.

Additional Comments:

Institute General Requirements

No Requirement Level

[Learning Outcomes]

Outcome
1. Communicate effectively both orally and in writing to a variety of audiences.

Outcome
2. Analyze and evaluate the cybersecurity needs of an organization to conduct a cybersecurity risk assessment.

Outcome
3. Design operational and strategic cybersecurity approaches and policies.

Outcome
4. Understand and appreciate the legal, ethical, technical, and psychological environment impacting individuals and business organizations to determine the implications and risks associated with cybersecurity decisions.

Outcome
5. Carry out research that demonstrates critical thinking by analyzing situations, integrating acquired knowledge, and developing solutions to real world cybersecurity challenges.

PM-CYBS - P.M. in Transdisciplinary Cybersecurity

[Program Overview]

Program Title
Professional Master in Transdisciplinary Cybersecurity

Department(s)
Cybersecurity (program)

Degree & Program Code
PM-CYBS

Simple Requisites

Program Requirements
The PMTC program requires a minimum of 30 graded graduate credits.

Students in the PMTC program must take all of the required core courses, a minimum of six credits of technical electives from the approved list, and at least six additional credits in the following cybersecurity areas: cybersecurity policy, psychology of cybersecurity, cybersecurity data science, or cybersecurity technical electives.

Note: other cybersecurity courses may be substituted for the approved list only with prior written approval from the advisor and the program chair, which must be filed with the Center for Graduate Studies prior to taking the course.

Professional Master in Transdisciplinary Cybersecurity Requirements
Type
Completion Requirement

Core Courses Requirements (18 credits)

Complete ALL of the following Courses:

- CYBS5002 - Cybersecurity Ethics and Law
- CYBS5003 - Cybersecurity Policy
- CYBS5004 - Psychology of Cybersecurity
- CYBS5005 - Data Science for Cybersecurity
- CYBS5009 - Cybersecurity Risk Analysis & Management
- CYBS5061 - Foundations of Cybersecurity

Technical Electives Requirements

Earn at least 6 credits from the following:

- CYBS5041 - Advanced Cryptography
- CYBS5054 - Computer Network Security
- CYBS5057 - Hardware-Based Network Security
- CYBS5063 - Access Control and System Security
- CYBS5064 - Secure Systems Administration
- CYBS5014 - Computer Security & Incident Response
- CYBS5015 - Reverse Engineering Malware
- EE5060 - Electronic Warfare
- EE5065 - Position, Navigation,Timing

Additional Comments:

- 6 credits of cybersecurity area courses

Institute General Requirements

No Requirement Level

[Learning Outcomes]

Outcome
1. Communicate effectively both orally and in writing to a variety of audiences.

Outcome
2. Analyze and evaluate the cybersecurity needs of an organization to conduct a cybersecurity risk assessment.

Outcome
3. Design operational and strategic cybersecurity approaches and policies.

Outcome
4. Understand and appreciate the legal, ethical, technical, and psychological environment impacting individuals and business organizations to determine the implications and risks associated with cybersecurity decisions.

Outcome
5. Carry out research that demonstrates critical thinking by analyzing situations, integrating acquired knowledge, and developing solutions to real world cybersecurity challenges.

Courses

CYBS5000 - Directed Research

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
12

Credit Hours Operator:
TO

Grade Modes
Pass/Fail, No Report

Course Description
This course may not be used to fulfill graduate degree requirements. This course is mainly for PhD students who have not passed their candidacy exam yet. Research under the guidance of a faculty member. May Be Repeated.

Equivalent Courses: Previous & Current Courses
CYBS500

No Requirements

CYBS5002 - Cybersecurity Ethics and Law

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Standard Letter

Course Description
A cybersecurity ethics and law course in which students learn standards of professional, ethical behavior in cybersecurity fields by examining case studies, ethical questions, and legal debates from the history of computing and cybersecurity. Shares lectures with PHIL 482, with additional requirements for graduate credit.

Equivalent Courses: Previous & Current Courses
CYBS502, PHIL4082

Simple Requisites

Course Requisite Requirements

Prerequisite: Graduate standing or consent of instructor and advisor

No Requirement Level

CYBS5003 - Cybersecurity Policy

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Standard Letter

Course Description
A cybersecurity policy course that uses laws and standards to guide organizational policy development to secure information technology resources, without needlessly limiting technical responses, and analyzes both the outcomes of and processes for establishing those laws and standards.

Equivalent Courses: Previous & Current Courses
CYBS503

Simple Requisites

Course Requisite Requirements

Prerequisite Type
Prerequisite

Prerequisite

Prerequisite: CYBS 5002 (Cybersecurity Ethics and Law) Graduate standing or consent of instructor and advisor

Complete ALL of the following Courses:

- CYBS5002 - Cybersecurity Ethics and Law

Additional Comments:

No Requirement Level

CYBS5004 - Psychology of Cybersecurity

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Standard Letter

Course Description
A psychology of cybersecurity course that addresses psychology issues from how humans respond to instructions and policies and to how differently hackers and defenders think and their associated motivations.

Equivalent Courses: Previous & Current Courses
CYBS504

Simple Requisites

Course Requisite Requirements

Prerequisite: Graduate standing or consent of instructor and advisor

Offered Spring Semesters

No Requirement Level

CYBS5005 - Data Science for Cybersecurity

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Standard Letter

Course Description
Data assembly, exploration, analysis, visualization, and inference. Python libraries such as NumPy, Pandas, and scikit-learn. Students are expected to explore problems related to cybersecurity threats, risks, and incidents that are important for businesses to become safer and less vulnerable to cyberattacks. Students must communicate and present their findings and results. Every student must complete at least one hands-on project. Prior knowledge of probability and statistics at the undergraduate level is assumed. Assumes experience with programming; experience with Python is recommended.

Equivalent Courses: Previous & Current Courses
CYBS505

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisite: Math 3082 & 3082L; Graduate standing or consent of instructor and advisor

Offered Fall Semesters

Complete ALL of the following Courses:

- MATH3082 - Probability and Statistics
  AND MATH3082L - Probability and Statistics Lab

Additional Comments:

No Requirement Level

CYBS5006 - Cyber Physical System Security

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
In this course we investigate security threats and countermeasures for cyber physical systems (CPS). Many of our critical infrastructure is built around CPS and as such they become targets for security attacks. The course will focus on attacks that target confidentiality, integrity and/or availability of CPS and how to mitigate them. Sample topics include but are not limited to network attacks, wireless/GPS exploitation, jamming and spoofing, and risk identification and management.

Equivalent Courses: Previous & Current Courses
CYBS506

Simple Requisites

Course Requisite Requirements

Prerequisite: Graduate standing or consent of instructor and advisor

No Requirement Level

CYBS5009 - Cybersecurity Risk Analysis & Management

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Standard Letter

Course Description
This course covers cybersecurity risk analysis and management for information systems. Topics include: threat modeling and analysis; quantitative and qualitative risk assessment; vulnerabilities, threats, witted adversaries, exploits, and mitigations; asset and inventory management; impact analysis, business continuity planning, and disaster recovery planning. Emphasis is placed in risk management analysis and its implications on IT infrastructures and compliance. Students will demonstrate effective application of the three pillars of confidentiality, integrity, and availability using threat modeling, risk assessment and mitigation as a basis for cybersecurity risk management planning in various simulated or real environments.

Equivalent Courses: Previous & Current Courses
CYBS509

Simple Requisites

Course Requisite Requirements

Prerequisite: Graduate standing or consent of instructor and advisor

Offered Spring Semesters

No Requirement Level

CYBS5014 - Computer Security & Incident Response

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Standard Letter

Course Description
This course covers what computer security incidents are and how to respond to an incident. Computer security incident case studies serve as the backbone of the course allowing students to analyze these case studies and determine how they were handled through process and technical analysis. Topics covered are data sources for incident detection and response, incident data analysis and incident remediation. Analysis areas covered are network event analysis, malware analysis and computer forensics for computer security incidents.

Simple Requisites

Course Requisite Requirements

Prerequisite: Graduate standing or consent of instructor and advisor

No Requirement Level

CYBS5015 - Reverse Engineering Malware

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Introduction to software reverse engineering of malicious software. Quick triage, static and dynamic analysis, string analysis, and deobfuscation analysis techniques. Intel x86 assembly, covering both 32 and 64-bit, Windows and Linux OS internals, will be discussed. Safe detonation using Cuckoo Sandbox, automated unpacking techniques. Detailed analysis and investigation of nation-state malware. Ghidra, FLARE VM, and other tools will be discussed.

Equivalent Courses: Previous & Current Courses
CYBS515

Simple Requisites

Course Requisite Requirements

Prerequisite: CYBS (Computer Security and Incident Response) and Graduate standing or consent of instructor and advisor

No Requirement Level

CYBS5041 - Advanced Cryptography

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Standard Letter

Course Description
This course provides an overview of modern cryptographic theory and techniques, mainly focusing on their application into real systems. Topics include number theory, probability and information theory, computation complexity, symmetric and asymmetric cryptosystems, one-way functions, block and stream ciphers, Kerberos authentication systems, public key infrastructure (PKI), secure socket layer/transport layer security (SSL/TLS), and cryptographic protocols/ applications in many real systems. (Same as CSE 541.)

Equivalent Courses: Previous & Current Courses
CYBS541

Simple Requisites

Course Requisite Requirements

Prerequisite: Graduate standing or consent of instructor and advisor

No Requirement Level

CYBS5054 - Computer Network Security

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Standard Letter

Course Description
This course will explore each layer of the internet protocol stack, focusing on security deficiencies, and remedies to those security deficiencies, and will involve extensive lab exercises using the Deter Lab shared testbed (accessed via the Internet to enable distance education participants). It will study computer network security architecture and security mechanisms to protect against sophisticated adversarial attacks. This course reviews cryptographic primitives that underlie most network security mechanisms, then applies this understanding to network services proving authentication for data and transaction integrity and availability, and encryption for confidentiality. It also covers the integration of security services into network applications and utilities including secure mail, secure web services, secure wireless, and investigates system security issues such as for firewalls and intrusion detections systems. (Same as CSE 554.)

Equivalent Courses: Previous & Current Courses
CYBS554

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisite: CYBS 5061 with a grade of C or higher, or consent of instructor and advisor

Complete ALL of the following Courses:

- CYBS5061 - Foundations of Cybersecurity

Additional Comments:

No Requirement Level

CYBS5057 - Hardware-Based Network Security

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Standard Letter

Course Description
This course will cover networking protocols, cryptography, and network security from the hardware implementation perspective. Topics include security of ND, NAT, IPSEC and other specialized IPv6 protocols in support of IoT functionality. The focus will be on implementation of security policy enforcement mechanisms in IPv6 network protocols in a Field Programmable Gate Array (FPGA) platform to protect an IoT application against sophisticated adversaries. Lab exercises using a FPGA platform will enable investigation of hardware-based security technologies such as the use of Physically Unclonable Functions that are not otherwise accessible from software. (Same as CSE 557.)

Equivalent Courses: Previous & Current Courses
CYBS557

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisite: CYBS 5061 and CYBS 5054, each with a grade of C or higher, or consent of instructor and advisor

Complete ALL of the following Courses:

- CYBS5061 - Foundations of Cybersecurity
  AND CYBS5054 - Computer Network Security

Additional Comments:

No Requirement Level

CYBS5061 - Foundations of Cybersecurity

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Standard Letter

Course Description
This course will explore the ideas, literature, and worked examples that established the foundations of information security. The course introduces the concept of the Information Domain as the fundamental primitive that is the axis for introducing the policy requirements of Confidentiality, Integrity and Availability that motivate the need for Information Security. The concept of the 225 reference monitor is the organizing principle for the course. The examination of foundational literature starts with papers and ideas that first appeared in the mid 1960's and spans the time of tremendous creativity up through the following four decades. (Same as CSE 561.)

Equivalent Courses: Previous & Current Courses
CYBS561

Simple Requisites

Course Requisite Requirements

Prerequisite: Graduate standing or consent of instructor and advisor

No Requirement Level

CYBS5063 - Access Control and System Security

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Standard Letter

Course Description
Topics include theoretical foundations for access control, formal access control models, access control mechanisms, tools and techniques, information flow policy, trust management, security architectures, and current issues of advanced research in access control. In addition, the protection mechanisms of general-purpose operating systems, software systems, and web applications are discussed. (Same as CSE 563.)

Equivalent Courses: Previous & Current Courses
CYBS563

Simple Requisites

Course Requisite Requirements

Prerequisite: Graduate standing or consent of instructor and advisor

No Requirement Level

CYBS5064 - Secure Systems Administration

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Standard Letter

Course Description
This course is primarily a Laboratory based course. The intention of the course is to give the students an experience of administering an IT system for a hypothetical business with the IT system experiencing increasingly aggressively sophisticated cyber-attacks. They are expected to build abusiness plan for the hypothetical business, a policy-based IT protection plan that they then implement on the host machines and networks in the laboratory. Simultaneously the adversary builds an exploitation plan that attempts to defeat the business's IT protection implementation and is able to achieve his/her exploitation objectives. The adversary has access to any/all exploit technology available, but there is a moderating factor of cost associated with the exploitation technology. The defenders have access to protection technology, but again there is a mitigating cost factor associated with the protection technology. The objective of the class is to experience and learn the capabilities an effectiveness of both defensive andexploitative technology with an appreciation of the need for policy and planning that directs, supports, and constrains the actions of both sets of actors. This course is not offered via Distance Education. (Same as CSE 564.)

Equivalent Courses: Previous & Current Courses
CYBS564

Simple Requisites

Course Requisite Requirements

Prerequisite Type
Prerequisite

Prerequisite

Prerequisite: CYBS 5061 and CYBS 5054, each with a grade of C or higher, or consent of instructor and advisor

Complete ALL of the following Courses:

- CYBS5061 - Foundations of Cybersecurity
  AND CYBS5054 - Computer Network Security

Additional Comments:

No Requirement Level

CYBS5081 - Directed Study

General

Credit Hrs

Credit Hrs:	Credit Hours Max:	Credit Hours Operator:
1	12	TO

Grade Modes
Audit, Pass/Fail, Standard Letter

Equivalent Courses: Previous & Current Courses
CYBS581

Simple Requisites

Course Requisite Requirements

Prerequisite: Consent of graduate advisor

No Requirement Level

CYBS5090 - Independent Study

General

Credit Hrs

Credit Hrs:	Credit Hours Max:	Credit Hours Operator:
1	12	TO

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Independent research supervised by a faculty member. It is expected that this work will culminate in a paper to be published, and an oral presentation is required.

Equivalent Courses: Previous & Current Courses
CYBS590

Simple Requisites

Course Requisite Requirements

Prerequisite: Consent of graduate advisor

No Requirement Level

CYBS5091 - Thesis

General

Credit Hrs

Credit Hrs:	Credit Hours Max:	Credit Hours Operator:
1	12	TO

Grade Modes
Audit, Pass/Fail, No Report, Standard Letter

Equivalent Courses: Previous & Current Courses
CYBS591

Simple Requisites

Course Requisite Requirements

Prerequisite: Consent of graduate advisor

No Requirement Level

CYBS5095 - Dissertation

General

Credit Hrs

Credit Hrs:	Credit Hours Max:	Credit Hours Operator:
1	12	TO

Grade Modes
Audit, Pass/Fail, Standard Letter

Equivalent Courses: Previous & Current Courses
CYBS595

Simple Requisites

Course Requisite Requirements

Prerequisites: Documentation of successful completion of PhD candidacy exam and Academic Advisor recommendation for candidacy.

No Requirement Level

E&ES Dept/ Environmental Science (program) Department

Programs

BS-ENVS - B.S. in Environmental Science

[Program Overview]

Program Title
Bachelor of Science in Environmental Science

Department(s)
E&ES, E&ES Dept/ Environmental Science (program), E&ES Dept/ Earth Science

Degree & Program Code
BS-ENVS

Required Specialization/Concentration(s)
Biology Option, Chemistry Option, Geology Option, Hydrology Option

Program Description
The Bachelor of Science degree in Environmental Science draws upon courses from biology, chemistry, Earth science, physics, and environmental engineering. Students must be aware of the complexity of environmental problems, yet have a rigorous background to address specific aspects of those problems. To ensure that graduates are competitive in the marketplace for diverse environmentally oriented careers, Environmental Science students take classes in all of the disciplines listed above. They must select a specialization in biology, chemistry, geology, or hydrology. Each option is sufficiently in-depth to allow students to continue their education in a traditional graduate program within that discipline. An advisory committee, composed of faculty from the specific disciplines, is convened to help students plan their programs.

Program Information & Policies

- In addition to the General Education and Institute Core Curriculum Requirements all Environmental Science students must complete the programs core courses along with a science option:
- All students in the Environmental Science program are required to attend the Environmental Science Senior Seminar (ENVS 4072) for four years or, if transfer students, for the duration of their enrollment in the Environmental Science program. In the first three years, students need only audit the seminar, but in their senior year, they are required to present at the seminar and take the class for a grade.
- Three credit hours of courses numbered 4091 and 4092 taken in the appropriate department in the subject area of environmental science. These credit hours shall comprise a supervised research project, supervised scholarship project, or a supervised internship, and must result in a written paper or senior thesis. Prior to beginning the research project or internship, the student must prepare a short proposal of the activity. This proposal must be approved by the student's advisor and two faculty from the Environmental Science Advisory Committee. Following completion of the project, all three faculty must sign off on the resulting research paper.

Simple Requisites

Program Requirements
In addition to the General Education and Institute Core Curriculum Requirements the following core program is required of all Environmental Science students:

Core Requirements for the Bachelor of Science Degree in Environmental Science
Type
Completion Requirement

Required Biology

Complete ALL of the following Course Sets:

- BIOL2110 & BIOL2110L: Principles of Biology I and Lab
- BIOL2610 & BIOL2610L: Principles of Biology II and Lab
  OR GEOL206 & GEOL206L: Earth History and Lab
- BIOL3043 & BIOL3043L: Environmental Microbiology and Lab
- BIOL3044 & BIOL3044L: Introductory Ecology and Lab

A 1000-Level Geology course and Associated Lab

Earn at least 4 credits from the following:

- 1000-Level Geology & Lab courses

Required Geology Courses

Complete ALL of the following Courses:

- GEOL2320 - Earth Surface Processes & Landforms
- GEOL4040 - Hydrology Theory & Field Methods
- GEOL4040L - Hydrology Theory & Field Methods Lab

Required Courses

Complete ALL of the following Courses:

- MATH2350 - Statistical Methods
- ENVS4012 - Geographic Information Systems
- ENVS4072 - Senior Seminar
- BIOL4091 - Special Problems
  OR GEOL4091 - Special Topics
  OR GEOL4092 - Senior Thesis
  OR CHEM4091 - Directed Study
- ENVE3002 - Environmental Law & Regulations

Additional Comments:

- All students in the Environmental Science program are required to attend the Environmental Science Senior Seminar (ENVS 4072) for four years or, if transfer students, for the duration of their enrollment in the Environmental Science program. In the first three years, students need only audit the seminar, but in their senior year, they are required to present at the seminar and take the class for a grade.
- Three credit hours of courses numbered 4091 and 4092 taken in the appropriate department in the subject area of environmental science. These credit hours shall comprise a supervised research project, supervised scholarship project, or a supervised internship, and must result in a written paper or senior thesis. Prior to beginning the research project or internship, the student must prepare a short proposal of the activity. This proposal must be approved by the student's advisor and two faculty from the Environmental Science Advisory Committee. Following completion of the project, all three faculty must sign off on the resulting research paper.

Bachelor of Science in Environmental Science with Biology Option
Type
Completion Requirement

Biology Option

Minimum credit hours required—121

In addition to the General Degree Requirements and the core Environmental Science Requirements (above), the following courses are required:

Complete ALL of the following Courses:

- BIOL3011 - Genetics
  AND BIOL3011L - Genetics Lab
- BIOL3031 - Cell Biology
- Technical Electives (9)—Technical electives 3000 level and above from the Biology Dept. catalog to be approved by the Advisory Committee

Additional Comments:

Bachelor of Science in Environmental Science with Chemistry Option
Type
Completion Requirement

Chemistry Option

Minimum credit hours required—121

In addition to the General Degree Requirements, and the core Environmental Science Requirements (above), the following courses are required:

Complete ALL of the following Courses:

- CHEM3031 - Physical Chemistry I
  AND CHEM3031L - Physical Chemistry I Lab
- CHEM4011 - Advanced Instrumental Methods
  AND CHEM4011L - Advanced Instrumental Lab
- Technical Electives (8)—3000 level and above from the Chemistry Dept. catalog to be approved by the ENVS advisory committee.

Additional Comments:

Bachelor of Science in Environmental Science with Geology Option
Type
Completion Requirement

Geology Option

Minimum credit hours required—121

In addition to the General Degree Requirements, and the core Environmental Science Requirements above), the following courses are required:

Complete ALL of the following Courses:

- GEOL1101 - Earth Science as a Profession
- GEOL2160 - Introduction to Mineralogy
  AND GEOL2160L - Introduction to Mineralogy Lab
- GEOL3053 - Structural Geology
- GEOL4003 - Introduction to Soils
- Technical Electives (4)—Technical electives 3000 level and above from the E&ES Dept. catalog to be approved by the Advisory Committee.

Additional Comments:

Bachelor of Science in Environmental Science with Hydrology Option
Type
Completion Requirement

Hydrology Option

Minimum credit hours required—121

In addition to the General Degree Requirements, and the core Environmental Science Requirements (above), the following courses are required:

Complete ALL of the following Courses:

- GEOL1101 - Earth Science as a Profession
- GEOL3040 - Global Climate Change Origins & Impacts
- GEOL4011 - Groundwater Hydrology
  OR GEOL4013 - Watershed Dynamics & Ecohydrology
  OR GEOL4014 - Vadose Zone Hydrology
- MATH3035 - Ordinary Differential Equation
  OR MATH3082 - Probability and Statistics
- Technical Electives (6)—Technical electives 3000 level and above from the E&ES Dept. catalog to be approved by the Advisory Committee.

Additional Comments:

Institute General Requirements

General Education Requirements for Bachelor of Science in Environmental Science
Type
Completion Requirement

Area 1: Communications Requirement for Bachelor of Science

Complete ALL of the following Course Sets:

- Area 1: Communications (BS Degree) (9 credits)

Area 2: Mathematics and Quantitative Reasoning Requirements for Bachelor of Science

Complete ALL of the following Course Sets:

- Area 2: Mathematics (BS Degree) (8 credits)

Area 3: Science Requirements for a Bachelor of Science

Complete ALL of the following Course Sets:

- Area 3: Science (BS Degree) (18 credits)

Area 4: Social and Behavioral Science Requirements for a Bachelor of Science

Earn at least 6 credits from the following:

- Area 4: Social and Behavioral Science (BS or BGS Degree) (6 credits)

Area 5: Humanities Course Requirements for a Bachelor of Science

Earn at least 6 credits from the following:

- Area 5: Humanities (BS or BGS Degree) (6 credits)

Area 6: Creative & Fine Art Requirement for a Bachelor of Science

Earn at least 3 credits from the following:

- Area 6: Creative and Fine Arts (BS, BA, or BGS Degree) (3 credits)

Area 7: Additional Humanities/Social Science Requirement for a Bachelor of Science

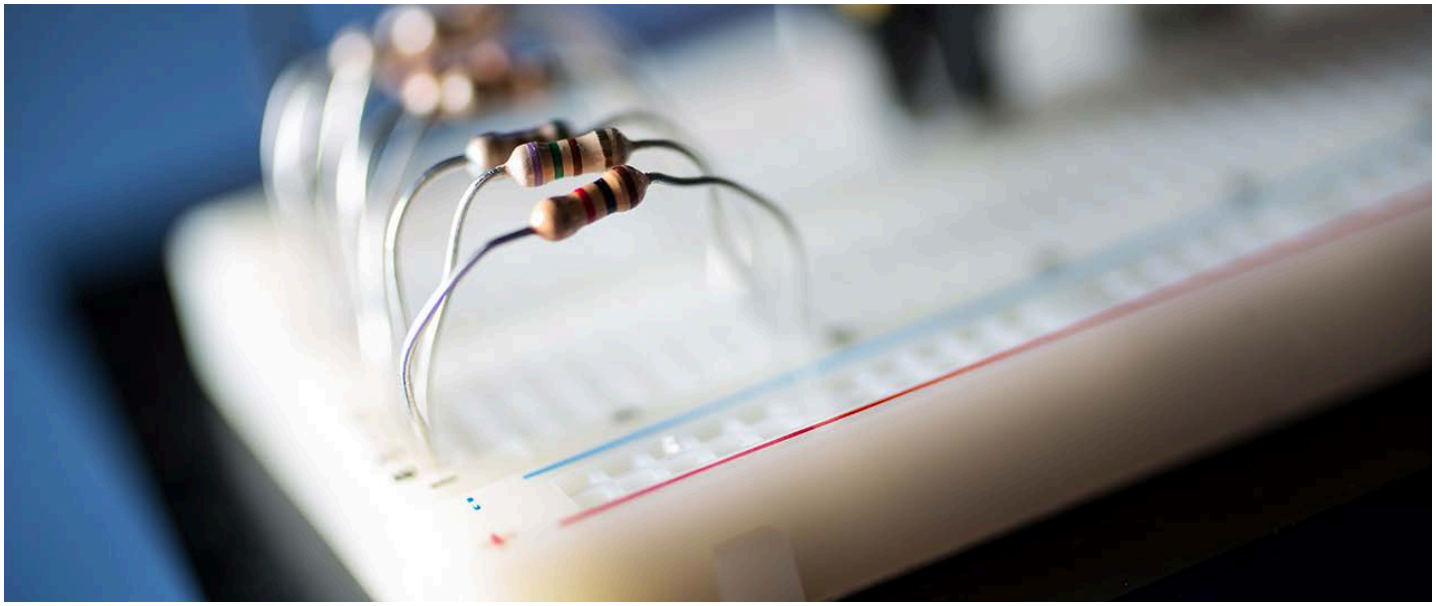
Earn at least 3 credits from the following:

- Area 7: Additional Courses from Areas 4, 5, 6 (BS, BA, or BGS Degree) (3 credits)

Additional Comments:

No Requirement Level

Electrical Engineering Department



Electrical Engineering

Degrees Offered: *B.S. in Electrical Engineering; M.S. in Electrical Engineering; Ph.D. in Electrical Engineering*

The mission of the New Mexico Tech Electrical Engineering Department is two-fold:

To develop and maintain a program of excellence in teaching which ensures that our graduates have technical knowledge and professional skills they need to become effective engineers in the rapidly-changing technical environment of today's society, so that these graduates will contribute to the growth and development of New Mexico and our nation, and To develop and maintain state-of-the-art research programs which are responsive to the needs of industry and government, which provide excellent educational opportunities for students, and which provide an environment for intellectual growth and excitement.

Programs

Optics (minor)

[Program Overview]

Program Title
Minor in Optical Science and Engineering

Department(s)
Electrical Engineering, Optics

Program Description
Students in the minor program in Optical Science and Engineering receive a broad introduction to optics as well as to specialized applications related to optical research activities on campus. The areas of research at New Mexico Tech include adaptive optics, interferometry, wavefront propagation, atmospheric turbulence, polarimetry and applications to directed energy, astronomy and communications.
The prime optical research site at New Mexico Tech is the Magdalena Ridge Observatory (MRO), a dedicated astronomical observatory that will support a large optical interferometer and a 2.4m single telescope. This facility provides a world-class facility for scientific research in optics, optical controls and astronomical science applications. On campus, the Etscorn Observatory provides access to commercial telescopes and imaging cameras.
A Tech student may earn a minor in Optical Science and Engineering as part of a Bachelor of Science degree. While fulfilling the requirements for a Bachelor of Science degree the student must complete a minimum of ten (10) hours of core optics courses, three (3) hours of electromagnetic theory, and at least five (5) additional hours from approved optional courses.

Simple Requisites

Program Requirements

Minor Requirements
Type
Completion Requirement

Minor Requirements

Complete ALL of the following Courses:

- OPTC3000 - Introduction to Optics
- OPTC4000 - Mathematical/Computational Opt
- OPTC4010 - Advance Optics

One of:

Complete at least 1 of the following courses:

- PHYS3033 - Electricity & Magnetism
- EE3032 - Electricity and Magnetism
- MTLS4047 - Optical Materials

Two of:

Complete at least 2 of the following courses:

- EE3051 - Microcontrollers
- EE3024 - Semiconductor Theory & Devices
- EE4031 - Electrodynamics
- MTLS4041 - X-Ray Diffraction
- MTLS4052 - Solid State Physics for Engineers
- PHYS3034 - Radiation & Optics
- PHYS4044 - Solid-State Physics
- OPT4020 - Interferometry & Optical Test (Inactive)
- OPT4030 - Thin Films (Inactive)
- OPT4060 - Optical Laboratory (Inactive)
- OPT4090 - Special Topics in Optics (Inactive)

Additional Comments:

Institute General Requirements

No Requirement Level

Accelerated M.S. in Electrical Engineering (pathway)

[Program Overview]

Program Title
Accelerated Masters in Electrical Engineering

Department(s)
Electrical Engineering

Program Description
Qualified students may apply for admission to the Accelerated Masters program in Electrical Engineering. In fulfillment of the requirement for both B.S and M.S degrees as outlined in their respective sections, accepted students may apply eight credits of 5000 level or above to both degrees.

G.C. in Electrical Engineering

[Program Overview]

Program Title
Graduate Certificate in Electrical Engineering

Department(s)
Electrical Engineering

Program Description
The Electrical Engineering graduate certificate program is aimed at practicing engineers wanting to increase their exposure to electrical engineering at the graduate level while not being tied to a degree program. The program is designed to provide a rigorous upgrade to the student 's skills in electrical engineering while focusing on topics of interest to the student.

Simple Requisites

Program Requirements
The certificate program requires a minimum of 16 credit hours of graduate course work.

Course Requirements
Type
Completion Requirement

Course Requirements

- EE 5021 Measurement and Instrumentation (4 credits)
- One 4 credit electrical engineering graduate course
- One 3 credit or higher electrical engineering course at either graduate or upper undergraduate level
- One 3 credit or higher graduate course in either mathematics, physics, engineering or computer science
- EE 5090 Independent Study (2 credits) supervised by a member of the electrical engineering department

Additional Comments:

Institute General Requirements

No Requirement Level

Electrical Engineering (minor)

[Program Overview]

Program Title
Minor in Electrical Engineering

Department(s)
Electrical Engineering

Simple Requisites

Program Requirements

Minimum credit hours required—18
Type
Completion Requirement

Any one out of the following

Complete ALL of the following Courses:

- EE161 - Basic Electronics Laboratory I
- EE162 - Basic Electronics Lab II
- EE211 - Circuits & Signals I
- EE212 - Circuits & Signals II
- EE252 - Digital Electronics
- EE271 - Mathematical Engineering

*Upper-level (3000 level or above)

Four (4) additional credit hours of upper-level (3000-level or above) Electrical Engineering courses.

Additional Comments:

Institute General Requirements

See the Institute General Education Core Requirements.

No Requirement Level

Renewable Energy (minor)

[Program Overview]

Program Title
Minor in Renewable Energy

Department(s)
Electrical Engineering

Program Description
This program provides students with a unique introduction to the fundamentals of alternative energy through to modern developments in the field. The emphasis of the program is on applications to small scale renewables as well as extensions to large scale power systems. Renewable energy types include: Solar; wind; tidal; geothermal; nuclear and power scavenging; and topics include: engineering and physics of renewable systems; conversion efficiency; storage; limitations; smart grid; control, and integration strategies and others.

Program Information & Policies
The Renewable Energy minor consists of 18 credits, including 15 credits of required courses.

Simple Requisites

Program Requirements

Minimum credit hours required—18
Type
Completion Requirement

Complete the following:

Complete ALL of the following Courses:

- EE211 - Circuits & Signals I
  OR ES3032 - Electrical Engineering
- ES3047 - Thermodynamics
- RNBL3031 - Intro to Renewable Energy
- RNBL4051 - RNBL Energy Gen, Convr & Stor
- RNBL4071 - Pwr Elec, Smrt Grid, Cyber Sec

approved elective courses:

3 additional credits of approved elective courses from the following list:
Approved Elective Courses: EE 3051: Microcontrollers, EE 3072: Modeling and Simulation, ENVE 4014: Energy and Environment, CE 4015: Green Building, CE 4003: Infrastructure

other courses may be used if approved by the advisor and chair

Additional Comments:

Institute General Requirements

See the Institute General Education Core Requirements.

No Requirement Level

BS-EE - B.S. in Electrical Engineering

[Program Overview]

Program Title
BS-EE

Department(s)
Electrical Engineering

Degree & Program Code
BS-EE

Program Description
The Department of Electrical Engineering concentrates on a high-quality undergraduate program in electronics and design, combined with a firm intellectual foundation in the fundamentals of circuits, signals, and systems. As with other degree programs at New Mexico Tech, students are also provided with a breadth of knowledge in the basic sciences, mathematics, humanities, and social sciences.
Laboratories constitute an important part of the electrical engineering program. Computer-based instruments and software packages provide students with up-to-date engineering and design techniques.
Engineering design is the iterative process of converting a set of needs into a process, system or component. Students learn to combine the tools of basic sciences, mathematics and engineering sciences to meet requirements using a process of establishing objectives and criteria, analysis, construction, test and evaluation. Several courses are strongly focused on the fundamentals of engineering design in which students apply understanding from previous courses to solve real-world problems. Projects for the final design courses change every year, and past contributors of projects include research laboratories at New Mexico Tech such as Langmuir Laboratory for Atmospheric Research, Energetic Materials Research and Testing Center, Etscorn Observatory, and those of individual professors; national organizations such as the VLA and VLBA facilities of the National Radio Astronomy Observatory, Sandia National Laboratories, Los Alamos National Laboratory, Air Force Research Laboratory, and Naval Research Laboratory; and companies such as Microsoft and National Instruments.
Graduates of the electrical engineering program will be well equipped with the practical skills necessary for immediate employment, as well as with the intellectual base for graduate studies and lifelong learning.

Program Information & Policies
Students that transfer into the NMT EE program with ES3032 Electrical Engineering, will have EE equivalency determined on a case by case basis.

Program Educational Objectives for Undergraduate Program in Electrical Engineering

The faculty of the Department of Electrical Engineering strives to continuously improve the undergraduate program in electrical engineering. The educational objectives reflect the needs of, and have been reviewed by, among others, the Advisory Board and faculty. Several years after graduation it is expected that the program's graduates will be:

- Recognized leaders in electrical engineering-related fields or other career paths, in the public and private sectors;
- Valued leaders and participants in diverse teams who boldly discover and apply new knowledge and engineering practices;
- Adaptive learners who continue to grow professionally in their organizations, or by earning post-graduate degrees.

Simple Requisites

Program Requirements

Minimum credit hours required—120 In addition to the General Education and Institute Core Curriculum, the following courses are required
Type
Completion Requirement

Electrical Engineering Requirement

Complete ALL of the following Courses:

- EE161 - Basic Electronics Laboratory I

- EE162 - Basic Electronics Lab II
- EE211 - Circuits & Signals I
- EE212 - Circuits & Signals II
- EE252 - Digital Electronics
- EE271 - Mathematical Engineering
- EE3011 - Signals and Linear Systems
- EE3032 - Electricity and Magnetism
- EE3051 - Microcontrollers
- EE3053 - Analog Electronics
- EE3061 - Mixed Electronics Lab I
- EE3062 - Mixed Electronics Lab II
- EE3072 - Modeling and Simulation
- EE4011 - Stochastic Processes and Communication
- EE4031 - Electrodynamics
- EE4072 - Digital Signal Processing
- EE4081 - Capstone Design I
- EE4081L - Capstone Design I
- EE4082 - Capstone Design II
- EE4082L - Capstone Design II

Math Requirements

Complete ALL of the following Courses:

- MATH2532 - Calculus III
- MATH3035 - Ordinary Differential Equation

Additional Comments:
upper-level (3000-level and above) mathematics elective (3)

Engineering electives: a minimum of nine engineering credit hours (200-level or above) courses, including Optical Science and Engineering (OPT), and excluding the Electrical Engineering core classes listed above, Engineering Management, and Computer Science courses, as well as ES 3016 and ES 3032. Students that transfer into the NMT EE program with ES 3032, will have EE equivalency determined on a case by case basis.

To enroll in an Electrical Engineering class, a student must have passed the prerequisites of the course. In addition, a student must be in good academic standing and have declared electrical engineering as a major to enroll in EE 4081.

Students pursuing a B.S. degree in Electrical Engineering must take all Electrical Engineering courses for a letter grade.

Institute General Requirements

General Education Requirements for Bachelor of Science in Electrical Engineering
Type
Completion Requirement

Area 1: Communications Requirement for Bachelor of Science

Complete ALL of the following Course Sets:

- Area 1: Communications (BS Degree) (9 credits)

Area 2: Mathematics and Quantitative Reasoning Requirements for Bachelor of Science

Complete ALL of the following Course Sets:

- Area 2: Mathematics (BS Degree) (8 credits)

Area 3: Science Requirements for a Bachelor of Science

Complete ALL of the following Course Sets:

- Area 3: Science (BS Degree) (18 credits)

Area 4: Social and Behavioral Science Requirements for a Bachelor of Science

Earn at least 6 credits from the following:

- Area 4: Social and Behavioral Science (BS or BGS Degree) (6 credits)

Area 5: Humanities Course Requirements for a Bachelor of Science

Earn at least 6 credits from the following:

- Area 5: Humanities (BS or BGS Degree) (6 credits)

Area 6: Creative & Fine Art Requirement for a Bachelor of Science

Earn at least 3 credits from the following:

- Area 6: Creative and Fine Arts (BS, BA, or BGS Degree) (3 credits)

Area 7: Additional Humanities/Social Science Requirement for a Bachelor of Science

Earn at least 3 credits from the following:

- Area 7: Additional Courses from Areas 4, 5, 6 (BS, BA, or BGS Degree) (3 credits)

Additional Comments:

No Requirement Level

[Learning Outcomes]

Outcome
1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics

Outcome
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors

Outcome
3. An ability to communicate effectively with a range of audiences

Outcome
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

Outcome
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives

Outcome
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions

Outcome
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

[Sample 4-Year Curriculum Plan(s)]

Degree Map Name
Sample Curriculum for the Bachelor of Science in Electrical Engineering
Total Degree Map Credits
120
Degree Map Effective Catalog Year
2025 -

Year	Semester	Actual Credits
Year 1	Fall	16

Course
- MATH1510 - g2:Calculus I

Actual Credits 4

Course
- PHYS1310 & PHYS1310L: g:Calculus-Physics I and Lab

Actual Credits 5

Course
- EE162 - Basic Electronics Lab II

Actual Credits 1

Course
- ENGL1110 - g1:Composition I

Actual Credits 3

Course
- Humanities

Actual Credits 3

Year	Semester	Actual Credits
Year 1	Spring	16

Course
- MATH1520 - g2:Calculus II

Actual Credits 4

Course
- PHYS1320 & PHYS1320L: g:Calculus-Based Physics II and Lab

Actual Credits 5

Course
- EE161 - Basic Electronics Laboratory I

Actual Credits 1

Course
- ENGL1120 - g1:Composition II

Actual Credits 3

Course
- Course Set Not Found

Actual Credits 3

Year	Semester	Actual Credits
Year 2	Fall	16

Course
- MATH3035 - Ordinary Differential Equation

Actual Credits 3

Course
- CHEM1215 & CHEM1215L: g:General Chemistry I and Lab

Actual Credits 4

Course
- EE211 - Circuits & Signals I

Actual Credits 3

Course
- EE271 - Mathematical Engineering

Actual Credits 3

Course
- Social Sciences

Actual Credits 3

Year	Semester	Actual Credits
Year 2	Spring	17

Course
- MATH2532 - Calculus III

Actual Credits 4

Course
- EE252 - Digital Electronics

Actual Credits 3

Course
- EE212 - Circuits & Signals II

Actual Credits 3

Course
- CHEM1225 & CHEM1225L: g: General Chemistry II and Lab

Actual Credits 4

Course
- Humanities

Actual Credits 3

Year	Semester	Actual Credits
Year 3	Fall	14

Course
- EE3061 - Mixed Electronics Lab I

Actual Credits 2

Course
- EE3053 - Analog Electronics

Actual Credits 3

Course
- EE3051 - Microcontrollers

Actual Credits 3

Course
- EE3011 - Signals and Linear Systems

Actual Credits 3

Course
- ENGL3041 - i1:Technical Writing

Actual Credits 3

Year	Semester	Actual Credits
Year 3	Spring	13

Course
- EE3032 - Electricity and Magnetism

Actual Credits 3

Course
- EE3072 - Modeling and Simulation

Actual Credits 3

Course
- EE3062 - Mixed Electronics Lab II

Actual Credits 1

Course
- TC: Science or Engineering Electives

Actual Credits 3

Course
- Math Electives

Actual Credits 3

Year	Semester	Actual Credits
Year 4	Fall	15

Course
- EE4081 - Capstone Design I

Actual Credits 3

Course
- EE4031 - Electrodynamics

Actual Credits 3

Course
- TC: Science or Engineering Electives

Actual Credits 3

Course
- EE4011 - Stochastic Processes and Communication

Actual Credits 3

Course
- Humanities/Social Science

Actual Credits 3

Year	Semester	Actual Credits
Year 4	Spring	13

Course
- EE4082 - Capstone Design II

Actual Credits 3

Course
- TC: Science or Engineering Electives

Actual Credits 3

Course
- EE4072 - Digital Signal Processing

Actual Credits 4

Course
- Social Sciences

Actual Credits 3

MS-EE - M.S. in Electrical Engineering

[Program Overview]

Program Title
MS-EE

Department(s)
Electrical Engineering

Degree & Program Code
MS-EE

Program Description
The Electrical Engineering graduate program provides students with unique research opportunities, thanks to its close association with many research facilities. These facilities include Energetic Materials Research and Testing Center, Langmuir Laboratory, Magdalena Ridge Observatory, National Radio Astronomy Observatory, Incorporated Research Institutions for Seismology, and Institute for Complex Additive Systems Analysis; all easily accessible from campus. These facilities can provide opportunities for students to participate in research related to leading scientific and engineering projects and allow them to achieve highly desirable educational and research experiences.

Program Information & Policies
The faculty of the Department of Electrical Engineering strives to continuously improve the graduate program in electrical engineering. The educational objectives reflect the needs of, and have been reviewed by, among others, the Advisory Board and faculty. Several years after graduation it is expected that our graduates will be:

- Technology leaders who fearlessly discover, apply, and teach new knowledge and engineering practices;
- Entrepreneurially minded innovators driving positive economic and social impact in their communities and the nation;
- Adaptive learners who continue to grow educationally and professionally through advancing their education.

Simple Requisites

Program Requirements

The student's course of study must be approved by the student's advisory committee, must fulfill the general requirements for the master's degree (page 51), and must include the course EE 5021, Measurement and Instrumentation.

At least 12 semester hours must be approved Electrical Engineering courses. No more than six (6) semester hours of advanced undergraduate course work may be used to satisfy the degree requirements. Students are required to take at least six (6) credit hours from outside the Electrical Engineering department. Students may choose between an M.S. with thesis (24 credit hours of courses plus six (6) thesis hours) or an M.S. with independent study (27 credit hours of courses plus three (3) independent study hours). Students may be required to take an appropriate software course if they don't have an appropriate programming background.

Institute General Requirements

No Requirement Level

[Learning Outcomes]

Outcome
1. An ability to apply methods of advanced analysis appropriate for professionals to use when solving problems;

Outcome
2. An ability to apply an in-depth knowledge in a particular field of study that supports the use of innovative techniques to solve problems;

Outcome
3. An ability to demonstrate skills pertinent to the research process, including the ability to formulate problems, synthesize and integrate information, work collaboratively, communicate effectively, and publish results.

PHD-EE - Ph.D. in Electrical Engineering

[Program Overview]

Program Title
Doctor of Philosophy in Electrical Engineering

Department(s)
Electrical Engineering

Degree & Program Code
PHD-EE

Program Description
The prospective doctoral candidate will develop a high level of competence in the fundamentals of research and develop the ability to integrate and apply them in cutting-edge research. The core areas of study and investigation are unique to each student in the program and developed in consultation between the prospective student and their graduate committee.

Simple Requisites

Program Requirements
The Ph.D. requirements include the following:

Select a graduate committee that shall consist of a minimum of four members:

1. An academic advisor from the Electrical Engineering department, and
2. AND at least three other members, one of which must be from outside the department assigned or approved by the Dean of Graduate Studies. The research advisor may be the academic advisor or another member of the committee.

Student with a Bachelor Degree Requirements
Type
Completion Requirement

Students with only a Bachelor of Science degree in related area must complete a minimum of 72 credit hours:

- A minimum of 24 credit hours of electrical engineering courses 5000-level or above including required core courses (8 credits)
- EE5060 Electronic Warfare, Electronic Warfare
- EE5065 Position, Navigation,Timing, Position, Navigation and Timing
- A minimum of 6 credit hours outside electrical engineering;
- 24 credit hours of dissertation;
- And no more than 6 credit hours of 3000- or 4000- level courses.

Additional Comments:

Students with a Master of Science Degree Requirements
Type
Completion Requirement

Students with a Master of Science degree in related area must complete a minimum of 48 credit hours:

- A minimum of 12 credit hours of electrical engineering courses of 5000-level or above including required core courses (8 credits)
- EE5060 Electronic Warfare, Electronic Warfare
- EE5065 Position, Navigation,Timing, Position, Navigation and Timing
- A minimum of 6 credit hours outside of the Electrical Engineering department unless satisfied by the Master of Science degree;
- 24 credit hours of dissertation;
- And no more than 3 credit hours of 3000- or 4000- level courses

Additional Comments:

Requirements For All Students In Program
Type
Completion Requirement

Requirements all students pursuing a PHD in Electrical Engineering will need to complete

All course work must be approved by the student's graduate committee, the Electrical Engineering Department Chair, and the Dean of Graduate Studies.

The graduate committee, in consultation with the student, will select a technical paper. The student must perform an in-depth study of the paper through analysis, modeling, and/or simulation. The student will present the analysis and critique of the paper in a written report and an oral presentation. The written report and the oral presentation constitute the qualifying examination. The exam is designed to test the student's ability to be successful in the Ph.D. program by demonstrating his/her ability to analyze, critique, solve technical problems, grasp fundamental concepts, solve open problems, and communicate effectively. The graduate student may only take the qualifying exam once. In case the student did not pass, he/she may appeal the decision to the Electrical Engineering Department Chair.

Successfully pass the candidacy examination. The student must present a detailed review of his/her research area and hypothesis under investigation to the members of his/her graduate committee. The presentation will be open to the public. This examination may only be taken after a student has passed the qualifying examination.

The admission to candidacy to the Ph.D. degree requires that the qualifying and candidacy examinations be passed and approved by the graduate committee; after which the student may enroll in EE5095 Dissertation: Dissertation.

The student must write a final dissertation and defend it in an oral public defense before the student's graduate committee.

Additional Comments:
Additional requirements include the **New Mexico Institute of Mining and Technology Graduate Program requirements**.

Institute General Requirements

No Requirement Level

[Learning Outcomes]

Outcome
1. An ability to apply methods of advanced analysis appropriate for professionals to use when solving problems

Outcome
2. An ability to apply an in-depth knowledge in a particular field of study that supports the use of innovative techniques to solve problems

Outcome
3. An ability to demonstrate skills pertinent to the research process, including the ability to formulate problems, synthesize and integrate information, work collaboratively, communicate effectively, and publish results.

Courses

EE161 - Basic Electronics Laboratory I

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
An introduction to electronics through practical hands-on based exercises building electronic systems with emphasis on analog electronics. Topics include: basic circuit analysis, battery chargers, amplifier circuits, circuit board layout and assembly, instrumentation and measurements, introduction to computer-based tools, and related topics.

Simple Requisites

Course Requisite Requirements

Corequisite
Type
Corequisite

Corequisite

Complete ALL of the following Courses:
- MATH1230 - Trigonometry
  AND MATH1240 - Pre-Calculus

Additional Comments:

No Requirement Level

EE162 - Basic Electronics Lab II

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
An introduction to electronics through practical hands-on based exercises building electronic systems with emphasis on digital electronics. Topics include: logic circuits, applications of microcontrollers, computer-based tools, and related topics.

Simple Requisites

Course Requisite Requirements

Corequisite
Type
Corequisite

Corequisite

Complete ALL of the following Courses:
- MATH1230 - Trigonometry
  AND MATH1240 - Pre-Calculus

Additional Comments:

No Requirement Level

EE211 - Circuits & Signals I

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Principles of electrical circuit analysis. Kirchhoff's laws, equivalent circuits, dependent sources, node and mesh analysis, signals, RLC components. Introductory circuits and operational amplifier circuits as examples.

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisites: MATH 1520

Normally offered fall semester

Complete ALL of the following Courses:
- MATH1520 - g2:Calculus II

Additional Comments:

No Requirement Level

EE212 - Circuits & Signals II

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Continuation of EE 211, Laplace transform techniques, transient response, power, steady-state sinusoidal response, and frequency response of RLC circuits.

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisite: EE 211 or ES 3032

Normally offered spring semester

Complete ALL of the following Courses:
- EE212 - Circuits & Signals II
  OR ES3032 - Electrical Engineering

Additional Comments:

No Requirement Level

EE252 - Digital Electronics

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Fundamental concepts of digital logic analysis and design. Topics include: Boolean algebra, logic gates, truth tables, simplification methods, multiplexers, decoders, registers, sequential digital design, finite state machines, hardware description language (HDL), and related topics.

Equivalent Courses: Previous & Current Courses
EE231

Simple Requisites

Course Requisite Requirements

Corequisite
Type
Corequisite

Corequisite

Corequisite: EE 271

Normally offered spring semester

Complete ALL of the following Courses:
- EE271 - Mathematical Engineering

Additional Comments:

No Requirement Level

EE271 - Mathematical Engineering

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Fundamental concepts of programming using MATLAB and C to address problems related to electrical engineering. Topics include: programming techniques, application of linear algebra, syntax of MATLAB and C, mathematical modeling and computations, data analysis, image processing, visualization, and other topics.

Simple Requisites

Course Requisite Requirements

Corequisite
Type
Corequisite

Corequisite

Corequisite: MATH 1510

Normally offered both fall and spring semesters

Complete ALL of the following Courses:
- MATH1510 - g2:Calculus I

Additional Comments:

No Requirement Level

EE3011 - Signals and Linear Systems

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Fundamentals of continuous and discrete signals and systems. Topics include: linear time- invariant systems, convolution, Fourier series, Fourier transforms, Laplace transforms, z-transforms, sampling theory, transfer functions, poles and zeros, feedback systems, filters, convolution, application of MATLAB, and related topics.

Equivalent Courses: Previous & Current Courses
EE311

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisites: EE 212, EE 271 and MATH 3035

Normally offered fall semester

Complete ALL of the following Courses:
- EE212 - Circuits & Signals II
- EE271 - Mathematical Engineering
  AND MATH3035 - Ordinary Differential Equation

Additional Comments:

No Requirement Level

EE3024 - Semiconductor Theory & Devices

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Fundamentals of semiconductor Materials and devices. Topics include introduction to quantum mechanics and electrical conduction in conductors, insulators, and semiconductors. The theory is applied to pn junctions, bipolar and field-effect transistors and opto-electronic devices.

Equivalent Courses: Previous & Current Courses
EE324

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:
- PHYS1320 - g3:Calculus-based Physics II

Additional Comments:

No Requirement Level

EE3032 - Electricity and Magnetism

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Introduction to electricity and magnetism based on Maxwell's Equations. Topics include: calculation of electric and magnetic fields produced by simple current and charge sources, effects of Materials, energy storage in fields, capacitance, inductance, electric and magnetic force calculations using virtual work, propagation of plane waves in vacuum and in Materials, reflection and refraction of plane waves at planar interfaces, magnetic circuit calculations, application of MATLAB, and related topics.

Equivalent Courses: Previous & Current Courses
EE332

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisites: EE 271 , PHYS 1320 and MATH 2532

Normally offered spring semester

Complete ALL of the following Courses:
- EE271 - Mathematical Engineering
- PHYS1320 - g3:Calculus-based Physics II
  AND MATH2532 - Calculus III

Additional Comments:

No Requirement Level

EE3051 - Microcontrollers

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Introduction to microcontrollers. Topics include: programming in assembly and C, bus structures, interrupts, timing, real-time control, parallel and serial interfaces, support devices, disassemblers, and related topics.

Equivalent Courses: Previous & Current Courses
EE308, EE351

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisite: EE 271

Normally offered fall semester

Complete ALL of the following Courses:
- EE271 - Mathematical Engineering

Additional Comments:

No Requirement Level

EE3052 - Microcomputer Interfacing

General

Credit Hrs
Credit Hrs:
4

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Design of hardware and software for microcomputer interfacing. Bus signals and timing. Interrupt and direct memory access handling. Students will design, build, program, and test a simple interface card for a common microcomputer bus.

Equivalent Courses: Previous & Current Courses
EE352

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:
- EE3051 - Microcontrollers

Additional Comments:

No Requirement Level

EE3053 - Analog Electronics

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Fundamentals of analog electronics. Topics include: principles and use of operational amplifiers, diodes, field effect transistors, bipolar junction transistors, basics of transistor operation in terms of semiconductor physics, and related topics.

Equivalent Courses: Previous & Current Courses
EE353

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisite: EE 212

Normally offered fall semester

Complete ALL of the following Courses:
- EE212 - Circuits & Signals II

Additional Comments:

No Requirement Level

EE3061 - Mixed Electronics Lab I

General

Credit Hrs
Credit Hrs:
2

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Intensive laboratory working with analog and digital electronics, FPGAs, and microcontrollers. Project topics include: oscillators, amplifiers, filters, analog-to-digital converters, digital-to- analog converters, direct digital synthesizers, interfacing, feedback control, and related topics.

Equivalent Courses: Previous & Current Courses
EE361

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisite: EE 252

Normally offered fall semester

Complete ALL of the following Courses:
- EE252 - Digital Electronics

Additional Comments:

Corequisite
Type
Corequisite

Corequisite

Corequisites: EE 3051 and EE 3053

Normally offered fall semester

Complete ALL of the following Courses:
- EE3051 - Microcontrollers
  AND EE3053 - Analog Electronics

Additional Comments:

No Requirement Level

EE3062 - Mixed Electronics Lab II

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Advanced laboratory working with analog/digital signals and systems. Project topics include: sensor fusion, radio frequency integrated circuits, software defined radios, testing and measurement techniques, and related topics

Equivalent Courses: Previous & Current Courses
EE362

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisite: EE 3051, 3053, 3061

Normally offered spring semester

Complete ALL of the following Courses:
- EE3051 - Microcontrollers
- EE3053 - Analog Electronics
  AND EE3061 - Mixed Electronics Lab I

Additional Comments:

Corequisite
Type
Corequisite

Corequisite

Corequisite: EE 3072

Normally offered spring semester

Complete ALL of the following Courses:
- EE3072 - Modeling and Simulation

Additional Comments:

No Requirement Level

EE3072 - Modeling and Simulation

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Course on simulation and modeling using modern engineering tools. Topics include: state-space modeling, modeling and simulation of systems, statistical techniques for data analysis, MATLAB, SIMULINK, CAD, Pspice, and related topics.

Equivalent Courses: Previous & Current Courses
EE372

Simple Requisites

Course Requisite Requirements

Corequisite
Type
Corequisite

Corequisite

Corequisite: EE 3062

Normally offered spring semester

Complete ALL of the following Courses:
- EE3062 - Mixed Electronics Lab II

Additional Comments:

No Requirement Level

EE4011 - Stochastic Processes and Communication

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Principles of communication theory. Topics include: analog modulation techniques, probability theory, random signals and noise, analysis of communication systems in presence of noise, digital communication, matched filters, channel capacity, multiple access, and related topics.

Equivalent Courses: Previous & Current Courses
EE411

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisite: EE 3011

Normally offered fall semester

Complete ALL of the following Courses:
- EE3011 - Signals and Linear Systems

Additional Comments:

No Requirement Level

EE4022 - Advanced Electronics

General

Credit Hrs
Credit Hrs:
4

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Advanced electronics theory with applications. Topics may include linear and switching power supplies, current feedback op-amps, electronic noise and interference ,timers and oscillators, feedback systems and phase-locked loops, and active filters.

Equivalent Courses: Previous & Current Courses
EE422

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:
- EE3053 - Analog Electronics
  AND EE3011 - Signals and Linear Systems

Additional Comments:

No Requirement Level

EE4031 - Electrodynamics

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Fundamentals and applications of electrodynamics. Topics include: transient and sinusoidal steady state solutions of uniform transmission line problems modeled in terms of circuit parameters, propagation characteristics of metallic and dielectric waveguides, radiation from linear wire antennas along with large and small aperture radiators, radiation patterns of antenna arrays, and related topics.

Equivalent Courses: Previous & Current Courses
EE431

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisite: EE 3032

Normally offered fall semester

Complete ALL of the following Courses:
- EE3032 - Electricity and Magnetism

Additional Comments:

No Requirement Level

EE4043 - Intermediate Control Theory

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Modeling of dynamical systems via differential equations, transfer functions, and state-space methods. Performance, characterization, and behavior of linear feedback-systems. Design of various types of control schemes to meet performance specifications.

Equivalent Courses: Previous & Current Courses
EE443

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:
- EE3011 - Signals and Linear Systems

Additional Comments:

No Requirement Level

EE4043L - Intermediate Control Theory Lab

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Use of computer-based data acquisition and control (DAC) hardware and software. Model validation and verification of physical systems. Implementation of real-time control schemes utilizing actuators and sensors.

Equivalent Courses: Previous & Current Courses
EE443L

Simple Requisites

Course Requisite Requirements

Corequisite
Type
Corequisite

Corequisite

Corequisite: EE 4043 or MENG 4005 or permission of instructor

Complete ALL of the following Courses:
- EE4043 - Intermediate Control Theory
  OR MENG4005 - Dynamic Systems & Controls

Additional Comments:

No Requirement Level

EE4072 - Digital Signal Processing

General

Credit Hrs
Credit Hrs:
4

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Principles of digital signal processing. Topics include: Infinite and finite impulse response filters, discrete and fast Fourier transforms, multi-rate processing, spectral estimation, quantization effects, system design, and implementation of real-time DSP algorithms on state-of-the-art hardware. Principles discussed in class will be demonstrated with real applications in labs that include design and implementation of infinite and finite impulse response filters, and applications such as communication systems, sound processing, image processing, and related topics.

Equivalent Courses: Previous & Current Courses
EE472

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisites: EE 3011 and EE 3051

Normally offered spring semester

Complete ALL of the following Courses:
- EE3011 - Signals and Linear Systems
  AND EE3051 - Microcontrollers

Additional Comments:

No Requirement Level

EE4072L - Digital Signal Processing Lab

General

Credit Hrs
Credit Hrs:
0

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Corequisite with EE 4072

Equivalent Courses: Previous & Current Courses
EE472L

No Requirements

EE4081 - Capstone Design I

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Student design teams begin an academic year long capstone design project under the supervision of a faculty advisor. Topics include: team building, design requirements and documentation, detailed planning, identification of project needs and establishment of goals leading toward the successful completion of the project, periodic design reviews and reports, applications of engineering skills, project management and formal presentations. Successful completion of

the project requires the application of electronics, applied physics, numerical computation, signal processing, other electrical engineering techniques to real world engineering problems, and related topics.

Equivalent Courses: Previous & Current Courses
EE481

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisites: EE 3011, EE 3032, 3062

EE 3072, and have declared electrical engineering as a major

Complete ALL of the following Courses:

- EE3011 - Signals and Linear Systems
- EE3032 - Electricity and Magnetism
- EE3062 - Mixed Electronics Lab II
  AND EE3072 - Modeling and Simulation

Additional Comments:

No Requirement Level

EE4081L - Capstone Design I

General

Credit Hrs
Credit Hrs:
0

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Corequisite with EE 4081

Equivalent Courses: Previous & Current Courses
EE481L

No Requirements

EE4082 - Capstone Design II

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
A continuation of the capstone design projects started in EE 4081. EE 4082 must be taken in the semester immediately following EE 4081 to maintain project continuity. The student teams provide status reports, a final presentation to faculty and reviewers, and a senior thesis, and bring their design projects to successful completion.

Equivalent Courses: Previous & Current Courses
EE482

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisite: EE 4081

Normally offered spring semester

Complete ALL of the following Courses:

- EE4081 - Capstone Design I

Additional Comments:

No Requirement Level

EE4082L - Capstone Design II

General

Credit Hrs
Credit Hrs:
0

Credit Hours Max:
1

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Corequisite with EE 4082

No Requirements

EE4091 - Special Topics

General

Credit Hrs
Credit Hrs:
1

Credit Hours Max:
4

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, Standard Letter

Equivalent Courses: Previous & Current Courses
EE491

No Requirements

EE5000 - Directed Research

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
12

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail

Course Description
Offered both Spring and Fall semester. Credits cannot be applied towards the 30 credit hours required for graduation. Research under the guidance of an EE faculty member.

Equivalent Courses: Previous & Current Courses
EE500

Simple Requisites

Course Requisite Requirements

Prerequisite: Graduate standing in electrical engineering or consent of instructor and advisor

No Requirement Level

EE5021 - Measurement & Instrumentation

General

Credit Hrs

Credit Hrs:
4

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Survey of various sensors and transducers for measuring physical quantities; measurement errors; analog and digital interfaces; sampling; quantization; actuators; and sensing devices in closed-loop control. Digital interfacing to the measurement devices for both experimentation and microprocessor control will be performed using a computer equipped with data acquisition hardware and software.

Equivalent Courses: Previous & Current Courses
EE521

Simple Requisites

Course Requisite Requirements

Prerequisites: Graduate standing in electrical engineering or consent of instructor and advisor

No Requirement Level

EE5031 - Advanced Digital Design

General

Credit Hrs

Credit Hrs:
4

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Advanced topics in digital design. Synchronous and asynchronous state machines. Timing issues in high-speed digital design. Design of a complex system using Verilog or VHDL programming language in a CAD environment.

Equivalent Courses: Previous & Current Courses
EE531

Simple Requisites

Course Requisite Requirements

Prerequisites: Graduate standing in electrical engineering or consent of instructor and advisor

No Requirement Level

EE5033 - Optical/RF Engineering

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Explore various topics in data links and telemetry including RF links, antennas, satellite communications, and optical fiber links. Projects will include design and fabrication of basic RF antenna and a case study of a satellite communications system.

Equivalent Courses: Previous & Current Courses
EE533

Simple Requisites

Course Requisite Requirements

Prerequisites: Graduate standing in electrical engineering or consent of instructor and advisor

No Requirement Level

EE5037 - Photonics

General

Credit Hrs

Credit Hrs:
4

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Topics include the generation, propagation, manipulation and detection of light from low to high energy. Uses and applications of optical systems: simple optics, binary and Fourier optics, electro-optics, wavefront analysis, modal decomposition, inversion techniques for wavefront reconstruction and correction and optical signal processing. Other advanced topics in optics.

Equivalent Courses: Previous & Current Courses
EE537

Simple Requisites

Course Requisite Requirements

Prerequisites: Graduate standing in electrical engineering or consent of instructor and advisor

No Requirement Level

EE5044 - Modern Control Theory

General

Credit Hrs
Credit Hrs:
4

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Treatment of modern approach to control system design primarily via state-space analysis techniques for both continuous and discrete time systems. Topics include the realization of MIMO models for real-systems, linear feedback control, the design of observers, optimal control, and concepts in stability. The latter part of the course will address recent advanced topics of current relevance. Associated hardware and software-based lab/project(s) will include the use of computer-based data acquisition systems.

Equivalent Courses: Previous & Current Courses
EE544

Simple Requisites

Course Requisite Requirements

Prerequisites: Graduate standing in electrical engineering or consent of instructor and advisor

No Requirement Level

EE5045 - Digital Communication I

General

Credit Hrs
Credit Hrs:
3

Credit Hours Max:
4

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Digital communication systems; response time requirements and control of user errors. Spread spectrum modulation and the fundamental limitations dictated by information theory. Various types of modulation and multiplexing including BPSK, QAM, QPSK, OQPSK. Statistical analysis of various modulation schemes.

Equivalent Courses: Previous & Current Courses
EE545

Simple Requisites

Course Requisite Requirements

Prerequisites: Graduate standing in electrical engineering or consent of instructor and advisor

No Requirement Level

EE5046 - Digital Communication II

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Spread-spectrum modulation, frequency hopping techniques, error control coding, multiple access techniques including TDMA (time division multiple access) and CDMA (code division multiple access). Various advanced case studies. Analysis of imperfections; noise and distortion line failures, data errors, delays and blocking, treatment of errors.

Equivalent Courses: Previous & Current Courses
EE546

Simple Requisites

Course Requisite Requirements

Prerequisites: Graduate standing in electrical engineering or consent of instructor and advisor

No Requirement Level

EE5048 - Manipulator-based Robotics

General

Credit Hrs
Credit Hrs:
4

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Fundamentals of the multi-disciplinary field of robotics. Emphasis is placed on understanding how to model and control robotic manipulators while providing an appreciation of the importance of sensing to robotic applications. Topics include: forward, inverse, and motion kinematics; dynamic modeling; position, velocity, and force control.

Equivalent Courses: Previous & Current Courses
EE548

Simple Requisites

Course Requisite Requirements

Prerequisites: Graduate standing in electrical engineering or consent of instructor and advisor

No Requirement Level

EE5051 - Discrete-Time Signals

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
The fast-Fourier transform and its computer implementation; spectral estimation; analytic signals; multi-dimensional signal processing; digital filters. Signal detection and estimation, Kalman Filters, linear predictive coding, and adaptive filters. Project(s) include the design and implementation of a Kalman filter for GPS data processing and LPC for speech recognition.

Equivalent Courses: Previous & Current Courses
EE551

Simple Requisites

Course Requisite Requirements

Prerequisites: Graduate standing in electrical engineering or consent of instructor and advisor

No Requirement Level

EE5052 - Image Processing & Data Compression

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
The basics of two-dimensional digital signal processing, image representation and human vision including color models, image transformation and video compression techniques (including JPEG and MPEG). Study of relevant current applications including HDTV.

Equivalent Courses: Previous & Current Courses
EE552

Simple Requisites

Course Requisite Requirements

Prerequisites: Graduate standing in electrical engineering or consent of instructor and advisor

No Requirement Level

EE5054 - Embedded Control Systems

General

Credit Hrs

Credit Hrs:
4

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Microcontroller- or microcomputer-based embedded control systems. A comparative survey of currently available embedded computers/controllers including SBC's, PICs, basic-stamps, and System on Chip (SoC) solutions. Real-time operating systems, including 5092 real-time LINUX, and hard real-time process requirements. Projects will include the implementation of an embedded real-time control solution.

Equivalent Courses: Previous & Current Courses
EE554

Simple Requisites

Course Requisite Requirements

Prerequisites: Graduate standing in electrical engineering or consent of instructor and advisor

No Requirement Level

EE5060 - Electronic Warfare

General

Credit Hrs

Credit Hrs:
4

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Explores the various aspects of Electronic Warfare (EW) from the standpoint of both the user and the attacker. The course begins with a definition of terms such as Electronic Support (ES), Electronic Protection (EP), Electronic Attack(EA), and Electronic Counter-Counter Measures (ECCM). The primary emphasis is on the impact of EW techniques on radar and communication systems.

Equivalent Courses: Previous & Current Courses
EE560

Simple Requisites

Course Requisite Requirements

Prerequisites: Graduate standing in electrical engineering or consent of instructor and advisor

No Requirement Level

EE5062 - Microwae Engineering & Radar

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Transmission media: waveguides, micro-strip and glass fiber. Ferrite devices and cavity resonators. Equivalent circuits using scattering and transmission matrices. Active components in microwave circuits.

Equivalent Courses: Previous & Current Courses
EE562

Simple Requisites

Course Requisite Requirements

Prerequisites: Graduate standing in electrical engineering or consent of instructor and advisor

No Requirement Level

EE5065 - Position, Navigation,Timing

General

Credit Hrs

Credit Hrs:
4

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Covers the fundamentals of timing, terrestrial location and navigation with an emphasis on practical exposure to the technology. Key components include: GPS fundamentals; an overview of inertial navigation technology; principles of strapdown inertial navigation systems including coordinate frames, attitude representation, and mechanization in various coordinate frames; sensor technology covering a wide range of accelerometers and gyroscopes; sensor specifications and characterization; testing and calibration approaches; effects of inertial sensor error and compensation methods; introduction to unmanned systems; analysis of real sensor data and simulation and modeling using MATLAB/Simulink.

Equivalent Courses: Previous & Current Courses
EE565

Simple Requisites

Course Requisite Requirements

Prerequisites: Graduate standing in electrical engineering or consent of instructor and advisor

No Requirement Level

EE5069 - Wireless Communications

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Signaling: exchange, subscriber loops, and local loops, transmission media, and multiplexing. Switching: network switching, space-division and panel switching, and various digital-switching methods. Cellular telephony, data networks and communication protocols.

Equivalent Courses: Previous & Current Courses
EE569

Simple Requisites

Course Requisite Requirements

Prerequisites: Graduate standing in electrical engineering or consent of instructor and advisor

No Requirement Level

EE5070 - Advance Topics in Electrical Engineering

General

Credit Hrs

Credit Hrs:
4

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Emerging technologies and specializations in Electrical Engineering addressed from the perspective of embedded systems and advanced design.

Equivalent Courses: Previous & Current Courses
EE570, EE570D

Simple Requisites

Course Requisite Requirements

Prerequisites: Graduate standing in electrical engineering or consent of instructor and advisor

No Requirement Level

EE5081 - Directed Study

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
12

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, No Report, Standard Letter

Equivalent Courses: Previous & Current Courses
EE581

Simple Requisites

Course Requisite Requirements

Prerequisite: Permission of graduate advisor

No Requirement Level

EE5090 - Independent Study

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
12

Credit Hours Operator:
TO

Grade Modes
No Report, Standard Letter

Course Description
Independent research supervised by a faculty member. It is expected that this work will culminate in a paper to be published, and an oral presentation is required.

Equivalent Courses: Previous & Current Courses
EE55990

Simple Requisites

Course Requisite Requirements

Prerequisite: Permission of graduate advisor

No Requirement Level

EE5091 - Thesis

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
12

Credit Hours Operator:
TO

Grade Modes
No Report

Equivalent Courses: Previous & Current Courses
EE591

No Requirements

EE5092 - Graduate Seminar I

General

Credit Hrs

Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Offered both Spring and Fall semester. Credits cannot be applied towards the 30 credit hours required for graduation.

Equivalent Courses: Previous & Current Courses
EE592

Simple Requisites

Course Requisite Requirements

Prerequisite: Graduate standing

No Requirement Level

EE5095 - Dissertation

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
12

Credit Hours Operator:
TO

Grade Modes
Audit, No Report

Equivalent Courses: Previous & Current Courses
EE595

Simple Requisites

Course Requisite Requirements

Prerequisite: Successful completion of PhD candidacy exam and Academic Advisor recommendation for candidacy.

No Requirement Level

OPTC4020 - Interferometry & Optical Test

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
An advanced course in designing and using thin film coatings.

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

Prerequisites

Prerequisite: OPT 400 or consent of instructor and advisor.

Complete ALL of the following Courses:

- OPTC4000 - Mathematical/Computational Opt
  OR OPT400 - Mathematical/Computational Opt (Inactive)

Additional Comments:

No Requirement Level

OPTC4030 - Thin Films

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
An advanced course in designing and using thin film coatings.

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisites

Prerequisite: OPT 400 or consent of instructor and advisor.

Complete ALL of the following Courses:

- OPTC4000 - Mathematical/Computational Opt
  OR OPT400 - Mathematical/Computational Opt (Inactive)

Additional Comments:

No Requirement Level

OPTC4060 - Optical Laboratory

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
An advanced laboratory in optics and photonic systems.

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisites

Complete ALL of the following Courses:

- OPTC3000 - Introduction to Optics
  OR OPT300 - Introduction to Optics (Inactive)

Additional Comments:

No Requirement Level

OPTC4090 - Special Topics in Optics

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
6

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
An advanced laboratory in optics and photonic systems.

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisites

Complete ALL of the following Courses:

- OPTC3000 - Introduction to Optics
  OR OPT300 - Introduction to Optics (Inactive)

Additional Comments:

No Requirement Level

RNBL3031 - Intro to Renewable Energy

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisites: EE 211 or ES 3032; EE271 or ES 111 or equivalent programming course; or permission of instructorIntroduction to energy needs and motivations for renewable energy, which include pollution and climate change caused by fossil fuel-based energy resources. Fundamentals of alternative and renewable energy systems including: Tidal, geothermal, solar, wind, photovoltaic systems. Basic energy storage, conversion considerations, efficiencies and applications will be introduced. This course will involve modeling of renewable energy topics using MATLAB.

Simple Requisites

Course Requisite Requirements

RNBL 3031 Prereq Requirements
Type
Prerequisite

Programming Req

Complete ALL of the following Courses:

- EE211 - Circuits & Signals I
  OR ES3032 - Electrical Engineering
- EE271 - Mathematical Engineering
  OR ES111 - Computer Programming for Engineers

Additional Comments:

No Requirement Level

RNBL4051 - RNBL Energy Gen, Convr & Stor

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Standard Letter

Course Description
Prerequisite: RNBL 3031Topics in large-and-small scale generation will be introduced with modeling and simulation of renewable energy systems through to usable power for consumers and industry. This course will involve modeling of renewable energy topics using MATLAB.

When Offered
Spring

Simple Requisites

Course Requisite Requirements

RNBL 4051 Prereq Requirements
Type
Prerequisite

Renewable Engergy Req

Complete ALL of the following Courses:

- RNBL3031 - Intro to Renewable Energy

Additional Comments:

No Requirement Level

RNBL4071 - Pwr Elec, Smrt Grid, Cyber Sec

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: RNBL 4051Applications of power electronics as used in inverters, driving motors using H-Bridges, control systems for battery charging and alternative power storage. Power distribution, integration with smart grids and cyber security issues and solutions for distributed systems. This course will involve modeling of renewable energy topics using MATLAB.

When Offered
Fall

Simple Requisites

Course Requisite Requirements

RNBL 4071 Prereq Requirements
Type
Prerequisite

Renewable Energy Req

Complete ALL of the following Courses:

- RNBL4071 - Pwr Elec, Smrt Grid, Cyber Sec

Additional Comments:

No Requirement Level

Engineering Science Department

- ***Professor:*** Leclerc (Dean of Engineering)
- ***Assistant Teaching Professors:*** Oxford, Gatto

Accreditation

The Bachelor of Science (BS) programs in Chemical Engineering, Civil Engineering, Electrical Engineering, Environmental Engineering, Materials Engineering, Mechanical Engineering, Mineral Engineering, and Petroleum and Natural Gas Engineering are accredited by the Engineering Accreditation Commission of ABET, www.abet.org.

The Bachelor of Science program in Computer Science is accredited by the Computing Accreditation Commission of ABET, www.abet.org.

Professional Examinations

Undergraduate engineering majors in Civil Engineering, Environmental Engineering, Mineral Engineering and Mechanical Engineering are required to take the Fundamentals of Engineering (FE) exam as a requirement for graduation. All engineering students are encouraged to take this exam, as it is the entry-level requirement for those individuals who intend to attain status as a professional engineer . The FE exam is a national, computer-based test; therefore, the results are transferable to any state or territory of the United States. See the NCEES website (http://www.ncees.org) for details.

Courses

ES110 - Intro to Engineering Design

General

Credit Hrs
Credit Hrs:
2

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Students will be introduced to the profession of engineering and gain fundamental engineering skills with an emphasis on engineering design and problem solving. Topics include problem definition, presentation of a solution, the engineering design process, working in a team environment, engineering graphics by hand and in SolidWorks, graphical solutions, and simple modeling in Microsoft Excel. Students will learn the process of designing, building, modeling, and optimizing a system through a semester-long project.

Equivalent Courses: Previous & Current Courses
ES1010

Simple Requisites

Course Requisite Requirements

Corequisites
Type
Completion Requirement

Complete ALL of the following Courses:
- MATH1220 - College Algebra

Additional Comments:

No Requirement Level

ES111 - Computer Programming for Engineers

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Engineering computer problem solving using a high-level programming language. Algorithm and program development and documentation. Emphasis is placed on programming logical and concise solutions to a variety of problems drawing from engineering disciplines of mechanics, civil, electrical, industrial, and economics.

Equivalent Courses: Previous & Current Courses
ES1011

Simple Requisites

Course Requisite Requirements

Corequisites
Type
Corequisite

Complete ALL of the following Courses:
- MATH1510 - g2:Calculus I

Additional Comments:

No Requirement Level

ES201 - Statics

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Forces and moments acting on rigid bodies in equilibrium, distributed forces including hydrostatic forces, friction, moment of inertia, and problem solution by computer.

Equivalent Courses: Previous & Current Courses
ES2011

Simple Requisites

Course Requisite Requirements

Prerequisites
Type

Prerequisite

Prerequisites

Complete ALL of the following Courses:

- PHYS1310 - g3:Calculus-based Physics I

Additional Comments:

Corequisites
Type
Corequisite

Corequisites

Complete ALL of the following Courses:

- MATH2532 - Calculus III

Additional Comments:

No Requirement Level

ES216 - Engineering Fluid Mechanics

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Fundamentals of fluid mechanics including fluid statics, velocity of continuous media, continuity, and momentum balance. Introduction of laminar and turbulent flows, similitude, dimensionless analysis, Bernoulli's equation, friction factor, introduction to pump and compressor selection.

Equivalent Courses: Previous & Current Courses
ES2016

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

Prerequisites

Complete ALL of the following Courses:

- PHYS1310 - g3:Calculus-based Physics I

Additional Comments:

Corequisites
Type
Corequisite

Corequisites

Complete ALL of the following Courses:

- MATH2532 - Calculus III

Additional Comments:

No Requirement Level

ES3002 - Mechanics of Materials

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Relationships between external forces acting on deformable bodies and the stresses and strains produced; tension, compression, torsion, shear, bending, and problem solution by computer. Failure criteria. Design of members and systems.

Equivalent Courses: Previous & Current Courses
ES302

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

Prerequisites

Complete ALL of the following Courses:

- ES201 - Statics
- MATH2532 - Calculus III

Additional Comments:

No Requirement Level

ES3003 - Engineering Dynamics

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Kinematics and kinetics of particles, systems of particles, and rigid bodies; and momentum and energy methods.

Equivalent Courses: Previous & Current Courses
ES303

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

Prerequisites

Complete ALL of the following Courses:

- ES201 - Statics
- MATH2532 - Calculus III

Additional Comments:

No Requirement Level

ES3005 - Engineering Analysis

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Solution of linear systems of equations using Gaussian elimination and matrix methods. Scalar and vector fields; gradient; divergence; curl; line, surface and volume integrals; Green's theorem and Stokes' theorem. Solutions to partial differential equations from heat transfer, mechanical vibrations, and fluid mechanics using separation of variables, series and Laplace transforms.

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

Prerequisites

Complete ALL of the following Courses:

- ES216 - Engineering Fluid Mechanics
- ES3002 - Mechanics of Materials
- MATH3035 - Ordinary Differential Equation

or consent of instructor and advisor

Additional Comments:

No Requirement Level

ES3016 - Engineering Economics

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Professional ethics. Economic decision-making for engineering alternatives. Use of compound interest and depreciation calculations to compare the relative economy of investments and procedures. The application of economic principles such as return on investment, leverage, and present worth to engineering problems. Use of PC computer programs. This course is not available for social science credit.

Equivalent Courses: Previous & Current Courses
ES316

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

Prerequisites

Complete ALL of the following Courses:

- MATH1520 - g2:Calculus II

Additional Comments:

No Requirement Level

ES3032 - Electrical Engineering

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Introduction to the fundamentals of electronics and circuits for applications (e.g., instrumentation, control systems and power systems) encountered by engineers. Techniques for analysis to determine voltages, currents and power are based on Kirchhoff's Laws, and include mesh and nodal analysis. Devices considered are resistors, inductors, capacitors, independent sources, dependent sources, diodes, operational amplifiers, digital-to-analog converters and analog-to-digital converters. Circuits addressed will contain constant (DC) sources, switched sources and sinusoidal (AC) sources, for which appropriate techniques will be developed and applied to determine responses in voltage, current and power.

Equivalent Courses: Previous & Current Courses
ES332

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

Prerequisites

Complete ALL of the following Courses:

- PHYS1320 - g3:Calculus-based Physics II
- MATH1520 - g2:Calculus II

Additional Comments:

No Requirement Level

ES3047 - Thermodynamics

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Introduction of the first and second laws of thermodynamics and their applications to engineering power cycles. Carnot cycle, Rankine cycle, refrigeration cycle, Otto cycle, and Diesel cycle.

Equivalent Courses: Previous & Current Courses
ES347

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

Prerequisites

Complete ALL of the following Courses:

- CHEM1225 - g3:General Chemistry II
- MATH1520 - g2:Calculus II
- PHYS1310 - g3:Calculus-based Physics I

Additional Comments:

No Requirement Level

ES3050 - Heat & Mass Transfer

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Fundamentals of heat transfer, steady- and unsteady-state conduction, convection and radiation. Fundamentals of mass transfer, steady and unsteady state, diffusion, and convection. Dimensionless analysis, equipment.

Equivalent Courses: Previous & Current Courses
ES350

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

Prerequisites

Complete ALL of the following Courses:

- ES216 - Engineering Fluid Mechanics
- ES3047 - Thermodynamics
- MATH3035 - Ordinary Differential Equation

Additional Comments:

No Requirement Level

ES4005L - Instrumentation, Measurements, & Processess Control Lab

General

Credit Hrs

Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Laboratory exercises involving instrumentation and design of basic control systems.

Equivalent Courses: Previous & Current Courses
ES405L

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

Prerequisites

Complete ALL of the following Courses:

- ES111 - Computer Programming for Engineers
  OR CH E3027 - Principles of Chemical Engineering II
- PHYS1320 - g3:Calculus-based Physics II

Additional Comments:

No Requirement Level

ES4091 - Directed Study

General

Credit Hrs

Credit Hrs:
0

Credit Hours Max:
3

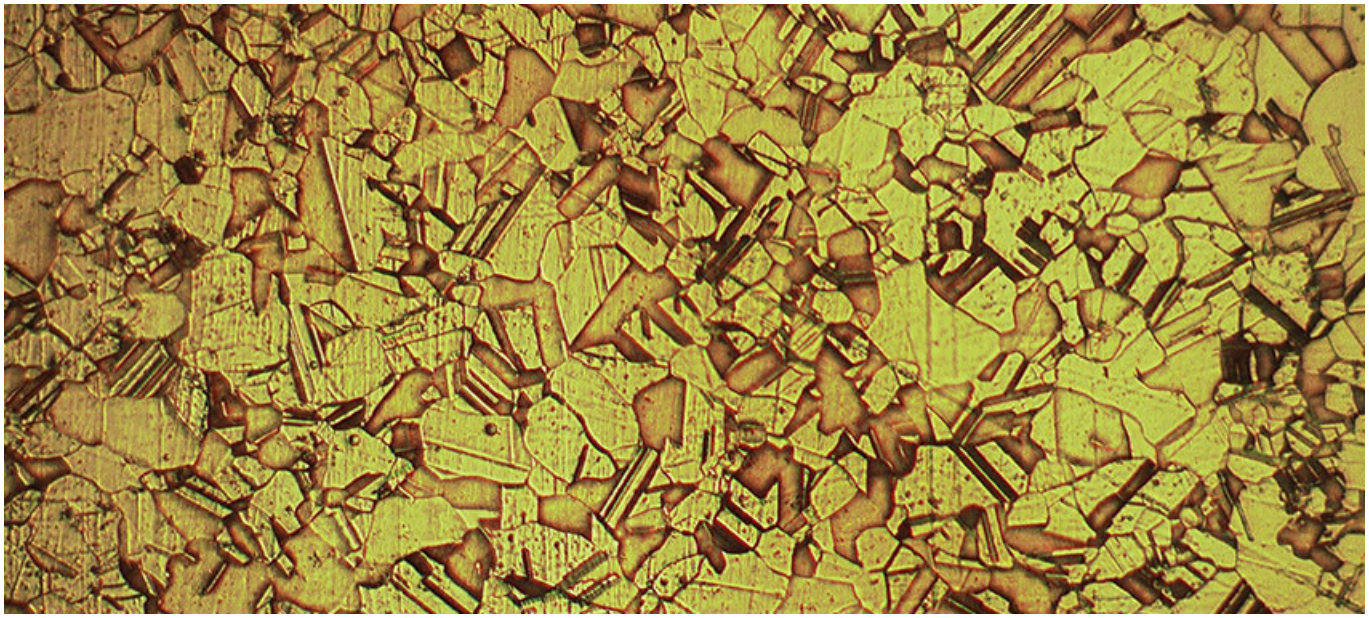
Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, Standard Letter

Equivalent Courses: Previous & Current Courses
ES491

No Requirements

Materials Engineering Department



Materials and Metallurgical Engineering

Degrees Offered: *B.S. in Materials Engineering,*
Materials Engineering with Metallurgical Engineering Option,
Materials Engineering with BioMaterials Engineering Option;
M.S., M.E., and Ph.D. in Materials Engineering

Web site: *https://www.nmt.edu/academics/mtls/index.php*

Department Mission Statement

To educate our students so that they are prepared to obtain and succeed in the best positions in industry, government laboratories, and graduate schools.

- To advance the frontiers of Materials science and engineering.
- To serve the public of New Mexico through outreach and expanded education.

Program Educational Objective

Program educational objectives are broad statements that describe the career and professional accomplishments that the program is preparing graduates to achieve. The Materials Engineering program will prepare graduates who:

- Establish themselves in a range of careers in industry or government or pursue post baccalaureate education in engineering, science, business, law, medicine, or other professional discipline.
- Advance in their chosen profession; and
- Engage in appropriate professional societies and in continuing education activities

Student Outcomes for Undergraduate Program in Material Engineering

Graduates of the Bachelor of Science in Material Engineering program will have demonstrated.

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3. An ability to communicate effectively with a range of audiences
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Programs

Accelerated M.S. in Materials Engineering (pathway)

[Program Overview]

Program Title
Accelerated Master of Science in Materials Engineering

Department(s)
Materials Engineering

Program Description
Qualified undergraduate students may apply for admission to the Accelerated Masters program in Materials Engineering. In fulfillment of the requirements for both B.S and M.S. degrees, as outlined in their respective sections, accepted students may apply six credits of 500-level courses to both degrees.

M.S. in Materials Engineering

[Program Overview]

Program Title
Master of Science in Materials Engineering

Department(s)
Materials Engineering

Program Description
The Master of Science Option prepares students for high quality research (and is often preferred for admission into PhD programs around the country). Full time graduate students must formalize an advisory committee that will consist of an academic advisor from the department and at least two additional members. The selection of an advisor must be completed by the end of the first semester while the remaining members of the committee along with thesis topic must be decided by the end of the second semester.

Program Information & Policies
Department faculty must not be in the minority in the committee. Part time or DE students must formalize their advisor by the time they complete 12 credits. The student must meet with his or her committee at least once per year.

Simple Requisites

Program Requirements
The Course Requirements include:

Master of Science in Materials Engineering Requirements
Type
Completion Requirement

Requirements

At least 24 credit hours of course work that must include:

- A minimum of 12 credit hours of MTLS 5000 level courses
- At least 6 hours of upper level (300+) courses outside the Materials Department, unless the student is from a non-Materials background in which case all courses may be from within the Materials Department
- No more than 3 hours of MTLS 5081 Directed Study
- 6 credit hours of MTLS 5091 (Thesis) that will be defend in a public oral defense
- MTLS 5092 each semester offered (for a maximum of two times)

Students may take MTLS 500(Directed Research) in multiple semesters but the credits may not count toward their degree requirements.

Courses must be approved by the advisory committee, and the research should be directed toward a journal publication. Students must inform faculty advisors in advance regarding courses that they plan to take in the following semester.

Additional Comments:
Students are required to write a thesis proposal and defend it in a public oral defense before the advisory committee at least one full semester (fall or spring) before the final defense. The final thesis must be successfully defended in a public oral defense before the advisory committee. Students may appeal to their advisory committee for possible exceptions.

Institute General Requirements

New Mexico Tech General Graduate Program Requirements.
Type
Completion Requirement

General Requirements

See additional information on the **New Mexico Tech General Graduate Program Requirements** webpage.

Additional Comments:
Note: Students pursuing an Master's. degree in a different discipline than their Bachelor's degree may request a waiver for the out of program requirement. Waivers must be approved by the student's advisor, committee, department chair, and the Dean of Graduate Studies.

These general requirements do not apply to students in the Master of Science for Teachers (MST) program

No Requirement Level

[Learning Outcomes]

Outcome
1. Critically assess the literature

Outcome
2. Effectively engage in written dissemination of technical findings and conclusions

Outcome
3. Effectively engage in oral dissemination of technical findings and conclusions

Outcome
4. Demonstrate a breadth of knowledge in Materials Engineering

Materials Engineering (minor)

[Program Overview]

Program Title
Minor in Materials Engineering

Department(s)
Materials Engineering

Program Description
Minimum of 17 credit hours required to obtain a Minor in Materials Engineering

Simple Requisites

Program Requirements

Minor in Materials Engineering
Type
Completion Requirement

The following courses are required:

Complete ALL of the following Courses:

- MATE202 - Materials Engineering I (Inactive)
  AND MTLS235 - Materials Engineering II
  AND MTLS3027 - Introduction to Physical Metallurgy

Electives

Approved Technical Electives (to yield total of 17)

Additional Comments:

Institute General Requirements

See the Institute **General Education Core Requirements.**

No Requirement Level

Polymer Science (minor)

[Program Overview]

Program Title
Minor in Polymer Science

Department(s)
Chemical Engineering, Materials Engineering

Program Description
Minimum credit hours required—19

Simple Requisites

Program Requirements
The following courses are required:

Minor in Materials Engineering
Type
Completion Requirement

Chemistry Required Courses

Complete ALL of the following Courses:
- CHEM3034 - Organic Chemistry II
- CHEM4046 - Polymer Chemistry

Materials Engineering Required Courses

Complete at least 1 of the following courses:
- MTLS202 - Materials Engineering I
  AND MTLS202L - Materials Engineering I Lab
- MTLS235 - Materials Engineering II
  AND MTLS235L - Materials Engineering II Lab
- MTLS3051 - Introduction to Polymeric Materials

Earn at least 6 credits from the following list

Earn at least 6 credits from the following:
- Technical Electives

Additional Comments:

Institute General Requirements

See the **Institute General Education Core Requirements**.

No Requirement Level

Minor in Quantum Materials

[Program Overview]

Department(s)
Materials Engineering

Program Description
Quantum Materials is a minor for those students whose backgrounds will complement the courses in this minor, such as physics (and perhaps chemistry, chemical engineering,and electrical engineering). The minor includes courses that comprise the core of the MTLS program as well as those specific for the minor or that could be used as a technical elective in the major.

Program Information & Policies
minimum requirements of 18 credits

Simple Requisites

Program Requirements

Minor in Quantum Materials
Type
Completion Requirement

Quantum Materials Core Courses

Complete ALL of the following Courses:
- MTLS202 - Materials Engineering I
- MTLS235 - Materials Engineering II
- MTLS4010 - Microstructure Characterization Methods & Analysis
- MTLS4052 - Solid State Physics for Engineers
- MTLS4077 - Introduction to Quantum Materials

Elective for Quantum Materials

Earn at least 3 credits from the following:
- MTLS4043 - Magnetic Materials
- MTLS4047 - Optical Materials
- MTLS4075 - Introduction to Nano Materials
- or a course approved by the Quantum Materials Minor Advisor.

Additional Comments:

Institute General Requirements
See the NMT Institute Requirements.

No Requirement Level

BS-MATE - B.S. in Materials Engineering

[Program Overview]

Program Title
BS in Materials Engineering

Department(s)
Materials Engineering

Degree & Program Code
BS-MATE

Program Description

Advanced technologies in for example the electronic or aerospace industries, are often initiated with innovations in new Materials. These innovations rest on a fundamental understanding of how the structure of a Material at different length scales, ranging from sub-atomic to nano-, to micro- and macro-scale influences material properties. The state of the Material at these length scales are probed by various characterizing methods, which provide understanding of mechanisms responsible for observed phenomenon. Thereby Material problems can be resolved and innovations made that are both efficient and based on solid scientific principles. The undergraduate Materials program provides this foundations in an academic atmosphere that fosters growth and collaboration. With a small class size, students have the opportunity to interact closely with professors and conduct research in laboratories.

Students are exposed to Materials science principles starting from their freshman year and continuing through their senior year. A number of options are available in the department so that students have the flexibility to select courses that suit a specialization. In addition to theoretical courses, students obtain an excellent experience in processing and characterization techniques during their junior and senior years, these constituting the core of most experimental research and innovations. Material probing methods include spectroscopic (e.g. X-ray, FTIR, Raman), electron microscopic, thermal, and mechanical characterization.

The processing-structure-property relations are developed and expanded upon throughout the undergraduate curriculum. Four classes in the junior year target the theories used to understand characteristics of metals, ceramics, polymers, and composites. Senior-level elective Materials courses target specialized topics such as electronic, structural, nano Materials, biomaterials, and computational Materials science. The senior design sequence emphasizes the synthesis of skills and ideas as well as providing experience in teamwork and practical design.

Research experience for the students is available and encouraged through part-time employment in the broad range of Materials research projects that are on-going in the department and also in other in-house research entities, such as the Energetic Materials Research and Testing Center and the Petroleum Recovery Research Center. Departmental collaborations with scientists at Los Alamos and Sandia National Laboratories provide another avenue for student involvement in research projects. Many of our students pursue graduate degrees either at New Mexico Tech or elsewhere while others seek employment directly. The department operates and maintains a broad range of instrumentation. A full list of these resources is available on the department's web site. Of particular note is the broad range of microscopy capabilities for research and instruction, including scanning electron microscopes, Auger probe and a scanning probe (atomic force) microscope.

Simple Requisites

Program Requirements

Minimum credit hours required—131

In addition to the General Education and Institute Core Curriculum, the following courses are required:

These additional courses may not be taken on a S/U basis

Requirements for Bachelor of Science in Materials Engineering

Type

Completion Requirement

Math Requirement

Credit for trigonometry or college algebra is not allowed for engineering students.

Complete ALL of the following Courses:

- MATH2532 - Calculus III
- MATH3035 - Ordinary Differential Equation

Engineering Science Requirements

Complete ALL of the following Courses:

- ES110 - Intro to Engineering Design
- ES111 - Computer Programming for Engineers
- ES201 - Statics
- ES3002 - Mechanics of Materials
- ES3032 - Electrical Engineering
  OR EE211 - Circuits & Signals I

Materials Engineering courses

Complete ALL of the following Courses:

- MTLS101L - Materials Science & Engineering Lab
- MTLS202 - Materials Engineering I
  AND MTLS202L - Materials Engineering I Lab
- MTLS235 - Materials Engineering II
  AND MTLS235L - Materials Engineering II Lab
- MTLS3001 - Introduction to Ceramic Engineering
- MTLS3010 - Processing & Microstructure Methods & Analysis
- MTLS3011 - Thermal & Mechanical Methods & Analysis
- MTLS3014 - Transport Processes
- MTLS3027 - Introduction to Physical Metallurgy
- MTLS3050 - Materials Thermodynamics
- MTLS3051 - Introduction to Polymeric Materials
- ME4010 - Environmental Issues
- MTLS4045 - Introduction to Composite Materials
- MTLS4081 - Engineering Design I
- MTLS4082 - Engineering Design II

Advanced Basic Sciences (3) Upper-level chemistry and physics and other natural sciences including life, earth, and space sciences.

CHEM 3011, CHEM 3031, CHEM 3033 or MTLS 4052 are recommended; advisor approval is required.

Technical electives (12)

Technical electives (12): Approved upper level MTLS courses. Up to 3 credit hours can be completed outside the department with the consent of the department.

Electives

Electives to complete 131 credit hours

Additional Comments:

Institute General Requirements

General Education Requirements for Bachelor of Science

Type

Completion Requirement

Area 1: Communications Requirement for Bachelor of Science

Complete ALL of the following Course Sets:

- Area 1: Communications (BS Degree) (9 credits)

Area 2: Mathematics and Quantitative Reasoning Requirements for Bachelor of Science

Complete ALL of the following Course Sets:

- Area 2: Mathematics (BS Degree) (8 credits)

Area 3: Science Requirements for a Bachelor of Science

Complete ALL of the following Course Sets:

- Area 3: Science (BS Degree) (18 credits)

Area 4: Social and Behavioral Science Requirements for a Bachelor of Science

Complete ALL of the following Course Sets:

- Area 4: Social and Behavioral Science (BS or BGS Degree) (6 credits)

Area 5: Humanities Course Requirements for a Bachelor of Science

Complete ALL of the following Course Sets:

- Area 5: Humanities (BS or BGS Degree) (6 credits)

Area 6: Creative & Fine Art Requirement for a Bachelor of Science

Complete ALL of the following Course Sets:

- Area 6: Creative and Fine Arts (BS, BA, or BGS Degree) (3 credits)

Area 7: Additional Humanities/Social Science Requirement for a Bachelor of Science

Complete ALL of the following Course Sets:

- Area 7: Additional Courses from Areas 4, 5, 6 (BS, BA, or BGS Degree) (3 credits)

Additional Comments:
Credit for trigonometry or college algebra is not allowed for engineering students.

No Requirement Level

[Learning Outcomes]

Outcome
1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics

Outcome
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors

Outcome
3. An ability to communicate effectively with a range of audiences

Outcome
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

Outcome
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives

Outcome
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use

Outcome
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies

[Sample 4-Year Curriculum Plan(s)]

Degree Map Name
Sample Curriculum for the Bachelor of Science In Materials Engineering
Total Degree Map Credits
131
Degree Map Effective Catalog Year
2025 -

Year	Semester	Actual Credits
Year 1	Fall	17

Course

- MTLS101L - Materials Science & Engineering Lab

Actual Credits 1

Course

- ENGL1110 - g1:Composition I

Actual Credits 3

Course

- MATH1510 - g2:Calculus I

Actual Credits 4

Course
- CHEM1215 & CHEM1215L: g:General Chemistry I and Lab

Actual Credits 4

Course
- Social Science/Humanities/Fine & Creative Arts Requirements

Actual Credits 3

Course
- ES110 - Intro to Engineering Design

Actual Credits 2

Year	Semester	Actual Credits
Year 1	Spring	17

Course
- ENGL1120 - g1:Composition II

Actual Credits 3

Course
- MATH1520 - g2:Calculus II

Actual Credits 4

Course
- CHEM1225 & CHEM1225L: g: General Chemistry II and Lab

Actual Credits 4

Course
- ES111 - Computer Programming for Engineers

Actual Credits 3

Course
- Humanities/Social Science

Actual Credits 3

Year	Semester	Actual Credits
Year 2	Fall	16

Course
- MTLS202 & MTLS202L: Materials Engineering I and Lab

Actual Credits 4

Course
- MATH2532 - Calculus III

Actual Credits 4

Course
- PHYS1310 & PHYS1310L: g:Calculus-Physics I and Lab

Actual Credits 5

Course
- Humanities/Social Science

Actual Credits 3

Year	Semester	Actual Credits
Year 2	Spring	18

Course
- MATH3035 - Ordinary Differential Equation

Actual Credits 3

Course
- PHYS1320 & PHYS1320L: g:Calculus-Based Physics II and Lab

Actual Credits 5

Course
- MTLS235 - Materials Engineering II
- **AND** MTLS235L - Materials Engineering II Lab

Actual Credits 4

Course
- ES201 - Statics

Actual Credits 3

Course
- Social Science/Humanities/Fine & Creative Arts Requirements

Actual Credits 3

Year	Semester	Actual Credits
Year 3	Fall	15

Course
- Humanities/Social Science

Actual Credits 3

Course
- ES3002 - Mechanics of Materials

Actual Credits 3

Course
- MTLS3001 - Introduction to Ceramic Engineering

Actual Credits 3

Course
- MTLS3050 - Materials Thermodynamics

Actual Credits 3

Course
- MTLS3010 - Processing & Microstructure Methods & Analysis

Actual Credits 3

Year	Semester	Actual Credits
Year 3	Spring	18

Course
- ENGL3041 - i1:Technical Writing

Actual Credits 3

Course
- ES3032 - Electrical Engineering
- **AND** EE211 - Circuits & Signals I

Actual Credits 3

Course
- MTLS3027 - Introduction to Physical Metallurgy

Actual Credits 3

Course
- MTLS3051 - Introduction to Polymeric Materials

Actual Credits 3

Course
- MTLS3014 - Transport Processes

Actual Credits 3

Course
- MTLS3011 - Thermal & Mechanical Methods & Analysis

Actual Credits 3

Year	Semester	Actual Credits
Year 4	Fall	15

Course
- Technical Elective (Generic)

Actual Credits 3

Course
- Technical Elective (Generic)

Actual Credits 3

Course
- MTLS4045 - Introduction to Composite Materials

Actual Credits 3

Course
- MTLS4081 - Engineering Design I

Actual Credits 3

Course
- MTLS4010 - Microstructure Characterization Methods & Analysis

Actual Credits 3

Year	Semester	Actual Credits
Year 4	Spring	15

Course
- Technical Elective (Generic)

Actual Credits 3

Course
- Technical Elective (Generic)

Actual Credits 3

Course
- Advanced Basic Science Elective (Generic)

Actual Credits 3

Course
- MTLS4082 - Engineering Design II

Actual Credits 3

Course
- Social Science/Humanities/Fine & Creative Arts Requirements

Actual Credits 3

BS-MATE - B.S. in Materials Engineering with BioMaterials Engineering Option

[Program Overview]

Program Title
BS in Materials Engineering with BioMaterials Engineering Option

Department(s)
Materials Engineering

Degree & Program Code
BS-MATE

Program Description
Advanced technologies in for example the electronic or aerospace industries, are often initiated with innovations in new Materials. These innovations rest on a fundamental understanding of how the structure of a Material at different length scales, ranging from sub-atomic to nano-, to micro- and macro-scale influences material properties. The state of the Material at these length scales are probed by various characterizing methods, which provide understanding of mechanisms responsible for observed phenomenon. Thereby Material problems can be resolved and innovations made that are both efficient and based on solid scientific principles. The undergraduate Materials program provides this foundations in an academic atmosphere that fosters growth and collaboration. With a small class size, students have the opportunity to interact closely with professors and conduct research in laboratories.
Students are exposed to Materials science principles starting from their freshman year and continuing through their senior year. A number of options are available in the department so that students have the flexibility to select courses

that suit a specialization. In addition to theoretical courses, students obtain an excellent experience in processing and characterization techniques during their junior and senior years, these constituting the core of most experimental research and innovations. Material probing methods include spectroscopic (e.g. X-ray, FTIR, Raman), electron microscopic, thermal, and mechanical characterization.
The processing-structure-property relations are developed and expanded upon throughout the undergraduate curriculum. Four classes in the junior year target the theories used to understand characteristics of metals, ceramics, polymers, and composites. Senior-level elective Materials courses target specialized topics such as electronic, structural, nano Materials, biomaterials, and computational Materials science. The senior design sequence emphasizes the synthesis of skills and ideas as well as providing experience in teamwork and practical design.
Research experience for the students is available and encouraged through part-time employment in the broad range of Materials research projects that are on-going in the department and also in other in-house research entities, such as the Energetic Materials Research and Testing Center and the Petroleum Recovery Research Center. Departmental collaborations with scientists at Los Alamos and Sandia National Laboratories provide another avenue for student involvement in research projects. Many of our students pursue graduate degrees either at New Mexico Tech or elsewhere while others seek employment directly. The department operates and maintains a broad range of instrumentation. A full list of these resources is available on the department's web site. Of particular note is the broad range of microscopy capabilities for research and instruction, including scanning electron microscopes, Auger probe and a scanning probe (atomic force) microscope.

Simple Requisites

Program Requirements
Minimum credit hours required—131
In addition to the General Education and Institute Core Curriculum, the following courses are required:
These additional courses may not be taken on a S/U basis

Requirements for Bachelor of Science in Materials Engineering
Type
Completion Requirement

Math Requirement

Credit for trigonometry or college algebra is not allowed for engineering students.

Complete ALL of the following Courses:
- MATH2532 - Calculus III
- MATH3035 - Ordinary Differential Equation

Engineering Science Requirements

Complete ALL of the following Courses:
- ES110 - Intro to Engineering Design
- ES111 - Computer Programming for Engineers
- ES201 - Statics
- ES3002 - Mechanics of Materials
- ES3032 - Electrical Engineering
  OR EE211 - Circuits & Signals I

Materials Engineering courses

Complete ALL of the following Courses:
- MTLS101L - Materials Science & Engineering Lab
- MTLS202 - Materials Engineering I
  AND MTLS202L - Materials Engineering I Lab
- MTLS235 - Materials Engineering II
  AND MTLS235L - Materials Engineering II Lab
- MTLS3001 - Introduction to Ceramic Engineering
- MTLS3014 - Transport Processes
- MTLS3027 - Introduction to Physical Metallurgy
- MTLS3050 - Materials Thermodynamics
- MTLS3051 - Introduction to Polymeric Materials
- MTLS4020 - Biomedical Materials
- MTLS4081 - Engineering Design I
- MTLS4082 - Engineering Design II

Two of the following

Complete at least 2 of the following courses:
- MTLS3010 - Processing & Microstructure Methods & Analysis
- MTLS3011 - Thermal & Mechanical Methods & Analysis
- MTLS4010 - Microstructure Characterization Methods & Analysis
- BIOL2110 - Pinciples of Biology: Cellular & Molecular
  AND BIOL2110L - Pinciples of Biology: Cellular & Molecular Lab
- BIOL3031 - Cell Biology

Technical electives (6): Suggested electives include

Earn at least 6 credits from the following:
- BIOL3041 - Microbiology
- BIOL3051 - Anatomy & Physiology
- CH E4073 - Polymer Materials Engineering
- CHEM3033 - Organic Chemistry I
  AND CHEM3033L - Organic Chemistry I Lab
- CHEM3034 - Organic Chemistry II
  AND CHEM3034L - Organic Chemistry II Lab
- MTLS4045 - Introduction to Composite Materials
- MATH2350 - Statistical Methods
- MATH3082 - Probability and Statistics
- MENG4060 - Intro to Biomedical Engineering
- MENG4065 - Biorheology
- MENG4089 - Pilot Course
- MENG5076 - Biomedical Mechatronics

Alternative or additional technical electives must be approved by the Student, the Advisor, and the Department Chair

Additional Comments:
3 credits from program specific electives

Institute General Requirements

General Education Requirements for Bachelor of Science
Type
Completion Requirement

Area 1: Communications Requirement for Bachelor of Science

Complete ALL of the following Course Sets:
- Area 1: Communications (BS Degree) (9 credits)

Area 2: Mathematics and Quantitative Reasoning Requirements for Bachelor of Science

Complete ALL of the following Course Sets:
- Area 2: Mathematics (BS Degree) (8 credits)

Area 3: Science Requirements for a Bachelor of Science

Complete ALL of the following Course Sets:

- Area 3: Science (BS Degree) (18 credits)

Area 4: Social and Behavioral Science Requirements for a Bachelor of Science

Complete ALL of the following Course Sets:

- Area 4: Social and Behavioral Science (BS or BGS Degree) (6 credits)

Area 5: Humanities Course Requirements for a Bachelor of Science

Complete ALL of the following Course Sets:

- Area 5: Humanities (BS or BGS Degree) (6 credits)

Area 6: Creative & Fine Art Requirement for a Bachelor of Science

Complete ALL of the following Course Sets:

- Area 6: Creative and Fine Arts (BS, BA, or BGS Degree) (3 credits)

Area 7: Additional Humanities/Social Science Requirement for a Bachelor of Science

Complete ALL of the following Course Sets:

- Area 7: Additional Courses from Areas 4, 5, 6 (BS, BA, or BGS Degree) (3 credits)

Additional Comments:
Credit for trigonometry or college algebra is not allowed for engineering students.

No Requirement Level

[Learning Outcomes]

Outcome
1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics

Outcome
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors

Outcome
3. An ability to communicate effectively with a range of audiences

Outcome
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

Outcome
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives

Outcome
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use

Outcome
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies

[Sample 4-Year Curriculum Plan(s)]

Degree Map Name
Sample Curriculum for the Bachelor of Science In Materials Engineering with BioMaterials Engineering Option
Total Degree Map Credits
132
Degree Map Effective Catalog Year
2025 -

Year	Semester	Actual Credits
Year 1	Fall	17

Course

- MTLS101L - Materials Science & Engineering Lab

Actual Credits 1

Course

- ENGL1110 - g1:Composition I

Actual Credits 3

Course

- MATH1510 - g2:Calculus I

Actual Credits 4

Course
- CHEM1215 & CHEM1215L: g:General Chemistry I and Lab

Actual Credits 4

Course
- Social Science/Humanities/Fine & Creative Arts Requirements

Actual Credits 3

Course
- ES110 - Intro to Engineering Design

Actual Credits 2

Year	Semester	Actual Credits
Year 1	Spring	17

Course
- ENGL1120 - g1:Composition II

Actual Credits 3

Course
- MATH1520 - g2:Calculus II

Actual Credits 4

Course
- CHEM1225 & CHEM1225L: g: General Chemistry II and Lab

Actual Credits 4

Course
- ES111 - Computer Programming for Engineers

Actual Credits 3

Course
- Humanities/Social Science

Actual Credits 3

Year	Semester	Actual Credits
Year 2	Fall	17

Course
- MTLS202 & MTLS202L: Materials Engineering I and Lab

Actual Credits 4

Course
- MATH2532 - Calculus III

Actual Credits 4

Course
- PHYS1310 & PHYS1310L: g:Calculus-Physics I and Lab

Actual Credits 5

Course
- BIOL2110 & BIOL2110L: Principles of Biology I and Lab

Actual Credits 4

Year	Semester	Actual Credits
Year 2	Spring	18

Course
- MATH3035 - Ordinary Differential Equation

Actual Credits 3

Course
- PHYS1320 & PHYS1320L: g:Calculus-Based Physics II and Lab

Actual Credits 5

Course
- MTLS235 - Materials Engineering II
- **AND** MTLS235L - Materials Engineering II Lab

Actual Credits 4

Course
- ES201 - Statics

Actual Credits 3

Course
- Social Science/Humanities/Fine & Creative Arts Requirements

Actual Credits 3

Year	Semester	Actual Credits
Year 3	Fall	15

Course
- MTLS3001 - Introduction to Ceramic Engineering

Actual Credits 3

Course
- BIOL3031 - Cell Biology

Actual Credits 3

Course
- ES3002 - Mechanics of Materials

Actual Credits 3

Course
- MTLS3050 - Materials Thermodynamics

Actual Credits 3

Course
- MTLS3010 - Processing & Microstructure Methods & Analysis

Actual Credits 3

Year	Semester	Actual Credits
Year 3	Spring	18

Course
- MTLS3051 - Introduction to Polymeric Materials

Actual Credits 3

Course
- MTLS3014 - Transport Processes

Actual Credits 3

Course
- MTLS3027 - Introduction to Physical Metallurgy

Actual Credits 3

Course
- EE3032 - Electricity and Magnetism
  OR
- EE211 - Circuits & Signals I

Actual Credits 3

Course
- ENGL3041 - i1:Technical Writing

Actual Credits 3

Course
- Humanities/Social Science

Actual Credits 3

Year	Semester	Actual Credits
Year 4	Fall	15

Course
- BIOL3041 - Microbiology
  OR
- BIOL3051 - Anatomy & Physiology
  OR
- CH E4073 - Polymer Materials Engineering
  OR
- CHEM3033 - Organic Chemistry I
- **AND** CHEM3033L - Organic Chemistry I Lab
  OR
- CHEM3034 - Organic Chemistry II
- **AND** CHEM3034L - Organic Chemistry II Lab
  OR
- MTLS4045 - Introduction to Composite Materials
  OR
- MATH2350 - Statistical Methods
  OR
- MATH3082 - Probability and Statistics
  OR
- MENG4060 - Intro to Biomedical Engineering
  OR
- MENG4065 - Biorheology
  OR
- MENG4089 - Pilot Course
  OR
- MTLS5076 - Drug Delivery Techniques

Actual Credits 3

Course
- Humanities/Social Science

Actual Credits 3

Course
- Humanities/Social Science

Actual Credits 3

Course
- MTLS4081 - Engineering Design I

Actual Credits 3

Course
- MTLS3010 - Processing & Microstructure Methods & Analysis
  OR
- MTLS3011 - Thermal & Mechanical Methods & Analysis
  OR
- MTLS4010 - Microstructure Characterization Methods & Analysis

Actual Credits 3

Year	Semester	Actual Credits
Year 4	Spring	15

Course
- MTLS4020 - Biomedical Materials

Actual Credits 3

Course

- BIOL3041 - Microbiology
  OR
- BIOL3051 - Anatomy & Physiology
  OR
- CH E4073 - Polymer Materials Engineering
  OR
- CHEM3033 - Organic Chemistry I
- **AND** CHEM3033L - Organic Chemistry I Lab
  OR
- CHEM3034 - Organic Chemistry II
- **AND** CHEM3034L - Organic Chemistry II Lab
  OR
- MTLS4045 - Introduction to Composite Materials
  OR
- MATH2350 - Statistical Methods
  OR
- MATH3082 - Probability and Statistics
  OR
- MENG4060 - Intro to Biomedical Engineering
  OR
- MENG4065 - Biorheology
  OR
- MENG4089 - Pilot Course
  OR
- MTLS5076 - Drug Delivery Techniques

Actual Credits 3

Course

- MTLS4082 - Engineering Design II

Actual Credits 3

Course

- Program Specific Elective (Generic)

Actual Credits 3

Course

- Humanities/Social Science

Actual Credits 3

BS-MATE - B.S. in Materials Engineering with Metallurgical Engineering Option

[Program Overview]

Program Title
BS in Materials Engineering with Metallurgical Engineering Option

Department(s)
Materials Engineering

Degree & Program Code
BS-MATE

Program Description
Advanced technologies in for example the electronic or aerospace industries, are often initiated with innovations in new Materials. These innovations rest on a fundamental understanding of how the structure of a Material at different length scales, ranging from sub-atomic to nano-, to micro- and macro-scale influences material properties. The state of the Material at these length scales are probed by various characterizing methods, which provide understanding of mechanisms responsible for observed phenomenon. Thereby Material problems can be resolved and innovations made that are both efficient and based on solid scientific principles. The undergraduate Materials program provides this foundations in an academic atmosphere that fosters growth and collaboration. With a small class size, students have the opportunity to interact closely with professors and conduct research in laboratories.
Students are exposed to Materials science principles starting from their freshman year and continuing through their senior year. A number of options are available in the department so that students have the flexibility to select courses that suit a specialization. In addition to theoretical courses, students obtain an excellent experience in processing and characterization techniques during their junior and senior years, these constituting the core of most experimental research and innovations. Material probing methods include spectroscopic (e.g. X-ray, FTIR, Raman), electron microscopic, thermal, and mechanical characterization.
The processing-structure-property relations are developed and expanded upon throughout the undergraduate curriculum. Four classes in the junior year target the theories used to understand characteristics of metals, ceramics, polymers, and composites. Senior-level elective Materials courses target specialized topics such as electronic, structural, nano Materials, biomaterials, and computational Materials science. The senior design sequence emphasizes the synthesis of skills and ideas as well as providing experience in teamwork and practical design.
Research experience for the students is available and encouraged through part-time employment in the broad range of Materials research projects that are on-going in the department and also in other in-house research entities, such as the Energetic Materials Research and Testing Center and the Petroleum Recovery Research Center. Departmental collaborations with scientists at Los Alamos and Sandia National Laboratories provide another avenue for student involvement in research projects. Many of our students pursue graduate degrees either at New Mexico Tech or elsewhere while others seek employment directly. The department operates and maintains a broad range of instrumentation. A full list of these resources is available on the department's web site. Of particular note is the broad range of microscopy capabilities for research and instruction, including scanning electron microscopes, Auger probe and a scanning probe (atomic force) microscope.

Simple Requisites

Program Requirements
Minimum credit hours required—131

The required curriculum for the Metallurgy Engineering Option is SAME as Materials Engineering. However, students with Metallurgy Engineering Option MUST take 12 credits in Technical Electives, with a minimum of 9 credits required in advisor approved METALS- FOCUSED courses
In addition to the General Education and Institute Core Curriculum, the following courses are required:
These additional courses may not be taken on a S/U basis

Requirements for Bachelor of Science in Materials Engineering
Type
Completion Requirement

Math Requirement

Credit for trigonometry or college algebra is not allowed for engineering students.

Complete ALL of the following Courses:

- MATH2532 - Calculus III
- MATH3035 - Ordinary Differential Equation

Engineering Science Requirements

Complete ALL of the following Courses:

- ES110 - Intro to Engineering Design
- ES111 - Computer Programming for Engineers

- ES201 - Statics
- ES3002 - Mechanics of Materials
- ES3032 - Electrical Engineering
  OR EE211 - Circuits & Signals I

Materials Engineering courses

Complete ALL of the following Courses:

- MTLS101L - Materials Science & Engineering Lab
- MTLS202 - Materials Engineering I
  AND MTLS202L - Materials Engineering I Lab
- MTLS235 - Materials Engineering II
  AND MTLS235L - Materials Engineering II Lab
- MTLS3001 - Introduction to Ceramic Engineering
- MTLS3010 - Processing & Microstructure Methods & Analysis
- MTLS3011 - Thermal & Mechanical Methods & Analysis
- MTLS3014 - Transport Processes
- MTLS3027 - Introduction to Physical Metallurgy
- MTLS3050 - Materials Thermodynamics
- MTLS3051 - Introduction to Polymeric Materials
- ME4010 - Environmental Issues
- MTLS4045 - Introduction to Composite Materials
- MTLS4081 - Engineering Design I
- MTLS4082 - Engineering Design II

Advanced Basic Sciences (3) Upper-level chemistry and physics and other natural sciences including life, earth, and space sciences.

CHEM 311, CHEM 331, CHEM 333 or MTLS 4052 are recommended; advisor approval is required.

Technical electives (12)

Technical electives (12): Approved upper level MTLS courses. Up to 3 credit hours can be completed outside the department with the consent of the department.

Electives

Electives to complete 131 credit hours

Additional Comments:

Institute General Requirements

General Education Requirements for Bachelor of Science
Type
Completion Requirement

Area 1: Communications Requirement for Bachelor of Science

Complete ALL of the following Course Sets:

- Area 1: Communications (BS Degree) (9 credits)

Area 2: Mathematics and Quantitative Reasoning Requirements for Bachelor of Science

Complete ALL of the following Course Sets:

- Area 2: Mathematics (BS Degree) (8 credits)

Area 3: Science Requirements for a Bachelor of Science

Complete ALL of the following Course Sets:

- Area 3: Science (BS Degree) (18 credits)

Area 4: Social and Behavioral Science Requirements for a Bachelor of Science

Complete ALL of the following Course Sets:

- Area 4: Social and Behavioral Science (BS or BGS Degree) (6 credits)

Area 5: Humanities Course Requirements for a Bachelor of Science

Complete ALL of the following Course Sets:

- Area 5: Humanities (BS or BGS Degree) (6 credits)

Area 6: Creative & Fine Art Requirement for a Bachelor of Science

Complete ALL of the following Course Sets:

- Area 6: Creative and Fine Arts (BS, BA, or BGS Degree) (3 credits)

Area 7: Additional Humanities/Social Science Requirement for a Bachelor of Science

Complete ALL of the following Course Sets:

- Area 7: Additional Courses from Areas 4, 5, 6 (BS, BA, or BGS Degree) (3 credits)

Additional Comments:
Credit for trigonometry or college algebra is not allowed for engineering students.

No Requirement Level

[Learning Outcomes]

Outcome
1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics

Outcome
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors

Outcome
3. An ability to communicate effectively with a range of audiences

Outcome
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

Outcome
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives

Outcome
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use

Outcome
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies

[Sample 4-Year Curriculum Plan(s)]

Degree Map Name
Sample Curriculum for the Bachelor of Science In Materials Engineering
Total Degree Map Credits
131
Degree Map Effective Catalog Year
2025 -

Year	Semester	Actual Credits
Year 1	Fall	17

Course
- MTLS101L - Materials Science & Engineering Lab

Actual Credits 1

Course
- ENGL1110 - g1:Composition I

Actual Credits 3

Course
- MATH1510 - g2:Calculus I

Actual Credits 4

Course
- CHEM1215 & CHEM1215L: g:General Chemistry I and Lab

Actual Credits 4

Course
- Social Science/Humanities/Fine & Creative Arts Requirements

Actual Credits 3

Course
- ES110 - Intro to Engineering Design

Actual Credits 2

Year	Semester	Actual Credits
Year 1	Spring	17

Course
- ENGL1120 - g1:Composition II

Actual Credits 3

Course
- MATH1520 - g2:Calculus II

Actual Credits 4

Course
- CHEM1225 & CHEM1225L: g: General Chemistry II and Lab

Actual Credits 4

Course
- ES111 - Computer Programming for Engineers

Actual Credits 3

Course
- Humanities/Social Science

Actual Credits 3

Year	Semester	Actual Credits
Year 2	Fall	16

Course
- MTLS202 & MTLS202L: Materials Engineering I and Lab

Actual Credits 4

Course
- MATH2532 - Calculus III

Actual Credits 4

Course
- PHYS1310 & PHYS1310L: g:Calculus-Physics I and Lab

Actual Credits 5

Course
- Humanities/Social Science

Actual Credits 3

Year	Semester	Actual Credits
Year 2	Spring	18

Course
- MATH3035 - Ordinary Differential Equation

Actual Credits 3

Course
- PHYS1320 & PHYS1320L: g:Calculus-Based Physics II and Lab

Actual Credits 5

Course
- MTLS235 - Materials Engineering II
- **AND** MTLS235L - Materials Engineering II Lab

Actual Credits 4

Course
- ES201 - Statics

Actual Credits 3

Course
- Social Science/Humanities/Fine & Creative Arts Requirements

Actual Credits 3

Year	Semester	Actual Credits
Year 3	Fall	15

Course
- Humanities/Social Science

Actual Credits 3

Course
- ES3002 - Mechanics of Materials

Actual Credits 3

Course
- MTLS3001 - Introduction to Ceramic Engineering

Actual Credits 3

Course
- MTLS3050 - Materials Thermodynamics

Actual Credits 3

Course
- MTLS3010 - Processing & Microstructure Methods & Analysis

Actual Credits 3

Year	Semester	Actual Credits
Year 3	Spring	18

Course
- ENGL3041 - i1:Technical Writing

Actual Credits 3

Course
- ES3032 - Electrical Engineering
- **AND** EE211 - Circuits & Signals I

Actual Credits 3

Course
- MTLS3027 - Introduction to Physical Metallurgy

Actual Credits 3

Course
- MTLS3051 - Introduction to Polymeric Materials

Actual Credits 3

Course
- MTLS3014 - Transport Processes

Actual Credits 3

Course
- MTLS3011 - Thermal & Mechanical Methods & Analysis

Actual Credits 3

Year	Semester	Actual Credits
Year 4	Fall	15

Course
- Technical Elective (Generic)

Actual Credits 3

Course
- Technical Elective (Generic)

Actual Credits 3

Course
- MTLS4045 - Introduction to Composite Materials

Actual Credits 3

Course
- MTLS4081 - Engineering Design I

Actual Credits 3

Course
- MTLS4010 - Microstructure Characterization Methods & Analysis

Actual Credits 3

Year	Semester	Actual Credits
Year 4	Spring	15

Course
- Technical Elective (Generic)

Actual Credits 3

Course
- Technical Elective (Generic)

Actual Credits 3

Course
- Advanced Basic Science Elective (Generic)

Actual Credits 3

Course
- MTLS4082 - Engineering Design II

Actual Credits 3

Course
- Social Science/Humanities/Fine & Creative Arts Requirements

Actual Credits 3

ME-MATE - M.E. in Materials Engineering

[Program Overview]

Program Title
Master of Engineering in Materials Engineering

Department(s)
Materials Engineering

Degree & Program Code
ME-MATE

Program Description
The Master of Engineering (ME) degree is a coursework only option for students seeking a non-research-based advanced degree. The ME in Materials Engineering is professionally-oriented, focused on satisfying the needs of practicing engineers in a materials-related discipline. Degree requirements are set by the departmental Master of Engineering Graduate Committee.

Simple Requisites

Program Requirements

The Course Requirements include:

1. At least 30 credit hours of upper level coursework that must include:
   (i) a minimum of 12 credit hours of MTLS 500 level courses
   and
   (ii) the 6 credit hours of outside department coursework must be selected from EMGT 501, EMGT 502, EMGT 503, EMGT 504, EMGT 505,EMGT 506, EMGT 507, EMGT 508, EMGT 509, or EMGT 510.
   (iii) ME students with a BS in Materials Engineering may take an additional 6 credits of elective outside of the Materials Engineering department, for a minimum of 18 hours of MTLS coursework. ME students with a BS outside of Materials Engineering must complete 21 credit hours of MTLS coursework.
2. Students may not use MTLS 581, Directed Study, to satisfy the coursework requirements for a Master of Engineering degree. All coursework used towards the ME degree requirements must carry a letter grade.
3. The student must work with his/her faculty advisor to form a course plan. Coursework to be applied towards the degree must be approved by the graduate student's advisor, chair, and the Dean of Graduate Studies
4. Students enrolled in the Master of Engineering program are required to take two semesters of MTLS 592. MTLS 592 cannot be used towards the ME 30 credit coursework requirements. If a student has completed their BS in Materials Engineering or affiliated field at New Mexico Tech and has at least a 3.0 GPA, the student can be accepted to the ME program without taking the GRE.

Institute General Requirements

See the **New Mexico Tech General Graduate Program Requirements** for further information.

No Requirement Level

[Learning Outcomes]

Outcome
Critically assess the literature

Outcome
Effectively engage in written dissemination of technical findings and conclusions

Outcome
Effectively engage in oral dissemination of technical findings and conclusions

Outcome
Demonstrate a breadth of knowledge in Materials Engineering

PHD-MATE - Ph.D. in Materials Engineering

[Program Overview]

Program Title
Doctor of Philosophy in Materials Engineering

Department(s)
Materials Engineering

Degree & Program Code
PHD-MATE

Program Description
The prospective doctoral candidate should develop a good background in Materials sciences, chemistry, physics, and mathematics, in addition to achieving a high level of competence in a specialized area of Materials. Programs are arranged by the prospective student and the student's advisory committee.

Simple Requisites

Program Requirements
The PhD requirements include the following:

Doctor of Philosophy in Materials Engineering Requirements
Type
Completion Requirement

Select an advisory committee that shall consist of a minimum of four members:

1. an academic advisor from the Materials department,
2. at least three other members out of which one must be from outside the department (not necessarily from a different field). The research advisor may be the academic advisor or other member of the committee. Materials faculty shall not be in the minority on the advisory committee. The student must select an academic advisor, who may serve as a temporary research advisor, before the second semester of study. The selection of the entire committee and dissertation topic must be completed by the end of the second semester of study for full-time in-house students, and immediately after completing 12 credit hours for DE students. The student must meet with his or her committee at least once per year, and must get courses approved by them.

Complete at least 24 credit hours of courses approved by the doctoral committee, including:

- At least 12 hours of 5000 level courses. No more than 3 hours of MTLS 5081 Directed Study may be used for fulfilling the course requirements. Students may take MTLS 5000 (Directed Research) in multiple semesters but the credits may not count towards their degree requirements.

For students who have already received an MS degree from the Materials department, the total credit requirements for course work may be reduced below 24 credits with the approval of their committee, department chair, and the graduate dean

Conduct a successful written and public oral critique of a paper published in a high quality professional journal

The paper choice shall be agreed on by the doctoral committee. The paper critique is the Materials Department's **Preliminary** (alternately called qualifying) examination. This is the first examination that a student has to pass. During the paper critique presentation, the student may be asked questions relating to background knowledge gained from taking regular coursework in Materials and related subjects. The paper critique must be completed within 18 months of enrolling into the PhD program.

Write a research proposal and defend it in a public oral defense at least two full semesters before the final dissertation defense

This proposal defense is the Materials Department **Candidacy** exam, and should address the rationale for the research plan and preliminary work in progress. This examination can only be taken after a student has passed the preliminary examination.

The admission to candidacy to the PhD degree requires that the preliminary and candidacy examinations be passed and approved by the advisory committee.

Following this, the student must enroll in at least 24 credit hours of MTLS 5095 Dissertation during which the student completes the research project approved by the advisory committee. The student cannot start taking MTLS 5095 credits until both the preliminary exam (paper critique) and the candidacy exam (proposal defense) have been passed.

Full Time

A full-time graduate student must be enrolled in a minimum of 9 credit hours per regular semester and 6 credit hours during the summer.

The student must submit at least one paper based on the dissertation to a recognized journal acceptable to the doctoral committee.

A preprint must be submitted to the doctoral committee prior to defense of the PhD dissertation. It is preferable that this paper be accepted by the journal and a written copy of the acceptance or conditional acceptance with reviewer comments should be provided to the committee.

The student must write the final dissertation and defend it in an oral public defense before the doctoral committee.

Additional Comments:
Additional requirements include the New Mexico Tech General Graduate Program Requirements.

Institute General Requirements

New Mexico Tech General Graduate Program Requirements.
Type
Completion Requirement

New Mexico Tech General Graduate Program Requirements.

Further information can be found on the **New Mexico Tech General Graduate Program Requirements** webpage.

Additional Comments:

No Requirement Level

[Learning Outcomes]

Outcome
1. Critically assess the literature

Outcome
2. Effectively engage in written dissemination of technical findings and conclusions

Outcome
3. Effectively engage in oral dissemination of technical findings and conclusions

Outcome
4. Demonstrate a breadth of knowledge in Materials Engineering

Courses

MTLS101L - Materials Science & Engineering Lab

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
2

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Hands-on laboratory experience with some fundamental concepts in Materials engineering: classification of solids, gelation processes, particulate dispersions, nucleation and growth of crystals, phase diagrams, magnetic domains, (explosive) welding, and composite design. Course provides a glossary of terms and concepts used in the field of Materials science and engineering.

Equivalent Courses: Previous & Current Courses
MATE101L

No Requirements

MTLS202 - Materials Engineering I

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
The course is an introduction to the important concepts in materials science and engineering with a goal of building the foundations for all other courses related to materials. The course introduces the perspectives needed to think about materials in other areas of engineering and the physical sciences. The structure, properties, and processing of metals, ceramics, polymers, and composite materials are discussed. Topics covered include atomic bonding, crystal structures and symmetry, metal alloys, strength, microstructures, glasses, defects, diffusion, elasticity, fracture, and phase diagrams.

Equivalent Courses: Previous & Current Courses
MATE202

Simple Requisites

Course Requisite Requirements

Corequisite Type
Corequisite

Corequisite

Enroll in the following Courses:

- CHEM1225 - g3:General Chemistry II

Additional Comments:

No Requirement Level

MTLS202L - Materials Engineering I Lab

General

Credit Hrs

Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Laboratory experiments addressing elementary design problems involving optimal use of Materials. Designed to reinforce principles discussed in MTLS 202.

Equivalent Courses: Previous & Current Courses
MATE202L

Simple Requisites

Course Requisite Requirements

Corequisite
Type
Corequisite

Corequisite

Enroll in the following Courses:

- MTLS202 - Materials Engineering I

Additional Comments:

No Requirement Level

MTLS235 - Materials Engineering II

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Survey of technologically important Materials including ceramics, glasses, semiconductors, polymers and composites. The objective is to understand the chemical composition, structure, processing and property relationships in material systems. The student will obtain a basic understanding of the principles of electronic transport, dielectric, thermal, optical and mechanical properties of engineered solids. Undergraduate students majoring in Materials Engineering must take MTLS 235L concurrently.

Equivalent Courses: Previous & Current Courses
MATE235

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

Prerequisites

Complete ALL of the following Courses:

- CHEM1225 - g3:General Chemistry II
  AND CHEM1225L - g3:General Chemistry II Lab

Additional Comments:

Corequisites
Type
Corequisite

Corequisites

Enroll in the following Courses:

- PHYS1320 - g3:Calculus-based Physics II
  AND PHYS1320L - g3:Calculus-based Physics II Lab

Additional Comments:

No Requirement Level

MTLS235L - Materials Engineering II Lab

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Laboratory experiments introducing the fabrication of technical Materials and the measurement of their properties. Designed to reinforce principles discussed in MTLS 235.

Equivalent Courses: Previous & Current Courses
MATE235L

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

Prerequisites

Complete ALL of the following Courses:

- CHEM1225 - g3:General Chemistry II
  AND CHEM1225L - g3:General Chemistry II Lab

Additional Comments:

Corequisite
Type
Corequisite

Corequisite

Enroll in the following Courses:

- MTLS235 - Materials Engineering II

Additional Comments:

No Requirement Level

MTLS3001 - Introduction to Ceramic Engineering

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Ceramic processing from raw Materials to finished products. Chemistry and structure of ceramic raw Materials. Ceramic powder preparation and characterization. Engineering ceramic suspensions. Microstructures of traditional (porcelain and glass) and advanced (modern structural and electrical) ceramics. Properties of ceramics, and their dependence on processing and microstructure.

Equivalent Courses: Previous & Current Courses
MATE301, MTLS301

Simple Requisites

Course Requisite Requirements

Prerequisites: MTLS 235; or consent of instructor and advisor
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- MTLS235 - Materials Engineering II

Additional Comments:

No Requirement Level

MTLS3010 - Processing & Microstructure Methods & Analysis

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Emphasis on the relationship between processing and microstructure. Processing techniques used to form metals, ceramics, polymers, and composites will be studied such as extrusion, pressing, forging, rolling, casting, and joining. Elementary analysis techniques such as optical and electron microscopy will be used to illustrate the effect of processing on microstructure.

Equivalent Courses: Previous & Current Courses
MATE310, MTLS310

Simple Requisites

Course Requisite Requirements

Prerequisites: MTLS 202, MTLS 235; or consent of instructor and advisor
Type
Prerequisite

Prerequisites

Complete ALL of the following Courses:

- MTLS202 - Materials Engineering I
- MTLS235 - Materials Engineering II

Additional Comments:

No Requirement Level

MTLS3011 - Thermal & Mechanical Methods & Analysis

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Emphasis on the use of thermal and mechanical techniques to both influence and measure the properties of metals, polymers, ceramics, and composites. Thermal techniques such as DSC, DTA, TGA, TMA, and dilatometry will be described. Thermal processing and temperature measurement techniques will also be covered. Mechanical techniques such as viscometry, rheometry, strength/toughness testing, hardness testing, and fatigue will be covered. These thermal and mechanical techniques will be used to elucidate the relationship between properties and microstructure, relaxation mechanisms, lifetime predictions, phase transformations, chemical reactions, and synthesis.

Equivalent Courses: Previous & Current Courses
MATE311, MTLS311

Simple Requisites

Course Requisite Requirements

Prerequisites: MTLS 202, MTLS 235; or consent of instructor and advisor.
Corequisites: ES 3002 or consent of instructor and advisor
Type
Completion Requirement

Prerequisites and Corequisites

Fulfill ALL of the following requirements:

Prerequisites

Complete ALL of the following Courses:

- MTLS202 - Materials Engineering I
- MTLS235 - Materials Engineering II

AND

Corequisites

Enroll in the following Courses:

- ES3002 - Mechanics of Materials

Additional Comments:

No Requirement Level

MTLS3014 - Transport Processes

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Introduction to the concepts of fluid dynamics and mass and heat transfer.

Equivalent Courses: Previous & Current Courses
MATE314, MTLS314

Simple Requisites

Course Requisite Requirements

Prerequisites: MATH 1510, MATH 1520, PHYS 1310
Type
Prerequisite

Prerequisites

Complete ALL of the following Courses:

- MATH1510 - g2:Calculus I
- MATH1520 - g2:Calculus II
- PHYS1310 - g3:Calculus-based Physics I

Additional Comments:

No Requirement Level

MTLS3027 - Introduction to Physical Metallurgy

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Mechanisms of deformation and fracture in metals. Binary phase diagrams. Phase transformations, age hardening, heat treatment of steels, TTT diagrams, CT diagrams, martensitic transformation, shape-memory effects. Common ferrous and non-ferrous alloys.

Equivalent Courses: Previous & Current Courses
MATE327, MTLS327

Simple Requisites

Course Requisite Requirements

Prerequisite: MTLS 202
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- MTLS202 - Materials Engineering I

Additional Comments:

No Requirement Level

MTLS3050 - Materials Thermodynamics

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
The mathematical structure of thermodynamics is developed and elucidated from a transport-process-based perspective. Basic quantities such as heat and temperature are carefully defined. The conserved nature of the First-Law and the non-conserved nature of the Second Law are emphasized. The consequences of the ensuing stability-conditions are explored in the area of phase equilibrium in multicomponent mixtures. (Same as Ch E 349)

Equivalent Courses: Previous & Current Courses
CH E3049, CH E349, MATE350, MTLS350

Simple Requisites

Course Requisite Requirements

Prerequisite: MATH 2532, CHEM 1215, PHYS 1310. (ES 3047 is recommended)
Type
Prerequisite

Prerequisites

Complete ALL of the following Courses:

- MATH2532 - Calculus III
- CHEM1215 - g3:General Chemistry I
- PHYS1310 - g3:Calculus-based Physics I

Additional Comments:

No Requirement Level

MTLS3051 - Introduction to Polymeric Materials

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Basic concepts of polymer science; polymerization reactions and mechanisms, as well as kinetics involved; polymer solutions, molecular-weight determinations, analysis and testing of polymers; structural properties of polymers; properties of commercial polymers; processing of polymers.

Equivalent Courses: Previous & Current Courses
MATE351, MTLS351

Simple Requisites

Course Requisite Requirements

Prerequisites: MTLS 202 or MTLS 235; MATH 2532 or MATH 3035
Type
Prerequisite

Prerequisites

Fulfill ALL of the following requirements:

MTLS 202 or MTLS 235

Complete ANY of the following Courses:

- MTLS202 - Materials Engineering I
- MTLS235 - Materials Engineering II

AND

MATH 2532 or MATH 3035

Complete ANY of the following Courses:

- MATH2532 - Calculus III
- MATH3035 - Ordinary Differential Equation

Additional Comments:

No Requirement Level

MTLS4002 - Physical Ceramics

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Review of ceramic microstructures. Atomistic, microstructural, and thermodynamic origins of ceramic properties, with emphasis on the effects of atomic and structural defects and interpretation of phase diagrams.

Equivalent Courses: Previous & Current Courses
MATE402, MTLS402, MTLS4020

Simple Requisites

Course Requisite Requirements

Prerequisite: MTLS 3001
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:
- MTLS3001 - Introduction to Ceramic Engineering

Additional Comments:

No Requirement Level

MTLS4010 - Microstructure Characterization Methods & Analysis

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Crystalline and non-crystalline Materials are characterized using various types of scattering, diffraction, absorption and microscopy techniques. Methodologies such as x-ray diffraction, electron diffraction and microscopy are introduced for analyzing crystallographic and other structural properties of metals, ceramics, polymers and composites.

Equivalent Courses: Previous & Current Courses
MATE410, MTLS410

Simple Requisites

Course Requisite Requirements

Prerequisites: PHYS 1320, MTLS 202, MTLS 235 or consent of instructor and advisor

Type
Prerequisite

Prerequisites

Complete ALL of the following Courses:
- PHYS1320 - g3:Calculus-based Physics II
- MTLS202 - Materials Engineering I
- MTLS235 - Materials Engineering II

Additional Comments:

No Requirement Level

MTLS4020 - Biomedical Materials

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course covers the application of Materials in medical devices. Mechanical properties of hard and soft tissues are reviewed. Applications of biomaterials in orthopedics are discussed with emphasis on problems of material-tissue interactions. Other biomedical Materials are covered with applications in skin transplants, eye surgery, pacemakers, tissue engineering, and neural prostheses. Host responses are surveyed including adaptation, inflammation, coagulation, foreign body effects, and changes in tissue and organ functions. Methods for biological and clinical testing are highlighted. Regulatory, ethical and business issues are discussed. Shares lecture with MTLS 5020 with additional expectations for graduate credit.

Equivalent Courses: Previous & Current Courses
MATE420, MATE520, MTLS420, MTLS5020, MTLS520

Simple Requisites

Course Requisite Requirements

Prerequisite: MTLS 202 or MTLS 235; or consent of instructor and advisor
Type
Prerequisite

Prerequisites

Complete ANY of the following Courses:
- MTLS202 - Materials Engineering I
- MTLS235 - Materials Engineering II

Additional Comments:

No Requirement Level

MTLS4035 - Mechanical Behavior of Material

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Elasticity and plasticity; flow criteria. Strengthening mechanisms. Deformation processes. Mechanical testing of Materials: tensile, hardness, fatigue, fracture, formability.

Equivalent Courses: Previous & Current Courses
MATE435, MTLS435

Simple Requisites

Course Requisite Requirements

Prerequisite: MTLS 202 or consent of instructor and advisor
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:
- MTLS202 - Materials Engineering I

Additional Comments:

No Requirement Level

MTLS4041 - X-Ray Diffraction

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Properties and generation of X-rays, X-ray diffraction phenomena. Single-crystal and powder techniques for study of structure of metals and alloys, imperfections, stress, and strain.

Equivalent Courses: Previous & Current Courses
MATE441, MTLS441

Simple Requisites

Course Requisite Requirements

Prerequisites: PHYS 1320, MTLS 202 or MTLS 235
Type
Prerequisite

Prerequisites

Complete ANY of the following Courses:
- PHYS1320 - g3:Calculus-based Physics II
- MTLS202 - Materials Engineering I
- MTLS235 - Materials Engineering II

Additional Comments:

No Requirement Level

MTLS4041L - X-ray Diffraction Lab

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Properties and generation of X-rays, X-ray diffraction phenomena. Single-crystal and powder techniques for study of structure of metals and alloys, imperfections, stress, and strain.

Equivalent Courses: Previous & Current Courses
MATE441L

No Requirements

MTLS4043 - Magnetic Materials

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
The origin of magnetism, theory of magnetism, comparison of diamagnetic, paramagnetic, ferromagnetic, and ferromagnetic solids. Magnetic measurements, magnetic characterization techniques, domain theory and hysteresis. Structure-processing-property relationships in magnetic Materials. Applications of “hard” and “soft” magnetic Materials.

Equivalent Courses: Previous & Current Courses
MATE443, MTLS443

Simple Requisites

Course Requisite Requirements

Prerequisite: MTLS 235 or consent of instructor and advisor
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:
- MTLS235 - Materials Engineering II

Additional Comments:

No Requirement Level

MTLS4045 - Introduction to Composite Materials

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Reinforcement Materials, glass, Kevlar, polyethylene, carbon, boron, silicon carbide, alumina, metallic fibers. Interface between the matrix and fiber. Polymer matrix, metal matrix, and ceramic matrix composites. Mechanism of fiber strengthening. Micromechanics and macromechanics of composite Materials, their strength and fracture behavior.

Equivalent Courses: Previous & Current Courses
MATE445, MATE445D, MTLS445, MTLS445D

Simple Requisites

Course Requisite Requirements

Prerequisites: ES 3002 or consent of instructor and advisor
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- ES3002 - Mechanics of Materials

Additional Comments:

No Requirement Level

MTLS4046 - Computational Methods in Materials Science

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Computers have become a common tool in the effort to bridge the gap between atomic and macroscopic Materials properties. Examples selected from the literature are used to introduce the student to the principal techniques employed in the field. Topics covered include: polymers, metals, ceramics, magnetic Materials, water, phase equilibrium, protein folding, self-assembled monolayers, gelation, the glass transition, rheology, and dielectric relaxation.

Equivalent Courses: Previous & Current Courses
MATE446, MTLS446, MTLS446D

Simple Requisites

Course Requisite Requirements

Prerequisite: MATH 2532
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- MATH2532 - Calculus III

Additional Comments:

No Requirement Level

MTLS4047 - Optical Materials

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Review of optical phenomena: reflection, transmission, absorption, color, polarization, refraction and birefringence, and their origin in Materials. Structure-processing-property relationships in optical Materials including crystals, glasses, and thin films. Applications including mirrors, filters, lenses, lasers, electro-optics, detectors and fiber optics.

Equivalent Courses: Previous & Current Courses
MATE447, MTLS447

Simple Requisites

Course Requisite Requirements

Prerequisite: MTLS 235 or consent of instructor and advisor
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- MTLS235 - Materials Engineering II

Additional Comments:

No Requirement Level

MTLS4052 - Solid State Physics for Engineers

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Discussion of physical properties of metals, semiconductors, and dielectrics from the viewpoint of solid-state theory. Electron dynamics, electronic transport, interaction of electromagnetic waves with solids, wave mechanics, quantum mechanics, free electron theory, band theory of solids. Application of semiconductor and quantum physics to modern electronic and opto-electronic devices.

Equivalent Courses: Previous & Current Courses
MATE452, MATE453, MTLS452, MTLS452D

Simple Requisites

Course Requisite Requirements

Prerequisite: Senior standing or consent of instructor and advisor
Type
Completion Requirement

Additional Comments:

No Requirement Level

MTLS4052L - Electronic Materials Lab

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
.Use of electronic measurement equipment to characterize the behavior of common circuit components: resistors, capacitors, inductors, temperature- and voltage-dependent resistors, diodes. Interpretation of electronic properties of Materials.

Equivalent Courses: Previous & Current Courses
MATE452L, MTLS452L

Simple Requisites

Course Requisite Requirements

Prerequisites: MTLS 235, MTLS 235L; or consent of instructor and advisor
Type
Prerequisite

Prerequisites

Complete ALL of the following Courses:
- MTLS235 - Materials Engineering II
- MTLS235L - Materials Engineering II Lab

Additional Comments:

No Requirement Level

MTLS4074 - Polymer Processing & Character

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
The basics of rheology, calorimetry and mechanical testing are covered. A specific polymer is used (e.g., an epoxy) throughout the course and the processing of this polymer is covered. Students are expected to acquire a working knowledge of the instrumentation and analysis tools used in the course. These include rheometers, calorimeters, and mechanical testing. The primary analysis tool is Kaleidagraph software.

Equivalent Courses: Previous & Current Courses
MATE474, MTLS474

Simple Requisites

Course Requisite Requirements

Prerequisite: consent of instructor
Type

Completion Requirement

Additional Comments:

No Requirement Level

MTLS4075 - Introduction to Nano Materials

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
An introduction to the basics of nanosystems, physics and chemistry of nanostructure synthesis and fabrication. Other topics include: semiconductor nanostructures, magnetic nanostructures and spintronics, molecular nanostructures, electron transport in nanosystems, optical effects in nanosystems, nanomachines, nanoscale biological assemblies, nanocomposite materials. Shares lecture with Graduate course MTLS 5075.

Equivalent Courses: Previous & Current Courses
MTLS5075

No Requirements

MTLS4075 - Introduction to Nano Materials

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
An introduction to the basics of nanosystems, physics and chemistry of nanostructure synthesis and fabrication. Other topics include: semiconductor nanostructures, magnetic nanostructures and spintronics, molecular nanostructures, electron transport in nanosystems, optical effects in nanosystems, nanomachines, nanoscale biological assemblies, nanocomposite materials. Shares lecture with Graduate course MTLS 5075.

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

MTLS 4075 Prerequiste requirements

Complete ALL of the following Courses:
- MTLS202 - Materials Engineering I
- MTLS235 - Materials Engineering II

Additional Comments:

No Requirement Level

MTLS4077 - Introduction to Quantum Materials

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Physical basics of quantum materials, discussion of electron band structure, electron transport and optical properties of quantum materials, -including 2D materials, superconductors, and topological materials; physics and chemistry of nano- synthesis and fabrication, as well as basic principles of quantum information and quantum computing technologies-the area of applications of these materials. Shares lecture with MTLS 5077.

Equivalent Courses: Previous & Current Courses
MTLS5077

No Requirements

MTLS4077 - Introduction to Quantum Materials

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Physical basics of quantum materials, discussion of electron band structure, electron transport and optical properties of quantum materials, -including 2D materials, superconductors, and topological materials; physics and chemistry of nano- synthesis and fabrication, as well as basic principles of quantum information and quantum computing technologies-the area of applications of these materials. Shares lecture with MTLS 5077.

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

MTLS 4077 Prerequisite

Senior standing in Materials Engineering, Electrical Engineering, Physics, or Chemistry, or consent of instructor

Additional Comments:

No Requirement Level

MTLS4079 - Transmission Electron Miscroscopy

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Electron optics, design and operation of TEM; specimen preparation; electron diffraction and interpretation of diffraction patterns; imaging, dynamical theory; image interpretation for perfect crystals, crystal defects, interfaces and precipitates. Use of a TEM.

Equivalent Courses: Previous & Current Courses
MATE479, MTLS479

Simple Requisites

Course Requisite Requirements

Prerequisites: MTLS 4041, MTLS 4010; or consent of instructor and advisor
Type
Prerequisite

Prerequisites

Complete ALL of the following Courses:

- MTLS4041 - X-Ray Diffraction
- MTLS4010 - Microstructure Characterization Methods & Analysis

Additional Comments:

No Requirement Level

MTLS4081 - Engineering Design I

General

Credit Hrs

Credit Hrs:
2

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Student design teams begin a year-long capstone design project. The teams will identify project needs, establish goals, determine design requirements, produce alternate solutions, and perform detailed planning. Project initiation, periodic design reports and design reviews. Students, faculty, and distinguished visitors discuss subjects of current and/or long-range interest in various fields of Materials. Undergraduate students majoring in Materials Engineering are required to take MTLS 4081 and MTLS 4081L concurrently.

Equivalent Courses: Previous & Current Courses
MATE481, MTLS481

Simple Requisites

Course Requisite Requirements

Prerequisites: Senior standing, MTLS 3001, MTLS 3051, METE or MTLS 3027, MTLS 3010, MTLS 3011 (BIOL 2110/2110L may substitute for MTLS 3010 or 3011 for students pursuing the Biomaterials Engineering option).
Type
Completion Requirement

Prerequisites

Fulfill ALL of the following requirements:

Complete All

Complete ALL of the following Courses:

- MTLS3001 - Introduction to Ceramic Engineering
- MTLS3051 - Introduction to Polymeric Materials

AND

METE 327 or MTLS3027

Complete ANY of the following Courses:

- METE327 - Physical Metallurgy (Inactive)
- MTLS3027 - Introduction to Physical Metallurgy

AND

Complete All

BIOL 2110/2110L may substitute for MTLS 3010 or 3011 for students pursuing the Biomaterials Engineering option.

Complete ALL of the following Courses:

- MTLS3010 - Processing & Microstructure Methods & Analysis
- MTLS3011 - Thermal & Mechanical Methods & Analysis

Additional Comments:

No Requirement Level

MTLS4081L - Engineering Design I Lab

General

Credit Hrs

Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Student design teams begin a year-long capstone design project. The teams will identify project needs, establish goals, determine design requirements, produce alternate solutions, and perform detailed planning. Project initiation, periodic design reports and design reviews. Students, faculty, and distinguished visitors discuss subjects of current and/or long-range interest in various fields of Materials. Undergraduate students majoring in Materials Engineering are required to take MTLS 4081 and MTLS 4081L concurrently.

Equivalent Courses: Previous & Current Courses
MATE481L, MTLS481L

Simple Requisites

Course Requisite Requirements

Prerequisites: Senior standing, MTLS 3001, MTLS 3051, METE or MTLS 3027, MTLS 3010, MTLS 3011 (BIOL 2110/2110L may substitute for MTLS 3010 or 3011 for students pursuing the Biomaterials Engineering option).
Type
Completion Requirement

Prerequisites

Fulfill ALL of the following requirements:

Complete ALL

Complete ALL of the following Courses:

- MTLS3001 - Introduction to Ceramic Engineering
- MTLS3051 - Introduction to Polymeric Materials

AND

Complete ANY

Complete ANY of the following Courses:

- METE327 - Physical Metallurgy (Inactive)
- MTLS3027 - Introduction to Physical Metallurgy

AND

Complete ALL

BIOL 2110/2110L may substitute for MTLS 3010 or 3011 for students pursuing the Biomaterials Engineering option.

Complete ALL of the following Courses:

- MTLS3010 - Processing & Microstructure Methods & Analysis
- MTLS3011 - Thermal & Mechanical Methods & Analysis

Additional Comments:

No Requirement Level

MTLS4082 - Engineering Design II

General

Credit Hrs

Credit Hrs:
2

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Continuation of the design projects initiated in MTLS 4081. The student design teams bring the projects to a successful conclusion. Economic analysis and detailed cost evaluation, use of engineering statistics in data analysis and design of experiments, preparation and presentation of final project report. Undergraduate students majoring in Materials Engineering are required to take MTLS 4082 and MTLS 4082L concurrently.

Equivalent Courses: Previous & Current Courses
MATE482, MTLS482

Simple Requisites

Course Requisite Requirements

Prerequisites: MTLS 4081, MTLS4081L
Type
Prerequisite

Prerequisites

Complete ALL of the following Courses:

- MTLS4081 - Engineering Design I

- MTLS4081L - Engineering Design I Lab

Additional Comments:

No Requirement Level

MTLS4082L - Engineering Design II Lab

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Continuation of the design projects initiated in MTLS 4081. The student design teams bring the projects to a successful conclusion. Economic analysis and detailed cost evaluation, use of engineering statistics in data analysis and design of experiments, preparation and presentation of final project report. Undergraduate students majoring in Materials Engineering are required to take MTLS 4082 and MTLS 4082L concurrently.

Equivalent Courses: Previous & Current Courses
MATE482L, MTLS482L

Simple Requisites

Course Requisite Requirements

Prerequisite: MTLS 4081, MTLS 4081L
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:
- MTLS4081 - Engineering Design I
  AND MTLS4081L - Engineering Design I Lab

Additional Comments:

No Requirement Level

MTLS4083 - Scanning Electron Microscopy

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Fundamental theory and experimental techniques in scanning electron microscopy. Electron optics, electron beam interactions with solids, signal detection and processing. Chemical X-ray microanalysis. Undergraduate students majoring in Materials Engineering are required to take MTLS 4083 and MTLS 4083L concurrently.

Equivalent Courses: Previous & Current Courses
MATE483, MTLS483

Simple Requisites

Course Requisite Requirements

Prerequisite: PHYS 1225 or consent of instructor and advisor. Corequisite: MTLS 4083L
Type
Prerequisite

Pre/Corequisite

Fulfill ANY of the following requirements:

Complete All

Complete ALL of the following Courses:
- PHYS1320 - g3:Calculus-based Physics II

OR

Complete All

Complete ALL of the following Courses:
- PHYS2251 - Comprehensive Physics II

OR

Complete All

Consent of instructor and advisor

Additional Comments:

No Requirement Level

MTLS4083L - Scanning Electron Microscopy Lab

General

Credit Hrs
Credit Hrs:
0

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Fundamental theory and experimental techniques in scanning electron microscopy. Electron optics, electron beam interactions with solids, signal detection and processing. Chemical X-ray microanalysis. Undergraduate students majoring in Materials Engineering are required to take MTLS 4083 and MTLS 4083L concurrently.

Equivalent Courses: Previous & Current Courses
MATE483L, MTLS483L

Simple Requisites

Course Requisite Requirements

Corequisite: MTLS 4083
Type
Corequisite

Corequisite

Enroll in the following Courses:
- MTLS4083 - Scanning Electron Microscopy

Additional Comments:

No Requirement Level

MTLS4091 - Directed Study/Senior Thesis

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
3

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, Standard Letter

Equivalent Courses: Previous & Current Courses
MATE491, MTLS491

Simple Requisites

Course Requisite Requirements

Prerequisite: Senior standing or consent of instructor and advisor
Type
Prerequisite
Additional Comments:

No Requirement Level

MTLS5000 - Directed Research

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
12

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, No Report, Standard Letter

Course Description
This course may not be used to fulfill graduate degree requirements.

Equivalent Courses: Previous & Current Courses
MATE500, MTLS500

Simple Requisites

Course Requisite Requirements

Prerequisite: Graduate standing
Type
Completion Requirement
Additional Comments:

No Requirement Level

MTLS5001 - Foundations of Materials

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course is designed for the Materials graduate students with undergraduate degrees from other disciplines. Fundamental elements of metals, ceramics, polymers and composites will be covered.

Equivalent Courses: Previous & Current Courses
MATE501, MTLS501

Simple Requisites

Course Requisite Requirements

Prerequisite: Graduate standing
Type
Completion Requirement
Additional Comments:

No Requirement Level

MTLS5002 - Physical Ceramics

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Review of ceramic microstructures. Atomistic, microstructural, and thermodynamic origins of ceramic properties, with emphasis on the effects of atomic and structural defects and interpretation of phase diagrams. Shares lectures with MTLS 4002, but is graded separately, and additional work is required at the graduate level.

Equivalent Courses: Previous & Current Courses
MATE402, MATE502, MTLS4002, MTLS402, MTLS502

Simple Requisites

Course Requisite Requirements

Prerequisite: MTLS 3001
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- MTLS3001 - Introduction to Ceramic Engineering

Additional Comments:

No Requirement Level

MTLS5003 - Crystal Chemistry & Crystal Physics

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Classification of elements and ions. Bonding and rules for building of structures in solids. Systematic review of the basic crystal structures of inorganic solids and their relationship with observed macroscopic properties. Introduction to crystal physics, relating measurable quantities to crystal symmetry.

Equivalent Courses: Previous & Current Courses
MATE503, MTLS503, MTLS503D

Simple Requisites

Course Requisite Requirements

Prerequisite: Graduate standing or consent of instructor
Type
Prerequisite

Additional Comments:

No Requirement Level

MTLS5005 - Electronic Materials

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Review of electronic, atomic, and defect structures which govern electrical behavior of ceramics and metals. Bulk and printed (thick film) electronic sensors and components. Superionic conductors used in solid electrolyte batteries, and developments in new high-temperature superconducting ceramics. Polarization mechanisms and relaxation phenomena in dielectrics, with discussion of low-permittivity and microwave dielectrics.

Equivalent Courses: Previous & Current Courses
MATE505, MTLS505, MTLS505D

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Completion Requirement

Prerequsite

Prerequisite: MTLS 235 and graduate standing or consent of instructor and advisor

Complete ALL of the following Courses:
- MTLS235 - Materials Engineering II

Additional Comments:

No Requirement Level

MTLS5009 - Satistical Mechanics of Simple Materials

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
After a brief review of thermodynamics, the basics of Statistical Mechanics are presented and applied to a number of cases of interest. These include solid state heat capacity, the adsorption of gases on surfaces, Bose-Einstein statistics, blackbody radiation, magnetism, superfluidity, Fermi-Dirac statistics, the electron gas, theories of phase transitions, and the Monte Carlo method.

Equivalent Courses: Previous & Current Courses
MATE509, MTLS509, MTLS509D

Simple Requisites

Course Requisite Requirements

Prerequisites: MTLS 3050 or Ch E 3049 or Graduate Standing or consent of instructor and advisor
Type
Completion Requirement

Prerequisite

Prerequisites: MTLS 3050 or Ch E 3049 or Graduate Standing or consent of instructor and advisor

Complete ALL of the following Courses:
- MTLS3050 - Materials Thermodynamics
  OR CH E3049 - Chemical Engineering Thermodynamics

Additional Comments:

No Requirement Level

MTLS5012 - Electronic Thin Films: S & T

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Discussion of thin-film deposition techniques (evaporation, sputtering, molecular beam epitaxy, liquid- phase epitaxy, and chemical vapor deposition), and their applications and limitations. Thin-film growth mechanism. Stress and interdiffusion in thin films. Electrical and optical properties of thin films, heterostructures, quantum wells, and superlattices.

Equivalent Courses: Previous & Current Courses
MATE512, MTLS512, MTLS512D

Simple Requisites

Course Requisite Requirements

Prerequisite: Graduate standing or consent of instructor and advisor

No Requirement Level

MTLS5014 - Liquid State Theory

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
An introduction to the study of many-particle systems and to the techniques of computer simulation. The statistical mechanics of simple liquids and their mixtures, with particular emphasis on the atomic origin of the structure factor and the relationships between atomic-level structure and macroscopic, thermodynamic properties.

Equivalent Courses: Previous & Current Courses
MATE514, MTLS514, MTLS514D

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Completion Requirement

Prerequisite

Prerequisite: MTLS 5009, Graduate standing or consent of instructor and advisor

Complete ALL of the following Courses:
- MTLS5009 - Satistical Mechanics of Simple Materials

Additional Comments:

No Requirement Level

MTLS5015 - Glasses & Other Complex Fluids

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Complex fluids span the range between the traditional Newtonian fluid (where shear stress is proportional to strain rate) and linear response solids (where shear stress is proportional to strain). In all cases, non-trivial relaxation mechanisms introduce a range of relaxation times and extreme temperature sensitivity in the a Materials' properties. Glasses are the most dramatic examples of this class of Materials although all polymeric Materials show complex behavior under temperature and time scales in typical applications. This course introduces the techniques used to quantify the thermal and temporal response of common complex fluids focusing primarily on rheometry and calorimetry. In addition, theories linking evolving microstructures are employed to explain the observed macroscopic responses.

Equivalent Courses: Previous & Current Courses
MATE515, MTLS515

Simple Requisites

Course Requisite Requirements

Prerequisite: MTLS 3051 or consent of instructor and advisor
Type
Prerequisite

Prerequisite

Fulfill ANY of the following requirements:

Complete ALL of the following Courses:
- MTLS3051 - Introduction to Polymeric Materials

OR

consent of instructor and advisor

Additional Comments:

Prerequisite
Type
Completion Requirement

Prerequisite

Prerequisite: MTLS 3051 or consent of instructor and advisor

Complete ALL of the following Courses:
- MTLS3051 - Introduction to Polymeric Materials

Additional Comments:

No Requirement Level

MTLS5016 - Biomimetic Materials

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
An overview of the field of biomimetics: the achievement of unusual Materials properties or processes by mimicry of various aspects of biological systems. Mimicry of natural structural design; biomimetic Materials processing; “artificial photosynthesis”; biomolecular electronics; and biomimetic catalysis. Interdisciplinary studies.

Equivalent Courses: Previous & Current Courses
MATE516, MTLS516

Simple Requisites

Course Requisite Requirements

Prerequisite: Graduate standing or consent of instructor and advisor

No Requirement Level

MTLS5020 - Biomedical Materials

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Standard Letter

Course Description
This course covers the application of Materials in medical devices. Mechanical properties of hard and soft tissues are reviewed. Applications of bioMaterials in orthopedics are discussed with emphasis on problems of material-tissue interactions. Other biomedical Materials are covered with applications in skin transplants, eye surgery, pacemakers, tissue engineering, and neural prostheses. Host responses are surveyed including adaptation, inflammation, coagulation, foreign body effects, and changes in tissue and organ functions. Methods for biological and clinical testing are highlighted. Regulatory, ethical and business issues are discussed. Shares lecture with MTLS 4020 with additional expectations for graduate credit.

Equivalent Courses: Previous & Current Courses
MATE420, MATE520, MTLS4020, MTLS420, MTLS520

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Completion Requirement

Prerequisites

Prerequisites: MTLS 202 or MTLS 235 or consent of instructor and advisor

Complete ALL of the following Courses:

- MTLS202 - Materials Engineering I
  OR MTLS235 - Materials Engineering II

Additional Comments:

No Requirement Level

MTLS5030 - Design & Analysis of Experiment

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Methods of statistics and modeling important to many problems in Materials science and engineering including Six Sigma. Examples are chosen from a number of actual experiences. Safety considerations and experiment design including analysis of risk, how risks may be integrated, and how formal procedures should be established. The use of information sources, such as Materials safety data sheets (MSDS). Shares lectures with MTLS 4030, but is graded separately, and additional work is required at the graduate level.

Equivalent Courses: Previous & Current Courses
MATE430, MATE530, MTLS4030, MTLS430, MTLS530, MTLS530D

No Requirements

MTLS5031 - Funding in Manufacturing Processes for Materials

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Introduction to Materials design; flow theories and work of deformation, microstructure-property relationships for different Materials; fracture; casting and heat-flow/mass-transfer issues; bulk deformation processing with applications to rolling and extrusion; powder metallurgy and sintering of metal and ceramic powders.

Equivalent Courses: Previous & Current Courses
MATE531, MTLS531, MTLS531D

Simple Requisites

Course Requisite Requirements

Prerequisite: Graduate standing or consent of instructor and advisor

No Requirement Level

MTLS5034 - Phase Equilibria in Materials Systems

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
The theoretical and practical aspects of phase equilibria of metal and ceramic multicomponent systems will be examined in detail. The thermodynamics and experimental methods of determining phase equilibria of these systems will be

studied. Particular emphasis to Gibbs phase rule, the construction and interpretation of phase diagrams, and the importance of nonequilibrium in metals and ceramics will be investigated. Thermodynamic calculations related to phase stability and phase diagram prediction will be performed using the modeling software, Thermo-Calc.

Equivalent Courses: Previous & Current Courses
MATE534, MTLS534, MTLS534D

Simple Requisites

Course Requisite Requirements

Prerequisite: MTLS 3050 and (METE 3027 or MTLS 3027), or consent of instructor and advisor
Type
Prerequisite

Prerequisites

Fulfill ALL of the following requirements:

Prerequisite

Complete ALL of the following Courses:

- MTLS3050 - Materials Thermodynamics

AND

Prerequisites

Complete ANY of the following Courses:

- METE327 - Physical Metallurgy (Inactive)
- MTLS3027 - Introduction to Physical Metallurgy

Additional Comments:

No Requirement Level

MTLS5035 - Metallurgical Phase Transformations

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Thermodynamic considerations, phase diagrams, and atomic diffusion are reviewed. Principles of crystal interfaces and microstructure are studied, including grain boundaries, interfaces, influence of interfaces and strain energy on microstructure and kinetics. Solidification of single-component and multicomponent systems is discussed with applications to ingots, castings, and welding. Diffusional and diffusionless phase transformations in metals and their alloys are discussed. Knowledge of the core thermodynamic concepts underlying materials behavior, as well as the structure of various engineering materials is required.

Equivalent Courses: Previous & Current Courses
MATE535, MTLS535, MTLS535D

Simple Requisites

Course Requisite Requirements

Prerequisite: Graduate standing in Materials Engineering or consent of instructor

No Requirement Level

MTLS5036 - Material Applications of Density Functional Theory

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
The course is an introduction to materials modeling using the quantum theory of materials and first-principles computational techniques. Specifically, the use of density functional theory will be explored to solve an approximated version of the Schrodinger equation in order to obtain materials properties of metals and their alloys. The course will explore theoretical aspects of density functional theory including the clamped nuclei approximation, the exclusion principles, and the mean-field approximation. The Hartree-Fock and Kohn-Sham equations are studied. All course material will be strongly coupled to hands-on computations using Vienna ab-initio Simulation Package

Equivalent Courses: Previous & Current Courses
MATE536, MTLS536, MTLS536D

Simple Requisites

Course Requisite Requirements

Prerequisite: Graduate standing or consent of instructor
Type
Completion Requirement

Fulfill ANY of the following requirements:

Graduate standing

OR

consent of instructor

Additional Comments:

No Requirement Level

MTLS5040 - Electrochemical Techniques & Processes

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
.This course is an overview of the growing field of electrochemistry, and the many electrochemical techniques and processes. The lectures and assignments will review the theory and the science of batteries, electroplating, fuel cells, electrocatalysis, electro-refining, corrosion, bioelectrochemistry, and organic electrosynthesis. In addition to the applications, the electrochemical techniques will also be introduced, including open circuit potentials, linear polarization, potentiodynamic polarization, cyclic voltammetry, zeta potentials, electrochemical impedance spectroscopy, and photoelectrochemistry.

Equivalent Courses: Previous & Current Courses
MATE540, MTLS540, MTLS540D

Simple Requisites

Course Requisite Requirements

Prerequisite: Graduate standing or consent of instructor and advisor
Type
Prerequisite

Fulfill ANY of the following requirements:

Graduate standing

OR

consent of instructor and advisor

Additional Comments:

No Requirement Level

MTLS5041 - Advanced Physical Metallurgy

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Application of thermodynamic principles to formation and stability of alloy systems. Recrystallization. Precipitation hardening. Physical metallurgy of steels, aluminum, rapidly solidified alloys, and quasi-crystals

Equivalent Courses: Previous & Current Courses
MATE541, MTLS541

Simple Requisites

Course Requisite Requirements

Prerequisite: METE 3027 or MTLS 3027; or consent of instructor
Type
Prerequisite

Prerequisites

Complete ANY of the following Courses:

- METE327 - Physical Metallurgy (Inactive)
- MTLS3027 - Introduction to Physical Metallurgy

Additional Comments:

No Requirement Level

MTLS5042 - Solid State Diffusion

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Fundamentals of diffusion will be studied including solutions to the diffusion equation, random walk theory, correlation effects, and diffusion mechanism. Experimental methods related to diffusion phenomena will be explored. Diffusion phenomena in metals, ionic crystals, semiconductors, and nonMTLSrial will be discussed with relation to thermodynamic, point-defect and defect reactions, and impurity effects.

Equivalent Courses: Previous & Current Courses
MATE542, MTLS542

Simple Requisites

Course Requisite Requirements

Prerequisite: Graduate standing or consent of instructor and advisor

No Requirement Level

MTLS5043 - Advanced Mechanical Metallurgy

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Theory of elasticity/plasticity; dislocation theory; strengthening mechanisms; tensile testing; fracture and related failure phenomena; principal features of fatigue and creep; metalworking; related strain state- strain rate phenomena, including shock deformation and high energy rate forming.

Equivalent Courses: Previous & Current Courses
MATE543, MTLS543, MTLS543D

Simple Requisites

Course Requisite Requirements

Prerequisite: MTLS 4035
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- MTLS4035 - Mechanical Behavior of Material

Additional Comments:

No Requirement Level

MTLS5045 - Micromechanics of Fracture

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Analysis of criteria for crack initiation and propagation leading to structural failure; study of fracture mechanics starting with Griffith theory for ideally brittle Materials through plane strain and ultimately elastic- plastic toughness phenomena. Effects of geometry, rate, environment, and microstructure will be considered as related to micromechanisms of fracture (cleavage, ductile fracture, fatigue, stress corrosion cracking).

Equivalent Courses: Previous & Current Courses
MATE545, MTLS545

Simple Requisites

Course Requisite Requirements

Prerequisite: MTLS 4035 or equivalent or consent of instructor and advisor
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- MTLS4035 - Mechanical Behavior of Material

Additional Comments:

No Requirement Level

MTLS5050 - Microstructure & Properties of Steels

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
The microstructure and mechanical properties of steels are covered in the course. Topics include the iron-carbon phase diagram, allotriomorphic transformation from austenite to ferrite, Widmanstätten ferrite, pearlite, kinetics of transformations and mechanisms that influence the microstructure and properties, effects of substitutional solutes on phase transformation and kinetics, crystallography of martensite, nucleation and growth of martensite and influence on mechanical properties, bainitic transformation and microstructure, thermomechanical treatment of steels, micro-alloyed steels, stainless steels, fracture and embrittlement.

Equivalent Courses: Previous & Current Courses
MATE550, MTLS550, MTLS550D

Simple Requisites

Course Requisite Requirements

Prerequisite: Graduate standing in Materials Engineering or consent of instructor
Type
Completion Requirement

Additional Comments:

No Requirement Level

MTLS5060 - Failure Analysis

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Failure analysis is the science of unraveling why a product failed unexpectedly. The results of the failure analysis may be used to design a better product, or as evidence in litigation. This course will cover the proper methodology for investigating a failure, the common failure modes of structures and machines, fractography, the procedure for writing a failure analysis report, and the legal implications.

Equivalent Courses: Previous & Current Courses
MATE560, MTLS560, MTLS560D

Simple Requisites

Course Requisite Requirements

Prerequisite: Graduate standing or consent of instructor and advisor
Type
Prerequisite

Additional Comments:

No Requirement Level

MTLS5064 - Nano-Optics

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Review of Nano-Optics—an emerging field, rapidly developing as a part of nanoscience and nanotechnology requiring tools and techniques for fabrication, manipulation and characterization at nanoscale. The class covers theoretical foundations on propagation and focusing of optical fields; methods of nanoscale optical microscopy: near-field optical probes and nanoscale distance control; features of optical interaction in nanoscale environments. Modern applications of nano-optics including quantum emitters, photonic crystals and resonators, surface plasmons structures and devices, will be discussed in the frames of this class.

Equivalent Courses: Previous & Current Courses
MATE564, MTLS564, MTLS564D

Simple Requisites

Course Requisite Requirements

Prerequisite: Graduate standing or consent of instructor and advisor
Type
Completion Requirement
Additional Comments:

No Requirement Level

MTLS5065 - Catalyst Characterization Techniques

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Standard Letter

Course Description
The course provides an overview of techniques used to characterize catalytic Materials including data analysis and linking physical and chemical properties to catalytic activity at the laboratory and process level. Topics include x-ray methods, neutron scattering methods, physical adsorption, chemical adsorption, temperature programmed techniques, photoelectron spectroscopy, vibrational spectroscopy, and electron microscopy. A research project is required.

Equivalent Courses: Previous & Current Courses
MATE565, MTLS565, MTLS565D

Simple Requisites

Course Requisite Requirements

Prerequisites: CH E 3049/MTLS 3050 and/or CHEM 3031/CHEM 3032 or consent of instructor and advisor
Type
Prerequisite

and/or

Fulfill ANY of the following requirements:

Ch E 3049 and MTLS 3050

Complete ALL of the following Courses:

- CH E3049 - Chemical Engineering Thermodynamics
- MTLS3050 - Materials Thermodynamics

OR

CHEM 3031 and CHEM 3032

Complete ALL of the following Courses:

- CHEM3031 - Physical Chemistry I
- CHEM3032 - Physical Chemistry II

OR

Completion of

Consent of instructor and advisor

Additional Comments:

No Requirement Level

MTLS5066 - Interfacial Phenomena

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Thermodynamics of interfaces (liquid/liquid, liquid/vapor, liquid/solid, solid/solid, solid/vapor); interfacial equilibria; interfacial free energy (surface tension measurements in liquids; specific surface free energy in solid systems); structure of solid surfaces and interfaces; properties of interfaces.

Equivalent Courses: Previous & Current Courses
MATE566, MTLS566

No Requirements

MTLS5070 - Corrosion Phenomena

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Theory of aqueous corrosion (thermodynamics and kinetics); forms of corrosion; corrosion testing and evaluation; designing to minimize corrosion; methods of corrosion prevention; corrosion in specific systems; case studies.

Equivalent Courses: Previous & Current Courses
MATE570, MTLS570, MTLS570D

Simple Requisites

Course Requisite Requirements

Prerequisite: Graduate standing or consent of instructor and advisor

No Requirement Level

MTLS5072 - Advanced Transport Phenomena

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Advanced topics in momentum, heat, and mass transfer. Newtonian and non-Newtonian fluid behavior and laminar flow problems, elementary turbulent flow concepts, energy balance applications in incompressible fluid flow, flow and vacuum production. Fourier's law and thermal conductivity of Materials, steady state and time dependent heat conduction, application in solidification,

elementary convective heat transfer. Diffusivity of Materials, diffusion of gases, liquids and solids and through porous media, time dependent diffusion, and interphase mass transfer.

Equivalent Courses: Previous & Current Courses
MATE572, MTLS572, MTLS572D

Simple Requisites

Course Requisite Requirements

Prerequisite: Graduate standing or consent of instructor and advisor

No Requirement Level

MTLS5075 - Introduction to Nano Materials

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
An introduction to physical basics of nanosystems, physics and chemistry of nanostructure synthesis and fabrication. Other topics include: semiconductor nanostructures, magnetic nanostructures and spintronics, molecular nanostructures, electron transport in nanosystems, optical effects in nanosystems, nanomachines, nanoscale biological assemblies, nanocomposite Materials.

Equivalent Courses: Previous & Current Courses
MATE575, MTLS575, MTLS575D

Simple Requisites

Course Requisite Requirements

Prerequisite: Graduate standing or consent of instructor and advisor
Type
Prerequisite
Additional Comments:

No Requirement Level

MTLS5076 - Drug Delivery Techniques

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Focus is on current developments in drug delivery techniques, with only a brief discussion of common clinical techniques. The first portion of the class focuses on various delivery mechanisms and the tools needed to validate successful targeted drug delivery (both in vitro, in vivo and diagnostic tools). The second part of the course focuses on current developments in drug delivery based on published research articles. Students will read, digest, and critically analyze scientific work from leading research laboratories. Students will also gain valuable communication tools, as each student will present an article of interest to the class. Finally, the third part of the course focuses on important Materials characterization methods such as biological sample prep, SEM, TEM, DSC, Flow Cytometry, Fluorescence Microscopy, ELISA Assays. Same as BIOT 576. Shares lecture with Ch E 476, with additional expectations for graduate credit.

Equivalent Courses: Previous & Current Courses
BIOT5076, BIOT576, CH E4076, CH E476, MATE576, MTLS576

Simple Requisites

Course Requisite Requirements

Prerequisite: Senior or graduate standing or consent of instructor and advisor
Type
Prerequisite
Additional Comments:

No Requirement Level

MTLS5077 - Introduction to Quantum Materials

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Physical basics of quantum materials, discussion of electron band structure, electron transport and optical properties of quantum materials, -including 2D materials, superconductors, and topological materials; physics and chemistry of nano- synthesis and fabrication, as well as basic principles of quantum information and quantum computing technologies-the area of applications of these materials. . Shares lecture with MTLS 4077 with additional expectations for graduate students

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

MTLS 5077 Prerequisite
Graduate standing or consent of instructor.

Additional Comments:

No Requirement Level

MTLS5077 - Introduction to Quantum Materials

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Physical basics of quantum materials, discussion of electron band structure, electron transport and optical properties of quantum materials, -including 2D materials, superconductors, and topological materials; physics and chemistry of nano- synthesis and fabrication, as well as basic principles of quantum information and quantum computing technologies-the area of applications of these materials. . Shares lecture with MTLS 4077 with additional expectations for graduate students

Equivalent Courses: Previous & Current Courses
MTLS4077

No Requirements

MTLS5080 - Dislocation Theory

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Dislocations in isotropic continua; effects of dislocations on crystal structure; point defects and physical properties; point defects and mechanical properties; dislocation-point-defect interactions and groups of dislocations; dislocation interactions.

Equivalent Courses: Previous & Current Courses
MATE580, MTLS580

Simple Requisites

Course Requisite Requirements

Prerequisite: Graduate standing in Materials Engineering or consent of instructor and advisor
Type
Completion Requirement
Additional Comments:

No Requirement Level

MTLS5081 - Directed Study

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
12

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Study under the guidance of a member of the department. In general, subject matter will supplement that available in the other graduate course offerings in metallurgy or Materials engineering.

Equivalent Courses: Previous & Current Courses
MATE581, MTLS581, MTLS581D

No Requirements

MTLS5090 - Independent Study

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
12

Credit Hours Operator:
TO

Grade Modes
Audit, No Report, Standard Letter

Course Description
The student must clearly demonstrate the ability to organize and pursue research. A written final report and public oral presentation is required.

Equivalent Courses: Previous & Current Courses
MATE590, MTLS590

No Requirements

MTLS5091 - Thesis

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
12

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, No Report

Equivalent Courses: Previous & Current Courses
MATE591, MTLS591

No Requirements

MTLS5092 - Materials Engineering Graduate Seminar

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
2

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail

Course Description
Seminar presentations by students, faculty and outside speakers. Discussion of topics of technical interest in Materials science and engineering and related fields.

Equivalent Courses: Previous & Current Courses
MATE592, MTLS592, MTLS592D

Simple Requisites

Course Requisite Requirements

Prerequisite: Graduate standing or consent of instructor and advisor
Type
Completion Requirement
Additional Comments:

No Requirement Level

MTLS5095 - Dissertation

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
13

Credit Hours Operator:
TO

Grade Modes
Pass/Fail, No Report

Equivalent Courses: Previous & Current Courses
MATE595, MTLS595

Simple Requisites

Course Requisite Requirements

Prerequisite: Successful completion of PhD candidacy exam and Academic Advisor recommendation for candidacy
Type
Completion Requirement
Additional Comments:

No Requirement Level

Mathematics Department

CONTACT US
Office: weir Hall 225, 801 Leroy Place
State & Zip: NM 87801
Phone: 575-835-5393
Website: https://www.nmt.edu/academics/math/index.php

- ***Professors*** *Avramidi, Borchers, Hossain , Stone (Chair of the Department), Wang*
- ***Associate Professors*** *Aitbayev, Gonzalez-Parra, Kerr, Makhnin, Orizaga, Zhang*
- ***Associate Teaching Professor*** *Wolford*
- ***Assistant Teaching Professors*** *Ballou, Crump*
- ***Emeritus Faculty*** *Arterburn, Forster, Schaffer, Sharples, Starrett*

Degrees Offered: *B.S. in Mathematics, M.S. in Mathematics with Specialization in Operations Research and Statistics, M.S. in Mathematics with specialization in Analysis, M.S. in Mathematics with Specialization in Industrial Mathematics; Ph.D. in Mathematics with Dissertation in Applied and Industrial Mathematics*

Additional Program Offered: Accelerated MS Program

Students and faculty in the mathematics department at Tech are involved in many areas of mathematics, from pure mathematics to applied mathematics, operations research, and statistics. The department offers bachelors, masters, and Ph.D. degrees in mathematics, and plays an important role in teaching mathematics to students in other disciplines. Faculty and students are also involved in a number of research projects, many of them in conjunction with researchers in other departments at Tech and at other institutions.

There are career opportunities for mathematics students at both the bachelor's and master's levels. Students in mathematics can prepare for actuarial careers, careers in education, and careers in a number of industries, including telecommunications, aerospace, information technology, and financial engineering.

Preparation for a career in industry should include a broad background in mathematics, modeling skills, computer skills, expertise in an area outside mathematics, and communication skills. Degree requirements are designed to help students develop these important abilities.

Mathematics can also be studied in preparation for more advanced work in a variety of fields including pure mathematics, applied mathematics, operations research, statistics, scientific computing, and business administration. Many students choose to combine a major in mathematics with a major in a second field such as management, computer science, engineering, or physics. A strong background in mathematics can be very helpful in graduate studies.

Students in the mathematics department at both the undergraduate and graduate level have many opportunities to interact with faculty and participate in a variety of mathematical activities. The department has weekly seminars in which faculty, graduate students, and visitors present their research. Both undergraduates and graduates are involved in research projects.

Many students are employed by the department as graders, lab facilitators, teaching assistants, and research assistants. Undergraduate students regularly compete in the William Lowell Putnam mathematics competition and in the COMAP contest in mathematical modeling.

Programs

Accelerated M.S. in Mathematics (pathway)

[Program Overview]

Program Title **Department(s)**
Accelerated Master's Degree Program in Mathematics Mathematics

Program Description
Accelerated Master's Degree Program in Mathematics (Minimum 150 credit hours) The Accelerated Master Degree program provides the opportunity to obtain a BS and MS degree in Mathematics in five years. Accepted students may apply at most 12 credits from 5000-level courses towards both their undergraduate and graduate degrees. It is recommended to apply to the program after completion of MATH 3052 and before enrolling in any graduate courses. The student will work with a professor in the Mathematics Department who will assist the student in developing the course of study and advise the student on their master's thesis or independent study.

Data Science (minor)

[Program Overview]

Program Title
Interdisciplinary Data Science Minor

Department(s)
CSE Computer Science & Engineering, Mathematics

Program Description
CS/Math Interdisciplinary Data Science Minor

Program Information & Policies
This minor is offered jointly by computer science and mathematics.

Minimum credit hours required: 20

Simple Requisites

Program Requirements

The following courses are required
Type
Completion Requirement

Required courses

Complete ALL of the following Courses:

- CSCI1210 - Programming Fundamentals
- CSCI1220 - Programming Fund Python
- CSE3007 - Python for Data Science
- CSE4011 - Data Science
- MATH2420 - Applied Linear Algebra
- MATH3082 - Probability and Statistics
  AND MATH3082L - Probability and Statistics Lab

Select one course in

Complete at least 1 of the following courses:

- CSE4065 - Neural Networks
- CSE4066 - Machine Learning
- MATH4041 - Statistical Machine Learning

Additional Comments:

Institute General Requirements

See the Institute **General Education Core Requirements.**

No Requirement Level

Graduate Minor in Applied Industrial Mathematics

[Program Overview]

Program Title
Graduate Minor in Applied & Industrial Mathematics

Department(s)
Mathematics

Simple Requisites

Program Requirements
The following courses are required:

Master of Science Level
Type
Completion Requirement

Complete at least 2 of the following courses

Complete at least 2 of the following courses:

- MATH4030 - Mathematical Modeling
- MATH4037 - Systems of Ordinary Differential Equations
- MATH4038 - Partial Differential Equations

Complete at least 2 of the following courses

Complete at least 2 of the following courses:

- MATH5030 - Mathematical Modeling
- MATH5031 - Topics in Ordinary Differential Equations
- MATH5032 - Perturbation Methods
- MATH5033 - Partial Differential Equations
- MATH5035 - Methods of Mathematical Physics
- MATH5037 - Bifurcation Theory
- MATH5038 - Wave Phenomena
- MATH5039 - Fluid Dynamics

Additional Comments:

PHD Level
Type
Completion Requirement

PHD Requirements

MS requirements plus two more of the listed 5000 level courses

Additional Comments:

Institute General Requirements

No Requirement Level

Graduate Minor in Numerical Analysis

[Program Overview]

Program Title
Graduate Minor in Numerical Analysis

Department(s)
Mathematics

Simple Requisites

Program Requirements
The following courses are required:

Master of Science Level
Type
Completion Requirement

Complete all of the following courses

Complete ALL of the following Courses:

- MATH4010 - Numerical Methods I
- MATH4011 - Numerical Linear Algebra

Complete at least 2 of the following courses

Complete at least 2 of the following courses:

- MATH5010 - Computational Fluid Dynamics
- MATH5011 - Numerical Methods for Partial Differential Equations
- MATH5012 - Numerical Methods for Wave Propagation

- MATH5013 - Advanced Topics in Numerical Analysis

Additional Comments:

PHD Level
Type
Completion Requirement

PHD Requirements

MS requirements plus two more of the listed 500 level courses

Additional Comments:

Institute General Requirements

No Requirement Level

Graduate Minor in Operations Research & Statistics

[Program Overview]

Program Title	Department(s)
Graduate Minor in Operations Research & Statistics	Mathematics

Simple Requisites

Program Requirements
The following courses are required:

Master of Science Level
Type
Completion Requirement

Complete all of the following courses

Complete ALL of the following Courses:

- MATH4015 - OR: Linear Programming
- MATH4083 - Mathematical Statistics

Complete at least 2 of the following courses

Complete at least 2 of the following courses:

- MATH5015 - Deterministic Operations Research
- MATH5016 - Stochastic Operations Research
- MATH5017 - Combinatorial Optimization
- MATH5018 - Convex Optimization for Nonlinear Programing
- MATH5019 - Inverse Problems
- MATH5020 - Applied Multivariate Analysis
- MATH5041 - Statistical Machine Learning
- MATH5082 - Linear Statistics Models with Applications
- MATH5083 - Topics in Probability & Statistics
- MATH5086 - Spatial Variability & Geostatistics
- MATH5087 - Analysis of Time Series & Spatial Series
- MATH5088 - Advanced Data Analysis

Additional Comments:

PHD Level
Type
Completion Requirement

PHD Requirements

MS requirements plus two more of the listed 5000 level courses

Additional Comments:

Institute General Requirements

No Requirement Level

Graduate Minor in Analysis

[Program Overview]

Program Title	Department(s)
Graduate Minor in Analysis	Mathematics

Simple Requisites

Program Requirements

Master of Science Level
Type
Completion Requirement

Complete all of the following courses

Complete ALL of the following Courses:

- MATH4035 - Complex Analysis
- MATH4042 - Intro to Differential Geometry
- MATH4071 - Intro to Analysis

Complete at least 2 of the following courses

Complete at least 2 of the following courses:

- MATH5031 - Topics in Ordinary Differential Equations
- MATH5033 - Partial Differential Equations
- MATH5034 - Topics in Partial Differential Equations
- MATH5035 - Methods of Mathematical Physics
- MATH5036 - Methods of Mathematical Physics
- MATH5037 - Bifurcation Theory
- MATH5075 - Functions of a Real Variable
- MATH5077 - Functional Analysis

Additional Comments:

PHD Level
Type
Completion Requirement

PHD Requirements

MS requirements plus two more of the listed 500 level courses

Additional Comments:

Institute General Requirements

No Requirement Level

Mathematics (minor)

[Program Overview]

Program Title
Minor in Mathematics

Department(s)
Mathematics

Simple Requisites

Program Requirements
Minimum credit hours required—18

Program Requirements
Type
Completion Requirement

The following courses are required

Complete ALL of the following Courses:

- MATH2420 - Applied Linear Algebra
  OR MATH3037 - Engineering Mathematics
- MATH3035 - Ordinary Differential Equation
- MATH3052 - Basic Concepts of Mathematics
- MATH3082 - Probability and Statistics

Additional Comments:
Six (6) additional hours of upper-division mathematics

Institute General Requirements

No Requirement Level

BS-MATH - B.S. in Mathematics

[Program Overview]

Program Title
Bachelor of Science in Mathematics

Department(s)
Mathematics

Degree & Program Code
BS-MATH

Program Description
none set

Simple Requisites

Program Requirements
Minimum credit hours required—120

In addition to the General Education and Institute Core Curriculum, the following courses are required:

Course Requirements
Type
Completion Requirement

Introduction to Computer Science:

Complete at least 1 of the following courses:

- EE271 - Mathematical Engineering
  OR ES111 - Computer Programming for Engineers
- CSCI1210 - Programming Fundamentals
- CSCI1220 - Programming Fund Python

Basic Mathematics

Complete ALL of the following Courses:

- MATH2532 - Calculus III
- MATH2420 - Applied Linear Algebra
- MATH3035 - Ordinary Differential Equation
- MATH3036 - Introduction to Partial Differential Equations
- MATH3052 - Basic Concepts of Mathematics
- MATH3072 - Basic Concepts of Analysis
- MATH3082 - Probability and Statistics
  AND MATH3082L - Probability and Statistics Lab
- MATH4054 - Linear Algebra

Mathematical Modeling

Complete ALL of the following Courses:

- MATH4030 - Mathematical Modeling

Mathematics Electives

Four courses from at least two of the following areas

Complete at least 4 courses in the following course sets:

- Applied Mathematics
- Pure Mathematics
- Operations Research and Statistics

Additional Comments:
Science, Engineering, or Mathematics Electives: Eight (8) credit hours from the science and engineering disciplines beyond the general degree requirements, or additional 3000-level or above mathematics electives.

Electives outside mathematics: A minor in another department or at least 18 related credit hours outside mathematics approved by the advisor. These 18 hours may include courses fulfilling the general education core requirements or other course requirements within this degree program.

Institute General Requirements

General Education Requirements for Bachelor of Science in Mathematics
Type
Completion Requirement

Area 1: Communications Requirement for Bachelor of Science

Complete ALL of the following Course Sets:

- Area 1: Communications (BS Degree) (9 credits)

Area 2: Mathematics and Quantitative Reasoning Requirements for Bachelor of Science

Complete ALL of the following Course Sets:

- Area 2: Mathematics (BS Degree) (8 credits)

Area 3: Science Requirements for a Bachelor of Science

Complete ALL of the following Course Sets:

- Area 3: Science (BS Degree) (18 credits)

Area 4: Social and Behavioral Science Requirements for a Bachelor of Science

Earn at least 6 credits from the following:

- Area 4: Social and Behavioral Science (BS or BGS Degree) (6 credits)

Area 5: Humanities Course Requirements for a Bachelor of Science

Earn at least 6 credits from the following:

- Area 5: Humanities (BS or BGS Degree) (6 credits)

Area 6: Creative & Fine Art Requirement for a Bachelor of Science

Earn at least 3 credits from the following:

- Area 6: Creative and Fine Arts (BS, BA, or BGS Degree) (3 credits)

Area 7: Additional Humanities/Social Science Requirement for a Bachelor of Science

Earn at least 3 credits from the following:

- Area 7: Additional Courses from Areas 4, 5, 6 (BS, BA, or BGS Degree) (3 credits)

Additional Comments:

No Requirement Level

[Learning Outcomes]

Outcome
1. Understand and write mathematical proofs

Outcome
2. Analyze and solve mathematical or statistical problems using analytical and computational techniques

Outcome
3. Communicate mathematical or statistical concepts and solutions orally and in writing in a clear and well organized manner using correct mathematical notation, formal mathematical definitions, and professional technology

[Sample 4-Year Curriculum Plan(s)]

Degree Map Name
Sample Curriculum for the Bachelor of Science in Mathematics
Total Degree Map Credits
123 - 124
Degree Map Effective Catalog Year
2026 -
Degree Map Description
General education requirements should be fulfilled as early as possible. The sequence MATH 3052 and MATH 3072 is a key prerequisite to many advanced courses and should be taken as early as possible, in no case later than the junior year.

Choice of electives must include courses for approved 18-hour sequence. It is strongly recommended that elective choices include advanced science and/or a foreign language.

Year	Semester	Actual Credits
Year 1	Fall	15

Course
- MATH1510 & MATH1510L: g:Calculus I & Lab

Actual Credits 4

Course
- CHEM1215 & CHEM1215L: g:General Chemistry I and Lab

Actual Credits 4

Course
- TC: Science or Engineering Electives

Actual Credits 4

Course
- ENGL1110 - g1:Composition I

Actual Credits 3

Year	Semester	Actual Credits
Year 1	Spring	15

Course
- MATH1520 - g2:Calculus II

Actual Credits 4

Course
- CHEM1225 & CHEM1225L: g: General Chemistry II and Lab

Actual Credits 4

Course
- TC: Science or Engineering Electives

Actual Credits 4

Course
- ENGL1120 - g1:Composition II

Actual Credits 3

Year	Semester	Actual Credits
Year 2	Fall	15

Course
- MATH2420 - Applied Linear Algebra

Actual Credits 3

Course
- MATH2532 - Calculus III

Actual Credits 4

Course
- PHYS1310 & PHYS1310L: g:Calculus-Physics I and Lab

Actual Credits 5

Course
- Humanities Electives (TC Degree)
  OR
- Science, Medicine, Technology Electives
  OR
- Technical Electives
  OR
- Psychology Electives
  OR
- Earth Science Dept Electives
  OR
- Technical Communication Electives
  OR
- Extra-curricular Electives
  OR
- TC: Science or Engineering Electives

Actual Credits 3

Year	Semester	Actual Credits
Year 2	Spring	17 - 18

Course
- MATH3035 - Ordinary Differential Equation

Actual Credits 3

Course
- MATH3052 - Basic Concepts of Mathematics

Actual Credits 3

Course
- PHYS1320 & PHYS1320L: g:Calculus-Based Physics II and Lab

Actual Credits 5

Course
- CSCI1210 - Programming Fundamentals
  OR
- ES111 - Computer Programming for Engineers

Actual Credits 3 - 4

Course
- Technical Electives
  OR
- Psychology Electives
  OR
- Humanities Electives (TC Degree)
  OR
- Psychology Electives
  OR
- Earth Science Dept Electives
  OR
- Extra-curricular Electives
  OR
- Technical Communication Electives
  OR
- TC: Science or Engineering Electives
  OR
- Science, Medicine, Technology Electives

Actual Credits 3

Year	Semester	Actual Credits
Year 3	Fall	16

Course
- MATH3072 - Basic Concepts of Analysis

Actual Credits 3

Course
- MATH3036 - Introduction to Partial Differential Equations

Actual Credits 3

Course
- MATH3082 & MATH3082L: Probability & Statistics and Lab

Actual Credits 4

Course
- Social Science/Humanities/Fine & Creative Arts Requirements

Actual Credits 3

Course

- Technical Electives
  OR
- Psychology Electives
  OR
- Humanities Electives (TC Degree)
  OR
- Psychology Electives
  OR
- Earth Science Dept Electives
  OR
- Extra-curricular Electives
  OR
- Technical Communication Electives
  OR
- TC: Science or Engineering Electives
  OR
- Science, Medicine, Technology Electives

Actual Credits 3

Year	Semester	Actual Credits
Year 3	Spring	15

Course

- MATH4054 - Linear Algebra

Actual Credits 3

Course

- ENGL3041 - i1:Technical Writing

Actual Credits 3

Course

- Math Electives

Actual Credits 3

Course

- Social Science/Humanities/Fine & Creative Arts Requirements

Actual Credits 3

Course

- Technical Electives
  OR
- Psychology Electives
  OR
- Humanities Electives (TC Degree)
  OR
- Psychology Electives
  OR
- Earth Science Dept Electives
  OR
- Extra-curricular Electives
  OR
- Technical Communication Electives
  OR
- TC: Science or Engineering Electives
  OR
- Science, Medicine, Technology Electives

Actual Credits 3

Year	Semester	Actual Credits
Year 4	Fall	15

Course

- MATH4030 - Mathematical Modeling

Actual Credits 3

Course

- Math Electives

Actual Credits 3

Course

- Social Science/Humanities/Fine & Creative Arts Requirements

Actual Credits 3

Course

- Social Science/Humanities/Fine & Creative Arts Requirements

Actual Credits 3

Course
- Technical Electives
  OR
- Psychology Electives
  OR
- Humanities Electives (TC Degree)
  OR
- Psychology Electives
  OR
- Earth Science Dept Electives
  OR
- Extra-curricular Electives
  OR
- Technical Communication Electives
  OR
- TC: Science or Engineering Electives

Actual Credits 3

Year	Semester	Actual Credits
Year 4	Spring	15

Course
- Math Electives

Actual Credits 3

Course
- Math Electives

Actual Credits 3

Course
- Social Science/Humanities/Fine & Creative Arts Requirements

Actual Credits 3

Course
- Social Science/Humanities/Fine & Creative Arts Requirements

Actual Credits 3

Course
- Technical Electives
  OR
- Psychology Electives
  OR
- Humanities Electives (TC Degree)
  OR
- Psychology Electives
  OR
- Earth Science Dept Electives
  OR
- Extra-curricular Electives
  OR
- Technical Communication Electives
  OR
- TC: Science or Engineering Electives
  OR
- Science, Medicine, Technology Electives

Actual Credits 3

MS-MATH - M.S. in Mathematics

[Program Overview]

Program Title
Master of Science in Mathematics

Department(s)
Mathematics

Degree & Program Code
MS-MATH

Required Specialization/Concentration(s)
Specialization in Analysis, Specialization in Industrial Math, Specialization in Statistics & Data Science

Program Description
A program fulfilling the general requirements must be completed. Two basic plans are offered: for the program without thesis, MATH 5090 (three credit hours) must be completed; for the program with thesis, MATH 5091 (six credit hours) must be completed. The student must fulfill the requirements for the undergraduate program in mathematics. In addition, the student must fulfill the requirements of one of the following three specializations: Analysis, Industrial Math, or Statistics & Data Science. Students interested in continuing for the PhD in Applied and Industrial Mathematics should take care to choose their courses so that they will fit that program as well.

Simple Requisites

Program Requirements
Master of Science in Mathematics

Interested students must fulfill the requirements for the undergraduate program in mathematics. In addition, the student must fulfill the requirements of one of the following three specializations.

Institute General Requirements
See the Master of Science information found in the Graduate section of the catalog at Master of Science Degree.

No Requirement Level

[Specializations/Dissertation Concentration Options]

Specialization/Dissertation Options

Specialization/Dissertation Title
Master of Science in Mathematics with Specialization in Analysis

Specialization/Dissertation Requirements
[Total: 30 cr hrs. of which six credit hours must be approved upper-division or graduate course work from another department.]

An interdisciplinary program in analysis is available at the graduate level within the various departments at New Mexico Tech. To specialize in this area the student must fulfill the requirements of the undergraduate program in mathematics and complete MATH 4035 and MATH 4071 or the equivalent.

Graduate work consists of:

1) A minimum of 12 credits from:

Earn at least 12 credits from the following:

- **MATH5031 - Topics in ODEs**
- **MATH5033 - Partial Differential Equations**
- **MATH5034 - Topics in PDEs**
- **MATH5035 - Methods of Mathematical Physic**
- **MATH5036 - Methods/Mathematical Physics**
- **MATH5037 - Bifurcation Theory**
- **MATH5042 - Topics Differential Geometry**
- **MATH5075 - Functions of a Real Variable**
- **MATH5077 - Functional Analysis**

2) Additional courses subject to the approval of the student's advisor to complete the requirements of the Graduate School.

Specialization/Dissertation Options

Specialization/Dissertation Title
Master of Science in Mathematics with Specialization in Statistics and Data Science

Specialization/Dissertation Requirements
An interdisciplinary program in statistics and data science is available at the graduate level. To specialize in this area, the student must fulfill the requirements for the undergraduate program in mathematics or a related field, including MATH 4083, and either MATH 4041 or MATH 5041, or the equivalent.

Graduate work would consist of:

1. **A minimum of 15 credits from:**

   Earn at least 15 credits from the following:

   - **MATH5018 - Convex Optimiz Nonlinear Prgmg**
   - **MATH5019 - Inverse Problems**
   - **MATH5020 - Applied Multivariate Analysis**
   - **MATH5082 - Linear Stat Models w/ Apps**
   - **MATH5083 - Topics in Probability & Stats**
   - **MATH5086 - Spatial Variability & Geostats**
   - **MATH5087 - Analy. of Time Series & Spat.**
   - **MATH5088 - Advanced Data Analysis**
2. **Two of the following CSE courses: (Complete at least 2 of the following courses):**

   - **CSE3007 - Python for Data Science**
   - **CSE4011 - Data Science**
   - **CSE4064 - Intro to Soft Computing**
   - **CSE5067 - Soft Computing**
   - **CSE4065 - Neural Networks**
   - **CSE5065 - Neural Networks**
   - **CSE4066 - Machine Learning**
   - **CSE4076 - Visualization**
   - **CSE5076 - Advanced Visualization**
   - **CSE5072 - Advanced Data Management**
3. **For the Independent Study option, three cr hrs of MATH 5090, for the Thesis option, six cr hrs of MATH 5091.**
4. **Additional courses subject to the approval of the student's advisor to satisfy the general requirements of the Master of Science degree, for the total of 30 cr hrs.**

Specialization/Dissertation Options

Specialization/Dissertation Title
Master of Science in Mathematics with Specialization in Industrial Mathematics

Specialization/Dissertation Requirements
[Total : 30 cr hrs. of which six credit hours must be approved upper-division or graduate course work from another department]

Industry and business provide many areas for the application of advanced mathematics, and many possibilities for mathematicians to make significant contributions. New Mexico Tech offers a program to prepare students for these opportunities. Students need a basic background in numerical analysis, differential equations, and statistics at the undergraduate level. The graduate requirements are:

1) Modeling Courses

Earn at least 3 credits from the following:

- MATH4030 - Mathematical Modeling
  OR MATH5030 - Mathematical Modeling

2) Core Industrial Mathematics Courses

Two of the following (Earn at least 6 credits from the following):

- **MATH5011 - Numerical Methods for PDEs**
- **MATH5018 - Convex Optimiz Nonlinear Prgmg**
- **MATH5032 - Perturbation Methods**
- **MATH5035 - Methods of Mathematical Physic**
- **MATH5041 - Statistical Machine Learning**
- **MATH5087 - Analy. of Time Series & Spat.**

3) A concentration of four related courses (12 credits), at least two at the 5000-level (beyond the two in requirement 2) and at least two in one other department, and additional courses to satisfy the general requirements of the Master of Science degree. The courses to satisfy this requirement must be approved by the student's advisory committee.

4) Each student spends one term, usually summer, in an internship in an industrial position. This internship is arranged by the student, with the approval of the student's advisory committee and should involve mathematical modeling, computation and analysis.

[Learning Outcomes]

Outcome
1. Solve a significant mathematical or statistical problem

Outcome
2. Communicate a mathematical or statistical solution in writing using professional format and correct mathematical notation

Outcome
3. Communicate the results of their work in an oral presentation. The presentation should be well organized, clear, and demonstrate good understanding of the mathematical or statistical topic

PHD-MATH - Ph.D. in Mathematics

[Program Overview]

Program Title
Doctor of Philosophy in Mathematics With Dissertation in Applied and Industrial Mathematics

Department(s)
Mathematics

Degree & Program Code
PHD-MATH

Program Description
Students of exceptional ability, as demonstrated in a master's degree program or in previous courses, may pursue a program leading to the doctoral degree. Although the master's degree is not a requirement for the Ph.D. degree, the experience gained in writing a master's thesis or independent study project is valuable.

Simple Requisites

Program Requirements
Up to 30 hours from a master's degree, excluding thesis and S/U courses, may be included.

48 hours of coursework approved by the student's advisory committee, including:

Preliminary Exam preparation
Type
Completion Requirement

Preliminary Exam preparation

The following courses may be taken in order to prepare for the PhD Preliminary Exam:
MATH4010 Numerical Methods I **Numerical Methods I**

MATH4011 Numerical Linear Algebra **Numerical Linear Algebra**

MATH4035 Complex Analysis **Complex Analysis**

MATH4037 Systems of ODE's **Systems of Ordinary Differential Equations**

MATH4038 Partial Differential Equations **Partial Differential Equations**

MATH4071 Intro to Analysis **Intro to Analysis**

MATH4083 Mathematical Statistics **Mathematical Statistics**

MATH4086 Intro to Stochastic Processes **Intro to Stochastic Processes**

Additional Comments:

5000-level MATH courses (30 credit hours)
Type
Completion Requirement

Complete all of the following courses

Complete ALL of the following Courses:
- MATH5030 - Mathematical Modeling
- MATH5032 - Perturbation Methods

Three courses from the following list

Complete at least 3 of the following courses:
- MATH5011 - Numerical Methods for Partial Differential Equations
- MATH5018 - Convex Optimization for Nonlinear Programing
- MATH5035 - Methods of Mathematical Physics
- MATH5038 - Wave Phenomena
- MATH5039 - Fluid Dynamics
- MATH5041 - Statistical Machine Learning
- MATH5077 - Functional Analysis
- MATH5082 - Linear Statistics Models with Applications

Three or more of the remaining classes are to be additional core classes from the list above or courses from:

Complete at least 3 of the following courses:
- MATH5009 - Graduate Internship
- MATH5010 - Computational Fluid Dynamics
- MATH5012 - Numerical Methods for Wave Propagation
- MATH5019 - Inverse Problems
- MATH5020 - Applied Multivariate Analysis
- MATH5031 - Topics in Ordinary Differential Equations
- MATH5033 - Partial Differential Equations
- MATH5036 - Methods of Mathematical Physics
- MATH5037 - Bifurcation Theory
- MATH5083 - Topics in Probability & Statistics
- MATH5084 - Topics in Probabilty & Statistics
- MATH5086 - Spatial Variability & Geostatistics
- MATH5087 - Analysis of Time Series & Spatial Series
- MATH5088 - Advanced Data Analysis

Additional Comments:

12 hours of upper-division or graduate-level courses from outside the math department

Dissertation (24 credit hours): MATH 5095

PhD Prelim Exam
Type
Completion Requirement

Differential Equations

Complete ALL of the following Courses:

- MATH4037 - Systems of Ordinary Differential Equations
- MATH4038 - Partial Differential Equations

Analysis

Complete ALL of the following Courses:

- MATH3072 - Basic Concepts of Analysis
- MATH4035 - Complex Analysis
- MATH4071 - Intro to Analysis

Numerical Analysis

Complete ALL of the following Courses:

- MATH4010 - Numerical Methods I
- MATH4011 - Numerical Linear Algebra

Probability & Statistics

Complete ALL of the following Courses:

- MATH4083 - Mathematical Statistics
- MATH4086 - Intro to Stochastic Processes

Additional Comments:
A student may choose any three areas listed above and must pass all three preliminary exams by the end of the student's fourth semester to continue in the program. A student who does not pass a preliminary exam after two attempts will be terminated from the PhD program.

Institute General Requirements

No Requirement Level

[Learning Outcomes]

Outcome
1. Solve a significant mathematical or statistical problem

Outcome
2. Communicate a mathematical or statistical solution in writing using professional format and correct mathematical notation

Outcome
3. Communicate the results of their work in an oral presentation. The presentation should be well organized, clear, and demonstrate good understanding of the mathematical or statistical topic

Courses

MATH1220 - College Algebra

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
The study of equations, functions and graphs, reviewing linear and quadratic functions, and concentrating on polynomial, rational, exponential and logarithmic functions. Emphasizes algebraic problem-solving skills and graphical representation of functions.

No Requirements

MATH1230 - Trigonometry

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
A study of plane trigonometry including the definitions of the fundamental trig functions using right angle triangle and unit circle approaches. Trig functions of any real number will be evaluated and the functions graphed along with their transformations. Trigonometric identities will be developed and demonstrated including multiple angle identities and identities developed from them. Inverse Trigonometric functions will be developed and used to solve trigonometric equations. Trigonometric applications will be solved using right angle trigonometry and the laws of sines and cosines. Trigonometric methods will be applied to complex numbers and the use of 2D vectors and vector dot products.

Equivalent Courses: Previous & Current Courses
MATH104

Simple Requisites

Course Requisite Requirements

Corequisite
Type
Corequisite

Corequisite: MATH 1240, or a prerequisite of a passing grade on the MATH 1240 Placement Test.

Complete ALL of the following Courses:

- MATH1240 - Pre-Calculus

Additional Comments:

No Requirement Level

MATH1230L - Trigonometry Lab

General

Credit Hrs
Credit Hrs:
0

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Corequisite with MATH 1230

No Requirements

MATH1240 - Pre-Calculus

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course extends students' knowledge of polynomial, rational, exponential and logarithmic functions to new contexts, including rates of change, limits, systems of equations, conic sections, and sequences and series.

Equivalent Courses: Previous & Current Courses
MATH103

No Requirements

MATH1240L - Pre-Calculus Lab

General

Credit Hrs
Credit Hrs:
0

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Corequisite with MATH 1240

No Requirements

MATH1430 - Application to Calculus 1

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
An algebraic and graphical study of derivatives and integrals, with an emphasis on applications on business, social science, economics and sciences.

No Requirements

MATH1510 - g2:Calculus I

General

Credit Hrs
Credit Hrs:
4

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Introduces the intuitive numerical and theoretical concepts of limits, continuity, differentiation and integration. Includes the study of extrema, curve sketching, and applications involving algebraic, exponential, logarithmic and trigonometric functions. Designed for mathematics, science and engineering majors.

Equivalent Courses: Previous & Current Courses
MATH131

No Requirements

MATH1510L - g2:Calculus I Lab

General

Credit Hrs
Credit Hrs:
0

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Corequisite with MATH 1510

No Requirements

MATH1520 - g2:Calculus II

General

Credit Hrs
Credit Hrs:
4

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Continues course of study begun in Calculus I. Covers integration techniques, numerical integration, improper integrals, some differential equations, sequences, series and applications.

Equivalent Courses: Previous & Current Courses
MATH0189, MATH132, MATH1520A, MATH1520B

Simple Requisites

Course Requisite Requirements

Prerequisite Requirements
Type
Prerequisite

MATH 1510 passed with grade C- or better

passed with grade C- or better

Complete ALL of the following Courses:

- MATH1510 - g2:Calculus I

Additional Comments:

No Requirement Level

MATH1520A - g2:Calculus II Extended (Part1)

General

Credit Hrs
Credit Hrs:
4

Grade Modes
Audit, Standard Letter

Course Description
Prerequisites: MATH 1510 passed with grade C- or betterContinuation of MATH 1510. Continues course of study begun in Calculus I. Covers integration techniques, numerical integration, improper integrals, some differential equations, sequences, series and applications.

Equivalent Courses: Previous & Current Courses
MATH0189

No Requirements

MATH1520B - g2:Calculus II Extended (Part 2)

General

Credit Hrs
Credit Hrs:
2

Grade Modes
Audit, Standard Letter

Course Description
Prerequisites: MATH 1510 and MATH 1520A passed with grade C- or betterContinuation of MATH 1510. Continues course of study begun in Calculus I. Covers integration techniques, numerical integration, improper integrals, some differential equations, sequences, series and applications.

No Requirements

MATH1526 - Vector Calculus

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
An introduction to topics in two and three dimension of vector calculus such as curl and divergence, line integrals and surface integrals, the Fundamental

When Offered
Spring, Fall

Theorem of Line Integrals, Green's Theorem, Stokes' Theorem and the Divergence Theorem will be covered.

Simple Requisites

Course Requisite Requirements

MATH 1526 Requirements
Type
Prerequisite

Multivariable Calculus Math 2350

Complete ALL of the following Courses:

- MATH2350 - Statistical Methods

Additional Comments:

Students enrolled in Math1526, will attend the last ¼ of Math 2532, Calculus III.

No Requirement Level

MATH2350 - Statistical Methods

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Exploratory data analysis. Introduction to probability, random variables and probability distributions. Concepts of Central Limit Theorem and Sampling Distributions such as sample mean and sample proportion. Estimation and hypothesis testing single population parameter for means and proportions and difference of two population parameters for means and proportions. Analysis categorical data for goodness of fit. Fitting simple linear regression model and inference for regression parameters. Analysis of variance for several population means. Techniques in data analysis using statistical packages. Techniques in data analysis using statistical computer packages.

Equivalent Courses: Previous & Current Courses
MATH283

Simple Requisites

Course Requisite Requirements

Prerequisite Requirements
Type
Prerequisite

MATH 1220 or higher

Complete ANY of the following Courses:

- MATH1220 - College Algebra
- MATH1230 - Trigonometry
- MATH1240 - Pre-Calculus
- MATH1430 - Application to Calculus 1
- MATH1510 - g2:Calculus I
- MATH1520 - g2:Calculus II

Additional Comments:

No Requirement Level

MATH2350L - Statistical Methods Lab

General

Credit Hrs
Credit Hrs:
0

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Corequisite with MATH 2350

No Requirements

MATH2420 - Applied Linear Algebra

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
An introductory study of the analysis and applications of systems of linear equations, vector spaces, matrices, and linear transformations, including computer-based linear algebra, matrix diagonalization, orthogonal decomposition, and Gram-Schmidt method.

Equivalent Courses: Previous & Current Courses
MATH254

Simple Requisites

Course Requisite Requirements

Prerequisite Requirements
Type
Prerequisite

MATH 1510 passed with grade C- or better

passed with grade C- or better

Complete ALL of the following Courses:

- MATH1510 - g2:Calculus I

Additional Comments:

No Requirement Level

MATH2420L - Applied Linear Algebra Lab

General

Credit Hrs
Credit Hrs:
0

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Corequisite with MATH 2420

No Requirements

MATH2532 - Calculus III

General

Credit Hrs
Credit Hrs:
4

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Vectors and vector operations in two and three dimensions, partial differentiation, multiple integration, topics in vector calculus in two and three dimensions.

Equivalent Courses: Previous & Current Courses
MATH231

Simple Requisites

Course Requisite Requirements

Prerequisite Requirements
Type
Prerequisite

MATH 1520 passed with grade C- or better

passed with grade C- or better

Complete ALL of the following Courses:
- MATH1520 - g2:Calculus II

Additional Comments:

No Requirement Level

MATH3032 - Vector Analysis

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Scalar and vector fields, gradient, divergence, curl, del operator, general orthogonal curvilinear coordinates, line integrals, surface and volume integrals, divergence theorem, Green's theorem, Stokes's theorem, applications.

Equivalent Courses: Previous & Current Courses
MATH332

Simple Requisites

Course Requisite Requirements

Prerequisite Requirements
Type
Prerequisite

MATH 2532 passed with grade C- or better

passed with grade C- or better

Complete ALL of the following Courses:
- MATH2532 - Calculus III

Additional Comments:

No Requirement Level

MATH3035 - Ordinary Differential Equation

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Solution methods for first order ordinary differential equations of various types, including separable, linear, Bernoulli and exact. Solution methods for second (and higher) order linear differential equations with constant coefficients. Series solutions. Laplace transforms. Applications.

Equivalent Courses: Previous & Current Courses
MATH335

Simple Requisites

Course Requisite Requirements

Prerequisite Requirements
Type
Prerequisite

MATH 1520 passed with grade C- or better

Earn a minimum C- of 1.67 in the following:
- MATH1520 - g2:Calculus II

Additional Comments:

No Requirement Level

MATH3035L - Ordinary Differential Equations Computer Lab

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Optional lab to accompany MATH 3035. Basic introduction to the "Maple" syntax required to solve ordinary differential equations with computers. Emphasis on modeling, using graphing capabilities to illustrate how responses (solutions) are influenced by changes in the initial data and physical parameters.

Equivalent Courses: Previous & Current Courses
MATH335L

Simple Requisites

Course Requisite Requirements

Corequisite Requirements
Type
Corequisite

MATH 3035 or equivalent

Enroll in the following Courses:
- MATH3035 - Ordinary Differential Equation

Additional Comments:

No Requirement Level

MATH3036 - Introduction to Partial Differential Equations

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Orthogonal functions, Sturm-Liouville theory, Fourier series and integrals, heuristic derivation of examples of partial differential equations taken from heat conduction, vibration problems, electromagnetism, etc.; separation of variables, application to boundary value problems.

Equivalent Courses: Previous & Current Courses
MATH336

Simple Requisites

Course Requisite Requirements

Prerequisite Requirements
Type
Prerequisite

Course Requirements

Fulfill ALL of the following requirements:

Prerequisite Courses

Complete ALL of the following Courses:
- MATH2532 - Calculus III
- MATH3035 - Ordinary Differential Equation
- MATH2420 - Applied Linear Algebra

Each of the above courses passed with a C- or higher.

Additional Comments:

No Requirement Level

MATH3037 - Engineering Mathematics

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Selected topics from linear algebra are discussed, including vectors, matrices, determinants, Gaussian elimination, vector spaces and basis as well as Eigenvalues, eigenvectors and diagonalization of matrices. Of particular interest will be linear algebra techniques which are utilized of solving systems of (linear) algebraic equations and solving systems of coupled ordinary differential equations using Laplace transforms and linear algebra tools.

Equivalent Courses: Previous & Current Courses
MATH337

Simple Requisites

Course Requisite Requirements

Prerequisites and Corequisite Requirements
Type
Completion Requirement

Course Requirements

Fulfill ALL of the following requirements:

Prerequisites: MATH 2532

Complete ALL of the following Courses:
- MATH2532 - Calculus III

AND

Corequisites: MATH 3035

Enroll in the following Courses:
- MATH3035 - Ordinary Differential Equation

Additional Comments:

No Requirement Level

MATH3052 - Basic Concepts of Mathematics

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Mathematical proofs, set theory, mathematical induction and recursion, relations and binary operations, functions, definition and development of some common number systems, cardinal numbers, abstract algebra.

Equivalent Courses: Previous & Current Courses
MATH352

Simple Requisites

Course Requisite Requirements

Prerequisite Requirements

Type
Prerequisite

Prerequisite: MATH 1520 passed with grade C- or better

passed with grade C- or better

Complete ALL of the following Courses:

- MATH1520 - g2:Calculus II

Additional Comments:

No Requirement Level

MATH3072 - Basic Concepts of Analysis

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Real numbers, sequences, limits, continuity, uniform continuity, differentiation, Reimann integral.

Equivalent Courses: Previous & Current Courses
MATH372

Simple Requisites

Course Requisite Requirements

Prerequisite Requirements
Type
Prerequisite

Prerequisite: MATH 3052 or equivalent passed with grade C- or better

Complete ALL of the following Courses:

- MATH3052 - Basic Concepts of Mathematics

Additional Comments:

No Requirement Level

MATH3082 - Probability and Statistics

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Exploratory data analysis, random variables, estimation and hypothesis testing, linear regression and analysis of variance, basic concepts of discrete and continuous probability distributions, bivariate probability distribution functions, expected values, moment generating function and weak law of large numbers. Uses of the central limit theorem and its applications. This course provides an introduction to probability theory and statistical inference. The theory of probability is the primary mathematical tool used in statistical inference and therefore this course will concentrate heavily on probability and statistics. The course has been designed for computer science and engineering students; however, it is broad enough for students from outside these disciplines.

Equivalent Courses: Previous & Current Courses
MATH382

Simple Requisites

Course Requisite Requirements

Prerequisite Requirements
Type
Prerequisite

Prerequisite: MATH 1520 passed with grade C- or better

passed with grade C- or better

Complete ALL of the following Courses:

- MATH1520 - g2:Calculus II

Additional Comments:

No Requirement Level

MATH3082L - Probability and Statistics Lab

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Entering data, descriptive statistics, graphing data, cross tabulation, hypothesis testing, and calculation of probabilities from different probability distributions. Each lab introduces a problem, provides some scientific background, suggests investigations for the data, and provides a summary of the theory used in the investigations.

Equivalent Courses: Previous & Current Courses
MATH382L

No Requirements

MATH3083 - Introduction to Biostatistics

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course covers the fundamental statistical concepts related to the practice of public health: descriptive statistics, design of biological research studies, probability, sampling, statistical distributions, confidence intervals, hypothesis testing, comparison of means and proportions, chi-squared tests, one-way & two-way ANOVA, simple and multiple linear regression, Fisher's Exact test and Mantel Hansel test for comparing several 2x2 tables. The course also uses the R

statistical software and includes many applications of statistics to health sciences and medical studies, emphasizing concepts and interpretation of results. Optional topics: principal components and factor analysis.

Equivalent Courses: Previous & Current Courses
MATH383

Simple Requisites

Course Requisite Requirements

Prerequisite Requirements
Type
Prerequisite

Prerequisite: Math 1520 passed with a grade of C- or better

passed with a grade of C- or better

Complete ALL of the following Courses:

- MATH1520 - g2:Calculus II

Additional Comments:

No Requirement Level

MATH3091 - Special Studies

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
6

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, Standard Letter

Equivalent Courses: Previous & Current Courses
MATH391

No Requirements

MATH4001 - Putnam Competition

General

Credit Hrs

Credit Hrs:
1

Grade Modes
Audit, Pass/Fail

Course Description
Students in this course will prepare for and then participate in the annual William Lowell Putnam Competition in mathematics. In preparation for the competition, students will learn problem-solving strategies and practice on problems from previous competitions. May be taken multiple times for credit.

Equivalent Courses: Previous & Current Courses
MATH401

No Requirements

MATH4010 - Numerical Methods I

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Floating point arithmetic, solution of linear and nonlinear systems of equations, interpolation, approximation, numerical differentiation and integration, numerical solution of ordinary differential equations.

Equivalent Courses: Previous & Current Courses
MATH410

Simple Requisites

Course Requisite Requirements

Prerequisite and Corequisite Requirements
Type
Completion Requirement

Course Requirements

Fulfill ALL of the following requirements:

Prerequisite: CSE 1220, CSE 1210, ES 111, or EE 271

Complete ANY of the following Courses:

- CSCI1220 - Programming Fund Python
- CSCI1210 - Programming Fundamentals
- ES111 - Computer Programming for Engineers
- EE271 - Mathematical Engineering

AND

Corequisite: MATH 3035

Enroll in the following Courses:

- MATH3035 - Ordinary Differential Equation

Additional Comments:

No Requirement Level

MATH4011 - Numerical Linear Algebra

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Direct and iterative methods for solving linear systems, conditioning and stability, methods for computing eigenvalues and eigenvectors, linear least squares problems, singular value decomposition, computational cost, and implementation of algorithms.

Equivalent Courses: Previous & Current Courses
MATH411

Simple Requisites

Course Requisite Requirements

Prerequisite Requirements
Type
Prerequisite

Course Requirements

Fulfill ALL of the following requirements:

Prerequisites: MATH 2420

Complete ALL of the following Courses:

- MATH2420 - Applied Linear Algebra

AND

Prerequisites: CSCI 1220, CSCI 1210, and ES 111

Complete ANY of the following Courses:

- CSCI1220 - Programming Fund Python
- CSCI1210 - Programming Fundamentals
- ES111 - Computer Programming for Engineers

Additional Comments:

No Requirement Level

MATH4015 - OR: Linear Programming

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Linear Programming, applications of LP, the simplex method, duality theory, computational complexity of LP, interior point methods.

Equivalent Courses: Previous & Current Courses
MATH415

Simple Requisites

Course Requisite Requirements

Prerequisite Requirements
Type
Prerequisite

Prerequisite: MATH 2420 passed with grade C- or better

passed with a grade of C- or better

Complete ALL of the following Courses:

- MATH2420 - Applied Linear Algebra

Additional Comments:

No Requirement Level

MATH4030 - Mathematical Modeling

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Introduction to the process of developing, analyzing, and refining mathematical models. Deterministic and probabilistic models considered for both discrete and continuous problems. Applications to a variety of fields. Shares lectures with MATH 5030, with additional work for the graduate level. (cross-listed with MATH 5030)

Equivalent Courses: Previous & Current Courses
MATH430, MATH530

Simple Requisites

Course Requisite Requirements

MATH 4030 Requirements
Type
Prerequisite

Programming Prereq Requirement

Complete ANY of the following Courses:

- CSCI1210 - Programming Fundamentals
  OR CSCI1220 - Programming Fund Python
  OR ES111 - Computer Programming for Engineers
  OR EE271 - Mathematical Engineering
  OR CH E3027 - Principles of Chemical Engineering II

Math prereq Requirements

Complete ALL of the following Courses:

- MATH2420 - Applied Linear Algebra
- MATH3035 - Ordinary Differential Equation
- MATH3082 - Probability and Statistics
  AND MATH3082L - Probability and Statistics Lab

Additional Comments:

MATH 4030 Pre- or Co- requisite Requirement
Type
Corequisite

Math 3036 pre or co requisite

Enroll in the following Courses:

- MATH3036 - Introduction to Partial Differential Equations

Additional Comments:

No Requirement Level

MATH4035 - Complex Analysis

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Algebra of complex numbers, analytic functions and Cauchy-Riemann equations, complex integration and Cauchy's theorem, integral formulae, power series, residues and contour integration, analytic continuation, Riemann surfaces.

Equivalent Courses: Previous & Current Courses
MATH435

Simple Requisites

Course Requisite Requirements

Prerequisite Requirement
Type
Prerequisite

Prerequisite: MATH 3036 passed with grade C- or better

passed with grade C- or better

Complete ALL of the following Courses:
- MATH3036 - Introduction to Partial Differential Equations

Additional Comments:

No Requirement Level

MATH4036 - Applications of Complex Analysis

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Topics selected from linear ordinary differential equations in the complex plane, special functions, conformal mapping, Laplace transform, Fourier and Hilbert transforms.

Equivalent Courses: Previous & Current Courses
MATH436

Simple Requisites

Course Requisite Requirements

Prerequisite Requirement
Type
Prerequisite

Prerequisite: MATH 4035 passed with grade C- or better

passed with grade C- or better

Complete ALL of the following Courses:
- MATH4035 - Complex Analysis

Additional Comments:

No Requirement Level

MATH4037 - Systems of Ordinary Differential Equations

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Theory and application of systems of ordinary differential equations, linear and nonlinear systems, two-dimensional autonomous systems, stability, periodic solutions and limit cycles, interspecies competition and predator/prey problems, pendulum equation, Duffing equation, Van der Pol equation, Lienard equation.

Equivalent Courses: Previous & Current Courses
MATH437

Simple Requisites

Course Requisite Requirements

Prerequisite Requirements
Type
Prerequisite

Course Requirements

Fulfill ALL of the following requirements:

Prerequisite: MATH 3035 passed with grade C- or better

Complete ALL of the following Courses:
- MATH3035 - Ordinary Differential Equation

AND

Prerequisites: MATH 2420 or MATH 3037, passed with grade C- or better

Complete ANY of the following Courses:
- MATH2420 - Applied Linear Algebra
- MATH3037 - Engineering Mathematics

Additional Comments:

No Requirement Level

MATH4038 - Partial Differential Equations

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Classification of classical partial differential equations of mathematical physics, boundary conditions, uniqueness theorems, first and second order equations, characteristics, boundary value problems, Green's functions, maximum principle.

Equivalent Courses: Previous & Current Courses
MATH438

Simple Requisites

Course Requisite Requirements

Prerequisite Requirement
Type
Prerequisite

Prerequisite: MATH 3036 passed with grade C- or better

passed with grade C- or better

Complete ALL of the following Courses:
- MATH3036 - Introduction to Partial Differential Equations

Additional Comments:

No Requirement Level

MATH4041 - Statistical Machine Learning

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Basics of statistical learning. Data visualization. Linear, nonlinear and logistic regression, variable selection and regularization. Linear classification methods. Smoothing methods. Tree-based methods. Support vector machines. Unsupervised learning: principal components analysis and clustering. The R and/or Python software will be used

Equivalent Courses: Previous & Current Courses
MATH441

Simple Requisites

Course Requisite Requirements

Prerequisite Requirements
Type
Prerequisite

Prerequisites: MATH 3082 and MATH 2420

Complete ALL of the following Courses:
- MATH3082 - Probability and Statistics
- MATH2420 - Applied Linear Algebra

Or consent of the instructor

Additional Comments:

No Requirement Level

MATH4042 - Intro to Differential Geometry

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Introduction to the theory of manifolds, vector fields, tensors, differential forms, exterior derivative, integration of differential forms Stokes' theorem, Lie derivative, covariant derivative, connection, curvature, tensor analysis, geodesics.

Equivalent Courses: Previous & Current Courses
MATH442

Simple Requisites

Course Requisite Requirements

Prerequisite Requirements
Type
Prerequisite

Prerequisites: MATH 2420 and MATH 2532 passed with grade C- or better

Complete ALL of the following Courses:
- MATH2420 - Applied Linear Algebra
- MATH2532 - Calculus III

Additional Comments:

No Requirement Level

MATH4054 - Linear Algebra

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Vector spaces, linear transformations, linear systems, eigenvalues and eigenvectors, Jordan canonical forms, inner product spaces, least squares problems, normal, unitary, and Hermitian transformations.

Equivalent Courses: Previous & Current Courses
MATH454

Simple Requisites

Course Requisite Requirements

Prerequisite Requirements
Type
Prerequisite

Prerequisites: MATH 2420 and MATH 3052, each passed with grade C- or better

passed with grade C- or better

Complete ALL of the following Courses:
- MATH2420 - Applied Linear Algebra
- MATH3052 - Basic Concepts of Mathematics

Additional Comments:

No Requirement Level

MATH4055 - Intro to Abstract Algebra

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
A study of abstract algebraic structures, semi-groups, groups, rings, ideals, integral domains, fields, vector spaces, field extensions.

Equivalent Courses: Previous & Current Courses
MATH455

Simple Requisites

Course Requisite Requirements

Prerequisite Requirement
Type
Prerequisite

Prerequisite: MATH 3052 passed with grade C- or better

passed with grade C- or better

Complete ALL of the following Courses:
- MATH3052 - Basic Concepts of Mathematics

Additional Comments:

No Requirement Level

MATH4061 - Intro to Topology

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Equivalent Courses: Previous & Current Courses
MATH461

No Requirements

MATH4071 - Intro to Analysis

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Basic concepts of the real-number system, elements of point-set theory, infinite sequences, limits, continuity, differentiation of functions of one variable, Riemann-Stieltjes integral, series, functions of several variables.

Equivalent Courses: Previous & Current Courses
MATH471

Simple Requisites

Course Requisite Requirements

Prerequisite Requirement
Type
Prerequisite

Prerequisite: MATH 3072 passed with grade C- or better

passed with grade C- or better

Complete ALL of the following Courses:
- MATH3072 - Basic Concepts of Analysis

Additional Comments:

No Requirement Level

MATH4072 - Intro to Analysis

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: MATH 3072 passed with grade C- or betterBasic concepts of the real-number system, elements of point-set theory, infinite sequences, limits, continuity, differentiation of functions of one variable, Riemann-Stieltjes integral, series, functions of several variables.

Equivalent Courses: Previous & Current Courses
MATH472

No Requirements

MATH4083 - Mathematical Statistics

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Introduction to decision theory. Multivariate distributions. Sampling distributions for the normal case. Convergence of random variables. Different methods of estimation. Principles of hypothesis testing.

Equivalent Courses: Previous & Current Courses
MATH483

Simple Requisites

Course Requisite Requirements

Prerequisite Requirement
Type
Prerequisite

Prerequisite: MATH 3082 passed with grade C- or better

passed with grade C- or better

Complete ALL of the following Courses:
- MATH3082 - Probability and Statistics

Additional Comments:

No Requirement Level

MATH4084 - Reliability & Quality Control

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Order statistics, testing and estimation for common lifetime distributions in reliability, accelerated life tests, Bayesian methods in reliability. Statistical techniques of industrial quality control, sampling methods, control charts. Applications in industry.

Equivalent Courses: Previous & Current Courses
MATH484

Simple Requisites

Course Requisite Requirements

Prerequisite Requirement
Type
Prerequisite

Prerequisite: MATH 3082 passed with grade C- or better

passed with grade C- or better

Complete ALL of the following Courses:
- MATH3082 - Probability and Statistics

Additional Comments:

No Requirement Level

MATH4086 - Intro to Stochastic Processes

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Conditioning. The Poisson process. Theory of Markov chains, continuous time Markov and semi- Markov processes. Topics from renewal theory and Markov renewal theory. Queuing Theory. Applications in science and engineering.

Equivalent Courses: Previous & Current Courses
MATH486

Simple Requisites

Course Requisite Requirements

Prerequisite Requirements
Type
Prerequisite

Prerequisites: MATH 2420 and MATH 3082, each passed with grade C- or better

passed with grade C- or better

Complete ALL of the following Courses:
- MATH2420 - Applied Linear Algebra
- MATH3082 - Probability and Statistics

Additional Comments:

No Requirement Level

MATH4088 - OR: Probabilistic Methods

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Monte Carlo Simulation Theory. Application of simulation to problems in science, engineering, and business. Queuing systems simulation. Inventory theory.

Equivalent Courses: Previous & Current Courses
MATH488

Simple Requisites

Course Requisite Requirements

Prerequisite Requirement
Type
Prerequisite

Prerequisite: MATH 3082 passed with grade C- or better

passed with grade C- or better

Complete ALL of the following Courses:
- MATH3082 - Probability and Statistics

Additional Comments:

No Requirement Level

MATH4091 - Directed Study

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
6

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, Standard Letter

Equivalent Courses: Previous & Current Courses
MATH491

No Requirements

MATH5000 - Directed Research

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
12

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, No Report

Equivalent Courses: Previous & Current Courses
MATH500

No Requirements

MATH5001 - Professional Development Seminar

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail

Course Description
A seminar in which students will develop skills in problem solving, communication, and research. Students will be expected to actively participate in the seminar by attending presentations, solving assigned problems, and preparing written and oral presentations. Graded S/U.

Equivalent Courses: Previous & Current Courses
MATH501

No Requirements

MATH5002 - Professional Development Seminar

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail

Course Description
A seminar in which students will develop skills in problem solving, communication, and research. Students will be expected to actively participate in the seminar by attending presentations, solving assigned problems, and preparing written and oral presentations. Graded S/U.

Equivalent Courses: Previous & Current Courses
MATH502

No Requirements

MATH5003 - Graduate Seminar

General

Credit Hrs

Credit Hrs:
0

Credit Hours Max:
1

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail

Course Description
Attend and participate in departmental seminars. Graded on an S/U basis.

Equivalent Courses: Previous & Current Courses
MATH503

Simple Requisites

Course Requisite Requirements

Prerequisite Requirement
Type
Prerequisite

Student Level Restriction

Must have graduate level standing

Additional Comments:

No Requirement Level

MATH5009 - Graduate Internship

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
6

Grade Modes
Audit, Pass/Fail, Standard Letter

Credit Hours Operator:
TO

Equivalent Courses: Previous & Current Courses
MATH509

Simple Requisites

Course Requisite Requirements

Prerequisite Requirement
Type
Prerequisite

Student Level Restriction

Must have Graduate level standing

Additional Comments:

No Requirement Level

MATH5010 - Computational Fluid Dynamics

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Equations of fluid dynamics, flow models, discretization, analysis of numerical schemes, numerical methods for basic partial differential equations, numerical methods for inviscid and viscous flows.

Equivalent Courses: Previous & Current Courses
MATH510

Simple Requisites

Course Requisite Requirements

Prerequisite Requirements
Type
Prerequisite

Prerequisite: MATH 3036, 4010 or equivalent; passed with a C– or better

Complete ALL of the following Courses:
- MATH3036 - Introduction to Partial Differential Equations
- MATH4010 - Numerical Methods I

Additional Comments:

No Requirement Level

MATH5011 - Numerical Methods for Partial Differential Equations

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Finite difference or finite element methods for parabolic, hyperbolic and elliptic partial differential equations; implementation, approximation, stability, and convergence.

Equivalent Courses: Previous & Current Courses
MATH511

Simple Requisites

Course Requisite Requirements

Prerequisite Requirement
Type
Prerequisite

Prerequisite: MATH 4010 or equivalent; passed with a C– or better

passed with a C– or better

Complete ALL of the following Courses:
- MATH4010 - Numerical Methods I

Additional Comments:

No Requirement Level

MATH5012 - Numerical Methods for Wave Propagation

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Finite volume methods for hyperbolic partial differential equations; Riemann problems; Godunov's and Roe's methods; high resolution methods; applications.

Equivalent Courses: Previous & Current Courses
MATH512

Simple Requisites

Course Requisite Requirements

Prerequisite Requirement
Type
Prerequisite

Prerequisite: MATH 4010 or equivalent; passed with a C– or better

passed with a C– or better

Complete ANY of the following Courses:
- MATH4010 - Numerical Methods I

Additional Comments:

No Requirement Level

MATH5013 - Advanced Topics in Numerical Analysis

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Topics chosen from areas in numerical analysis, numerical partial differential equations, and numerical linear algebra. May be taken multiple times for credit.

Equivalent Courses: Previous & Current Courses
MATH513

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

Prerequisite Requirements

passed with a C– or better

Complete ALL of the following Courses:

- MATH4010 - Numerical Methods I

Additional Comments:

No Requirement Level

MATH5015 - Deterministic Operations Research

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Study of a special topic in deterministic operations research. May be taken multiple times for credit.

Equivalent Courses: Previous & Current Courses
MATH515

Simple Requisites

Course Requisite Requirements

Prerequisite Requirement
Type
Prerequisite

Prerequisite: MATH 4015; passed with a C– or better

Complete ALL of the following Courses:

- MATH4015 - OR: Linear Programming

Or consent of instructor and advisor

Additional Comments:

No Requirement Level

MATH5016 - Stochastic Operations Research

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Study of a special topic in stochastic operations research. May be taken multiple times for credit.

Equivalent Courses: Previous & Current Courses
MATH516

Simple Requisites

Course Requisite Requirements

Prerequisite Requirement
Type
Prerequisite

Prerequisite: MATH 4086 passed with a C– or better

Complete ALL of the following Courses:

- MATH4086 - Intro to Stochastic Processes

Or consent of instructor and advisor

Additional Comments:

No Requirement Level

MATH5017 - Combinatorial Optimization

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Maximum flow, shortest path, and minimum cost flow problems on networks. Matching. Matroids. Cutting plane and branch and bound methods for integer programming. Computational complexity of combinatorial optimization problems.

Equivalent Courses: Previous & Current Courses
MATH517

Simple Requisites

Course Requisite Requirements

Prerequisite Requirement
Type
Prerequisite

Prerequisite: MATH 4015 passed with a C– or better

Complete ALL of the following Courses:

- MATH4015 - OR: Linear Programming

Or consent of instructor and advisor

Additional Comments:

No Requirement Level

MATH5018 - Convex Optimization for Nonlinear Programing

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Theory and applications of constrained and unconstrained optimization, convexity, Lagrangian duality theory, Newton and quasi-Newton methods, first order methods.

Equivalent Courses: Previous & Current Courses
MATH518

Simple Requisites

Course Requisite Requirements

Prerequisite Requirements
Type
Prerequisite

Prerequisites: MATH 4010 or MATH 4015, passed with a C– or better

Complete ANY of the following Courses:

- MATH4010 - Numerical Methods I
- MATH4015 - OR: Linear Programming

Or consent of instructor and advisor.

Additional Comments:

No Requirement Level

MATH5019 - Inverse Problems

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Theory and practice of the various techniques of inverting geophysical data to obtain models. Primary emphasis is on the understanding and use of linear inverse techniques. (Same as GEOP 529.)

Equivalent Courses: Previous & Current Courses
MATH519

Simple Requisites

Course Requisite Requirements

Prerequisite Requirement
Type
Prerequisite

Prerequisite: MATH 3035 passed with a C– or better

Complete ALL of the following Courses:

- MATH3035 - Ordinary Differential Equation

Or consent of instructor and advisor.

Additional Comments:

No Requirement Level

MATH5020 - Applied Multivariate Analysis

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Multivariate normal distribution and tests assessing multivariate normality. Estimation and hypotheses testing regarding the parameters of multivariate normal populations. Principal component analysis, factor analysis, canonical correlations analysis, classification and discriminant analysis, cluster analysis, multivariate linear models, and multivariate analysis of variance and covariance. Applications in science and engineering.

Equivalent Courses: Previous & Current Courses
MATH520

Simple Requisites

Course Requisite Requirements

Prerequisite Requirements
Type
Prerequisite

Prerequisites: MATH 3082 and MATH 4083, passed with a C– or better

Complete ALL of the following Courses:

- MATH3082 - Probability and Statistics
- MATH4083 - Mathematical Statistics

Additional Comments:

No Requirement Level

MATH5030 - Mathematical Modeling

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Introduction to the process of developing, analyzing, and refining mathematical models. Deterministic and probabilistic models considered for both discrete and continuous problems. Applications to a variety of fields. Shares lectures with MATH 4030, with additional work for the graduate level. (cross-listed with MATH 4030)

Equivalent Courses: Previous & Current Courses
MATH430, MATH530

Simple Requisites

Course Requisite Requirements

MATH 5030 Requirements
Type
Prerequisite

Programming Prereq Requirement

Complete ANY of the following Courses:
- CSCI1210 - Programming Fundamentals
  OR CSCI1220 - Programming Fund Python
  OR ES111 - Computer Programming for Engineers
  OR EE271 - Mathematical Engineering
  OR CH E3027 - Principles of Chemical Engineering II

Math Prereq Requirements

Complete ALL of the following Courses:
- MATH2420 - Applied Linear Algebra
- MATH3035 - Ordinary Differential Equation
- MATH3082 - Probability and Statistics
  AND MATH3082L - Probability and Statistics Lab

Additional Comments:

MATH 5030 Pre- or Co- requisite Requirement
Type
Corequisite

Math 3036 Pre or Co Requisite

Enroll in the following Courses:
- MATH3036 - Introduction to Partial Differential Equations

Additional Comments:

No Requirement Level

MATH5031 - Topics in Ordinary Differential Equations

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Study of a special topic in ordinary differential equations not usually treated. Normally one related to a field of research interest at Tech. May be taken multiple times for credit.

Equivalent Courses: Previous & Current Courses
MATH531

Simple Requisites

Course Requisite Requirements

Prerequisite Requirement
Type
Prerequisite

Prerequisite: MATH 4037 or equivalent; passed with a C– or better

passed with a C– or better

Complete ALL of the following Courses:
- MATH4037 - Systems of Ordinary Differential Equations

Additional Comments:

No Requirement Level

MATH5032 - Perturbation Methods

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
A survey of expansion techniques. Regular and singular perturbations. Poincaré-Linstedt method. Matched asymptotic expansions. Multiple scales.

Equivalent Courses: Previous & Current Courses
MATH532

Simple Requisites

Course Requisite Requirements

Prerequisite Requirement
Type
Prerequisite

Prerequisite: MATH 4037 or equivalent; passed with a C– or better

passed with a C– or better

Complete ALL of the following Courses:
- MATH4037 - Systems of Ordinary Differential Equations

Additional Comments:

No Requirement Level

MATH5033 - Partial Differential Equations

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Study of a special topic in partial differential equations not usually treated. Normally one related to a field of research interest at Tech. May be taken multiple times for credit.

Equivalent Courses: Previous & Current Courses
MATH533

Simple Requisites

Course Requisite Requirements

Prerequisite Requirement
Type
Prerequisite

Prerequisite: MATH 4038 or equivalent; passed with a C– or better

passed with a C– or better

Complete ALL of the following Courses:
- MATH4038 - Partial Differential Equations

Additional Comments:

No Requirement Level

MATH5034 - Topics in Partial Differential Equations

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Study of a special topic in partial differential equations not usually treated. Normally one related to a field of research interest at Tech. May be taken multiple times for credit.

Equivalent Courses: Previous & Current Courses
MATH534

Simple Requisites

Course Requisite Requirements

Prerequisite Requirement
Type
Prerequisite

Prerequisite: MATH 4038 or equivalent; passed with a C– or better

passed with a C– or better

Complete ALL of the following Courses:
- MATH4038 - Partial Differential Equations

Additional Comments:

No Requirement Level

MATH5035 - Methods of Mathematical Physics

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Hilbert spaces, orthonormal systems, spectral theory of self-adjoint operators, integral equations, ordinary and partial differential operators, distributions and fundamental solutions, asymptotic expansions, Laplace method, stationary phase method, asymptotic expansion of fundamental solutions, mathematical foundations of quantum mechanics.

Equivalent Courses: Previous & Current Courses
MATH535

Simple Requisites

Course Requisite Requirements

Prerequisite Requirement
Type
Prerequisite

Prerequisite: MATH 3072; passed with a C– or better

Complete ALL of the following Courses:
- MATH3072 - Basic Concepts of Analysis

Or consent of instructor and advisor.

Additional Comments:

No Requirement Level

MATH5036 - Methods of Mathematical Physics

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Hilbert spaces, orthonormal systems, spectral theory of self-adjoint operators, integral equations, ordinary and partial differential operators, distributions and fundamental solutions, asymptotic expansions, Laplace method, stationary phase method, asymptotic expansion of fundamental solutions, mathematical foundations of quantum mechanics.

Equivalent Courses: Previous & Current Courses
MATH536

Simple Requisites

Course Requisite Requirements

Prerequisite Requirement
Type
Prerequisite

Prerequisite: MATH 3072; passed with a C– or better

Complete ALL of the following Courses:
- MATH3072 - Basic Concepts of Analysis

Or consent of instructor and advisor.

Additional Comments:

No Requirement Level

MATH5037 - Bifurcation Theory

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Discrete and continuous models. Nonlinear buckling, expansion of the bifurcated solution, stability analysis, Hopf bifurcation, degree theory, the Rabinowitz theorem, and other topics.

Equivalent Courses: Previous & Current Courses
MATH537

Simple Requisites

Course Requisite Requirements

Prerequisite Requirement
Type
Prerequisite

Prerequisite: MATH 4037 or equivalent; passed with a C– or better

passed with a C– or better

Complete ALL of the following Courses:

- MATH4037 - Systems of Ordinary Differential Equations

Additional Comments:

No Requirement Level

MATH5038 - Wave Phenomena

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Hyperbolic and dispersive waves. Characteristic methods, breaking and shock fitting, and weak solutions. Examples drawn from water waves, traffic flow problems, supersonic flight, and other areas.

Equivalent Courses: Previous & Current Courses
MATH538

Simple Requisites

Course Requisite Requirements

Prerequisite Requirement
Type
Prerequisite

Prerequisite: MATH 4038 or equivalent; passed with a C– or better

Complete ALL of the following Courses:

- MATH4038 - Partial Differential Equations

Or consent of instructor and advisor.

Additional Comments:

No Requirement Level

MATH5039 - Fluid Dynamics

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
The Navier-Stokes equations, inviscid flow, irrational fluids, viscosity, and turbulence. Other topics as time and interest permit.

Equivalent Courses: Previous & Current Courses
MATH539

Simple Requisites

Course Requisite Requirements

Prerequisite Requirement
Type
Prerequisite

Prerequisite: MATH 4038 or equivalent; passed with a C– or better

Complete ALL of the following Courses:

- MATH4038 - Partial Differential Equations

Additional Comments:

No Requirement Level

MATH5040 - Calculus of Variations

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Development of the classical theorems of Calculus of Variations, applications, some numerical approaches. Includes Euler equations, broken extremals an the Weierstrass-Erdmann conditions, the second variation and Hamilton-Jacobi equation, the Weierstrass E-function, and the Ritz method.

Equivalent Courses: Previous & Current Courses
MATH540

Simple Requisites

Course Requisite Requirements

Prerequisite Requirement
Type
Prerequisite

Course Requirements

Fulfill ANY of the following requirements:

Prerequisite: MATH 4037; passed with a C– or better

Complete ALL of the following Courses:

- MATH4037 - Systems of Ordinary Differential Equations

OR

Student Level Requirement

Must have Graduate level standing.

Additional Comments:

No Requirement Level

MATH5041 - Statistical Machine Learning

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Basics of statistical learning. Data visualization. Linear, nonlinear and logistic regression, variable selection and regularization. Linear classification methods. Smoothing methods. Tree-based methods. Basics of statistical learning. Data visualization. Linear, nonlinear and logistic regression, variable selection and regularization. Linear classification methods. Smoothing methods. Tree-based methods.

Equivalent Courses: Previous & Current Courses
MATH541

Simple Requisites

Course Requisite Requirements

Prerequisite Requirements
Type
Prerequisite

Prerequisites: MATH 3082 and MATH 2420

Complete ALL of the following Courses:

- MATH3082 - Probability and Statistics
- MATH2420 - Applied Linear Algebra

Or consent of the instructor.

Additional Comments:

No Requirement Level

MATH5042 - Topics in Differential Geometry

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Study of advanced topics in differential geometry such as: Brouwer degree, fundamental group, homology groups, De Rham cohomology, Betti numbers, fibre bundles, Morse theory, Lie groups, covering spaces, homotopy groups. May be taken multiple times for credit.

Equivalent Courses: Previous & Current Courses
MATH542

Simple Requisites

Course Requisite Requirements

Prerequisite Requirement
Type
Prerequisite

Prerequisite: MATH 4042; passed with a C– or better

Complete ALL of the following Courses:

- MATH4042 - Intro to Differential Geometry

Or consent of instructor and advisor.

Additional Comments:

No Requirement Level

MATH5075 - Functions of a Real Variable

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Topological concepts, category, measure theory, Lebesgue measure and integration, derivatives and the Radon-Nikodym theorem, product spaces and measures, function spaces, normed linear spaces.

Equivalent Courses: Previous & Current Courses
MATH575

Simple Requisites

Course Requisite Requirements

Prerequisite Requirements
Type
Prerequisite

Course Requirements

Fulfill ALL of the following requirements:

Prerequisites: MATH 4071 and MATH 4072; passed with a C– or better

Complete ALL of the following Courses:

- MATH4071 - Intro to Analysis
- MATH4072 - Intro to Analysis

AND

Prerequisites: MATH 4061 or MATH 5061 recommended; passed with a C– or better

Complete at least 1 of the following courses:

- MATH4061 - Intro to Topology

Additional Comments:

No Requirement Level

MATH5077 - Functional Analysis

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Normed vector spaces, Banach spaces, Banach fixed point theorem. Lebesgue integral, Lebesgue measure. Hilbert spaces and orthonormal systems, strong and weak convergence. Linear operators on Hilbert spaces, self-adjoint operators, compact operators, spectral theory, Fourier transform. Applications to integral and differential equations, Fredholm theory. Distributions and partial differential equations, fundamental solutions, resolvent, Green's functions, weak solutions.

Equivalent Courses: Previous & Current Courses
MATH577

Simple Requisites

Course Requisite Requirements

Prerequisite Requirement
Type
Prerequisite

Prerequisite: MATH 4071 or equivalent; passed with a C– or better

passed with a C– or better

Complete ALL of the following Courses:

- MATH4071 - Intro to Analysis

Additional Comments:

No Requirement Level

MATH5081 - Directed Study

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
12

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
An advanced course offered on demand under the guidance of a senior staff member.

Equivalent Courses: Previous & Current Courses
MATH581

No Requirements

MATH5082 - Linear Statistics Models with Applications

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
An in-depth study of regression and analysis of variance models. Topics include multiple regressions and model building, analysis of residuals, analysis of variance as regression analysis, generalized linear models, generalized linear mixed models, nonlinear models, multi-factor models with equal and unequal sample sizes, random and fixed effects models, randomized complete block designs, and analysis of covariance. The statistical packages SAS and Minitab will be used for data analysis.

Equivalent Courses: Previous & Current Courses
MATH582

Simple Requisites

Course Requisite Requirements

Prerequisite Requirement
Type
Prerequisite

Prerequisite: MATH 4083; passed with a C– or better

Complete ALL of the following Courses:

- MATH4083 - Mathematical Statistics

Or consent of instructor and advisor.

Additional Comments:

No Requirement Level

MATH5083 - Topics in Probability & Statistics

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Advanced topics selected from linear regression analysis, the design of experiments, decision theory. Bayes and empirical Bayes procedures. Markov chains, Markov and semi-Markov processes, renewal theory. May be taken multiple times for credit.

Equivalent Courses: Previous & Current Courses
MATH583

Simple Requisites

Course Requisite Requirements

Prerequisite Requirements
Type
Prerequisite

Prerequisites

Complete ALL of the following Courses:

- MATH4083 - Mathematical Statistics
- MATH4086 - Intro to Stochastic Processes

or consent of instructor and advisor; passed with a C- or better

Additional Comments:

No Requirement Level

MATH5084 - Topics in Probabilty & Statistics

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Advanced topics selected from linear regression analysis, the design of experiments, decision theory. Bayes and empirical Bayes procedures. Markov chains, Markov and semi-Markov processes, renewal theory. May be taken multiple times for credit.

Equivalent Courses: Previous & Current Courses
MATH584

Simple Requisites

Course Requisite Requirements

Prerequisite Requirements
Type
Prerequisite

Prerequisites

Complete ALL of the following Courses:

- MATH4083 - Mathematical Statistics
- MATH4086 - Intro to Stochastic Processes

or consent of instructor and advisor; passed with a C- or better

Additional Comments:

No Requirement Level

MATH5086 - Spatial Variability & Geostatistics

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Introduction to spatial and temporal variability. Stationary and intrinsic random fields, variograms and estimation. Kriging, co-kriging, and simulation of random fields. Conditioning and conditional simulation. Indicator kriging and simulation. Applications from hydrology, mining, petroleum engineering, and other fields of science and engineering.

Equivalent Courses: Previous & Current Courses
MATH586

Simple Requisites

Course Requisite Requirements

Prerequisite Requirement
Type
Prerequisite

Prerequisite: MATH 3082; passed with a C– or better

passed with a C– or better

Complete ALL of the following Courses:

- MATH3082 - Probability and Statistics

Additional Comments:

No Requirement Level

MATH5087 - Analysis of Time Series & Spatial Series

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
An introductory overview of methods for analyzing temporal and spatial series with an emphasis on scientific applications. Linear systems in continuous and discrete time, Fourier analysis, spectral estimation, convolution and

Equivalent Courses: Previous & Current Courses
MATH587

Topics include Fourier series and Laplace transforms, stationary and nonstationary time series, ARIMA modeling, forecasting, and generalizations to multidimensional and multichannel applications. (Same as GEOP 5005)

No Requirements

MATH5088 - Advanced Data Analysis

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Topics include linear regression, inferential tools for regression, model checking and refinement, experimental design, repeated measures and other multivariate responses, comparisons of proportions or odds, logistic regressions and power analysis. Principal components and factor analysis are also introduced.

Equivalent Courses: Previous & Current Courses
MATH588

Simple Requisites

Course Requisite Requirements

Prerequisite Requirement
Type
Prerequisite

Prerequisite: MATH 4083; passed with a C– or better

Complete ALL of the following Courses:

- MATH4083 - Mathematical Statistics

Or consent of instructor and advisor.

Additional Comments:

No Requirement Level

MATH5090 - Independent Study

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
12

Credit Hours Operator:
TO

Grade Modes
Pass/Fail, No Report, Standard Letter

Course Description
Under the direction of a faculty member appointed by the department, the student shall prepare a paper making use of standard reference sources on some topic not covered by other course work.

Equivalent Courses: Previous & Current Courses
MATH590

No Requirements

MATH5091 - Thesis

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
12

Credit Hours Operator:
TO

Grade Modes
Pass/Fail, No Report

Equivalent Courses: Previous & Current Courses
MATH591

No Requirements

MATH5095 - Dissertation

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
12

Credit Hours Operator:
TO

Grade Modes
No Report

Equivalent Courses: Previous & Current Courses
MATH595

Simple Requisites

Course Requisite Requirements

Prerequisite Requirement
Type
Completion Requirement

Student Attribute Requirements

Successful completion of PhD candidacy exam and Academic Advisor recommendation for candidacy.

Additional Comments:

No Requirement Level

Mechanical Engineering Department

- ***Professor:*** *Bakhtiyarov, Ford, Zagrai*
- ***Associate Professors:*** *Bin (Chair of the Department), Ghosh, Hassanalian, Lee, Ryu, Wei*
- ***Associate Teaching Professor:*** *O'Malley*
- ***Assistant Teaching Professor:*** *Dinwiddie*
- ***Emeritus:*** *Gerity, Ostergren*

Degrees Offered: *B.S. in Mechanical Engineering; M.E. in Mechanical Engineering; M.S. in Mechanical Engineering; PhD in Mechanical Engineering*

The Department of Mechanical Engineering at New Mexico Tech administers the following programs:

Bachelor of Science in Mechanical Engineering

Master of Engineering in Mechanical Engineering

- Specialization in Explosives Engineering
- Specialization in Fluid and Thermal Sciences
- Specialization in Mechatronics and Robotics
- Specialization in Solid Mechanics

Master of Science in Mechanical Engineering

- Specialization in Explosives Engineering
- Specialization in Fluid and Thermal Sciences
- Specialization in Mechatronics Systems and Robotics
- Specialization in Solid Mechanics

Doctor Philosophy in Mechanical Engineering

The Department of Mechanical Engineering also offers M.S. and M.E. degrees without specialization.

Program Educational Objectives

The Department of Mechanical Engineering at New Mexico Tech will produce Bachelor of Science graduates who are independent thinkers, taking ownership in identifying problems and determining effective solution strategies in a timely manner. Upon graduation, students will be prepared to:

1. Successfully enter government laboratories, graduate schools, industry, and other areas of the profession.
2. Have an understanding of the importance of life-long learning such that they seek personal and professional growth.
3. Have achieved a noteworthy level of workplace responsibility.

Student Outcomes for Undergraduate Program in Mechanical Engineering

Graduates of the Bachelor of Science in Mechanical Engineering program will have demonstrated

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3. An ability to communicate effectively with a range of audiences
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Programs

Accelerated Masters in Mechanical Engineering

[Program Overview]

Program Title
Accelerated Masters in Mechanical Engineering

Department(s)
Mechanical Engineering

Program Description
Qualified undergraduate students may apply for admission to the Accelerated Masters program in Mechanical Engineering. In fulfillment of the requirements for both B.S and M.S. degrees, as outlined in their respective sections, accepted students may apply six credits of 5000-level courses to both degrees.

[Learning Outcomes]

Outcome
1. Learn to reason well and to evaluate and apply information

Outcome
2. Develop analytical and quantitative skills for competence in science and math

Outcome
3. Communicate to different audiences in multiple forms

Outcome
4. Exercise their role as members of diverse societies and cultures

Outcome
5. Learn responsible values and ethics for their professional lives

Outcome
6. Gain expertise in their chosen field of study

G.C. in Explosives Engineering

[Program Overview]

Program Title
Graduate Certificate in Explosive Engineering

Department(s)
Mechanical Engineering

Program Description
The Graduate Certificate in Explosives Engineering provides formal coursework in the highly- specialized field of explosives engineering to post-baccalaureate professionals/graduate students who do not wish to pursue a graduate degree. The program is targeted at scientists and engineers that hold at least a BS degree in mechanical engineering or related field. The 12 credit hours of coursework cover fundamental aspects of explosives and wave propagation, and also allow flexibility to pursue topics of individual interest.

Simple Requisites

Program Requirements

The requirements for the Graduate Certificate in Explosive Engineering.
Type
Completion Requirement

Courses Required:

Complete ALL of the following Courses:

- MENG5045 - Introduction to Explosives Engineering
- MENG5049 - Wave Propagation

Complete at least 6 credits from the following:

Earn at least 6 credits from the following:

- MENG5013 - Impact Dynamics
- MENG5046 - Detonation Theory
- MENG5047 - Theory of Propellants and Pyrotechnics
- MENG5050 - Advanced Explosives Engineering
- MENG5052 - Explosives Technology & Applications
- MENG5053 - Computer Modeling of Detonations
- MENG5055 - Shock Propagation in Air
- MENG5056 - Compressible Fluid Flow

Additional Comments:

Institute General Requirements

No Requirement Level

[Learning Outcomes]

Outcome
1. Learn to reason well and to evaluate and apply information

Outcome
2. Develop analytical and quantitative skills for competence in science and math

Outcome
3. Communicate to different audiences in multiple forms

Outcome
4. Exercise their role as members of diverse societies and cultures

Outcome
5. Learn responsible values and ethics for their professional lives

Outcome
6. Gain expertise in their chosen field of study

Aerospace Engineering (minor)

[Program Overview]

Program Title
Minor in Aerospace Engineering

Department(s)
Mechanical Engineering

Program Description
Minimum of 18 Credits are required

Simple Requisites

Program Requirements
Minimum credit hours required – 18

Minor in Aerospace Engineering
Type
Completion Requirement

The following courses are required:

Complete ALL of the following Courses:

- AE3011 - Aerodynamics I
- AE4012 - Aerospace Systems

Additional twelve

Additional twelve (12) credit hours of AE courses.

Aerospace-related graduate level (5000) MENG courses may also be used with approval of the Aerospace Engineering Minor Advisor.

Additional Comments:

Institute General Requirements

See the Institute **General Education Core Requirements.**

No Requirement Level

Biomedical Engineering (minor)

[Program Overview]

Program Title
Minor in Biomedical Engineering

Department(s)
Mechanical Engineering

Program Description
Minimum of 19 Credits are required

Simple Requisites

Program Requirements
Minimum credit hours required – 19

Minor in Biomedical Engineering
Type
Completion Requirement

The following courses are required:

Complete ALL of the following Courses:

- BIOL2110 - Pinciples of Biology: Cellular & Molecular
  AND BIOL2110L - Pinciples of Biology: Cellular & Molecular Lab
- BIOL3031 - Cell Biology
- BIOL3051 - Anatomy & Physiology
- BIOL3052 - Anatomy and Physiology II

Two Courses from:

Complete at least 2 of the following courses:

- MTLS3051 - Introduction to Polymeric Materials
- MENG4060 - Intro to Biomedical Engineering
- MENG4065 - Biorheology
- MTLS5016 - Biomimetic Materials
- CH E4073 - Polymer Materials Engineering
- MENG5076 - Biomedical Mechatronics
- MENG4086 - Special Topics Biomedical Eng

Senior Design Project

Students, who are interested in a minor in Biomedical Engineering, will do their Junior/Senior Design Project in the Biomedical Engineering field. This is an opportunity for them to implement their learning in the mechanical engineering and life sciences fields to tackle a particular problem in the biomedical engineering field.

Additional Comments:

Institute General Requirements

See the Institute **General Education Core Requirements.**

No Requirement Level

Explosives Engineering (minor)

[Program Overview]

Program Title
Minor in Explosives Engineering

Department(s)
Mechanical Engineering

Program Description
Minimum of 18 Credits are required

Simple Requisites

Program Requirements

Minor in Explosives Engineering
Type
Completion Requirement

The following courses are required:

Complete ALL of the following Courses:

- EXPL4045 - Introduction to Explosives Eng
  OR MENG5045 - Introduction to Explosives Engineering
- EXPL4049 - Wave Propagation
  OR MENG5049 - Wave Propagation

One course from (ES fundamentals):

Complete at least 1 of the following courses:

- MENG216 - Engineering Fluid Mechanics
  OR ES216 - Engineering Fluid Mechanics
- ES3002 - Mechanics of Materials
- ES3047 - Thermodynamics

Additional credits

Additional 9 credits hours from EXPL courses
Explosives-related graduate level (500) MENG courses may be used with the approval of the Explosive Engineering Minor Advisor.

Additional Comments:

Institute General Requirements

See the Institute **General Education Core Requirements.**

No Requirement Level

Mechanical Engineering (minor)

[Program Overview]

Program Title
Minor in Mechanical Engineering

Department(s)
Mechanical Engineering

Program Description
Minimum of 18 credit hours required

Simple Requisites

Program Requirements

Minor in Mechanical Engineering
Type
Completion Requirement

The following courses are required:

At least eighteen (18) credit hours of ES or MENG courses and/or labs beyond those required for major. These courses and labs are subject to the approval of the Mechanical Engineering Minor Advisor.

Additional Comments:

Institute General Requirements

See the Institute **General Education Core Requirements.**

No Requirement Level

BS-MENG - B.S. in Mechanical Engineering

[Program Overview]

Program Title
BS-MENG

Department(s)
Mechanical Engineering

Degree & Program Code
BS-MENG

Program Description
Mechanical engineering is considered to be one of the cornerstone engineering disciplines and is perhaps the broadest of all engineering disciplines. Mechanical engineers are found in every sector of our technology-based economy. Mechanical engineers find careers in (to name just a few): electric power generation and distribution; petroleum exploration, production and refining; automotive, truck and bus manufacturing; light and heavy rail transportation and manufacturing; agricultural equipment manufacturing; commercial and industrial construction industries; aeronautical design and manufacturing; national defense & energy industries; semiconductor manufacturing; biomedical technology; petrochemical process industries; basic Materials extraction and refining industries.
The undergraduate mechanical engineering program is very broad in its scope, yet it contains sufficient depth to ensure competency in the discipline. Mechanical engineering students must take a heavy load of science and mathematics as prerequisites for their engineering science courses. Mechanical engineers in industry must be able to interact with many engineering disciplines, so they are required to take courses in other engineering disciplines. Also, because mechanical engineers design and manufacture components and systems, they are required to take courses that emphasize the engineering design/definition process. The mechanical engineering graduate engineer should be well equipped to undertake a professional engineering career in any technology that he or she chooses.

Program Information & Policies
The mechanical engineering program at New Mexico Tech offers the students hands-on laboratory experience in fluid and thermal sciences, mechanics of Materials, vibrations, mechatronics, dynamic systems and controls, instrumentation, and measurement. Junior and senior mechanical engineering students work on design projects for two years that range from building an off-road vehicle for the Baja SAE® competition to aerospace aircraft design to designing and launching a rocket in the Spaceport American Cup Challenge. Included in the range of design projects are those sponsored by national laboratories and industry.

Simple Requisites

Program Requirements
Minimum credit hours required—135

In addition to the General Education and Institute Core Curriculum (with MENG 3041 substituted for ENGL 3041), the following courses are required:

Required courses
Type
Completion Requirement

Engineering Science Courses

Complete ALL of the following Courses:

- ES201 - Statics
- ES216 - Engineering Fluid Mechanics
- ES3002 - Mechanics of Materials
- ES3003 - Engineering Dynamics
- ES3016 - Engineering Economics
- ES3032 - Electrical Engineering
- ES3047 - Thermodynamics
- ES3050 - Heat & Mass Transfer

Mechanical Engineering Courses

Complete ALL of the following Courses:

- MENG110 - Introduction to Mechanical Engineering **AND** MENG110L - Introduction to Mechanical Engineering Lab
- MENG210 - Sophomore Design & Measurements **AND** MENG210L - Sophomore Design & Measurements Lab
- MENG3002L - Mechanics of Materials Lab
- MENG3004 - Advanced Strength of Materials
- MENG3005 - Numerical Methods & Analysis
- MENG3041 - Mechanical Engineering Technical Writing
- MENG3081 - Junior Engineering Design Clinic I
- MENG3082 - Junior Engineering Design Clinic II

- MENG4005 - Dynamic Systems & Controls
  AND MENG4005L - Dynamic Systems & Controls Lab
- MENG4021 - Finite Element Analysis & Design
  AND MENG4021L - Finite Element Analysis & Design Lab
- MENG4031 - Fluid & Thermal Systems
  AND MENG4031L - Fluid & Thermal Systems Lab
- MENG4041 - Dynamics & Vibrations in Structural Design
- MENG4051 - Design of Machine Elements
- MENG4081 - Senior Engineering Design Clinic I
- MENG4082 - Senior Engineering Design Clinic II
- MENG4083 - Mechatronics
  AND MENG4083L - Mechatronics Lab

Students changing degree programs may substitute ES 111 for MENG 210 (lecture only).

Materials Engineering Requirement

Complete ALL of the following Courses:

- MTLS202 - Materials Engineering I
  AND MTLS202L - Materials Engineering I Lab

Math Requirement

Complete ALL of the following Courses:

- MATH2532 - Calculus III
- MATH3035 - Ordinary Differential Equation

Technical Electives

Technical Electives: Six hours from upper-division (300, 400, or 500 level) technical courses chosen by the student with the faculty advisor's approval. Recommendations include classes from AE, EXPL, MENG, or other engineering or science disciplines.

Earn at least 6 credits

Additional Comments:
Credit for MATH 1240, pre-calculus, and MATH 1230, trigonometry, is not allowed for mechanical engineering students.

Courses used for the degree, including the General Education Core Curriculum, may not be taken on an S/U basis except for two courses in Humanities and/or Social Science.

Mechanical engineering majors must take the Fundamentals in Engineering (FE) exam as a requirement for graduation. Passing this exam is a major step in the process of attaining professional registration. It is **strongly** recommended that the exam be taken in semester 7, before the graduation semester (semester 8).

Institute General Requirements

General Education Requirements for Bachelor of Science in Mechanical Engineering
Type
Completion Requirement

Area 1: Communications Requirement for Bachelor of Science

Complete ALL of the following Course Sets:

- Area 1: Communications (BS Degree) (9 credits)

Area 2: Mathematics and Quantitative Reasoning Requirements for Bachelor of Science

Complete ALL of the following Course Sets:

- Area 2: Mathematics (BS Degree) (8 credits)

Area 3: Science Requirements for a Bachelor of Science

Complete ALL of the following Course Sets:

- Area 3: Science (BS Degree) (18 credits)

Area 4: Social and Behavioral Science Requirements for a Bachelor of Science

Complete ALL of the following Course Sets:

- Area 4: Social and Behavioral Science (BS or BGS Degree) (6 credits)

Area 5: Humanities Course Requirements for a Bachelor of Science

Complete ALL of the following Course Sets:

- Area 5: Humanities (BS or BGS Degree) (6 credits)

Area 6: Creative & Fine Art Requirement for a Bachelor of Science

Complete ALL of the following Course Sets:

- Area 6: Creative and Fine Arts (BS, BA, or BGS Degree) (3 credits)

Area 7: Additional Humanities/Social Science Requirement for a Bachelor of Science

Complete ALL of the following Course Sets:

- Area 7: Additional Courses from Areas 4, 5, 6 (BS, BA, or BGS Degree) (3 credits)

Additional Comments:

No Requirement Level

[Learning Outcomes]

Outcome
1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics

Outcome
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors

Outcome
3. An ability to communicate effectively with a range of audiences

Outcome
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

Outcome
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives

Outcome
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions

Outcome
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

[Sample 4-Year Curriculum Plan(s)]

Degree Map Name
Sample Curriculum for the Bachelor of Science in Mechanical Engineering
Total Degree Map Credits
134
Degree Map Effective Catalog Year
2025 -

Year	Semester	Actual Credits
Year 1, Semester 1	Fall	17

Course
- ENGL1110 - g1:Composition I

Actual Credits 3

Course
- MATH1510 - g2:Calculus I

Actual Credits 4

Course
- CHEM1215 & CHEM1215L: g:General Chemistry I and Lab

Actual Credits 4

Course
- MENG110 & MENG110L: Introduction to Mechanical Engineering and Lab

Actual Credits 3

Course
- Area 4: Social and Behavioral Science (BS or BGS Degree) (6 credits)

Actual Credits 3

Year	Semester	Actual Credits
Year 1, Semester 2	Spring	16

Course
- ENGL1120 - g1:Composition II

Actual Credits 3

Course
- MATH1520 - g2:Calculus II

Actual Credits 4

Course
- PHYS1310 & PHYS1310L: g:Calculus-Physics I and Lab

Actual Credits 5

Course
- CHEM1225 & CHEM1225L: g: General Chemistry II and Lab

Actual Credits 4

Year	Semester	Actual Credits
Year 2, Semester 3	Fall	17

Course
- Area 5: Humanities (BS or BGS Degree) (6 credits)

Actual Credits 3

Course
- MATH2532 - Calculus III

Actual Credits 4

Course
- MENG210 & MENG210L: Sophomore Design & Measurement and Laboratory

Actual Credits 3

Course
- ES201 - Statics

Actual Credits 3

Course
- MTLS202 & MTLS202L: Materials Engineering I and Lab

Actual Credits 4

Year	Semester	Actual Credits
Year 2, Semester 4	Spring	18

Course
- MATH3035 - Ordinary Differential Equation

Actual Credits 3

Course
- PHYS1320 & PHYS1320L: g:Calculus-Based Physics II and Lab

Actual Credits 5

Course
- ES3016 - Engineering Economics

Actual Credits 3

Course
- MENG216 - Engineering Fluid Mechanics

OR
- ES216 - Engineering Fluid Mechanics

Actual Credits 3

Course
- ES3002 - Mechanics of Materials

Actual Credits 3

Course
- MENG3002L - Mechanics of Materials Lab

Actual Credits 1

Year	Semester	Actual Credits
Year 3, Semester 5	Fall	17

Course
- MENG3005 - Numerical Methods & Analysis

Actual Credits 3

Course
- ES3003 - Engineering Dynamics

Actual Credits 3

Course
- MENG3004 - Advanced Strength of Materials

Actual Credits 3

Course
- ES3047 - Thermodynamics

Actual Credits 3

Course
- MENG3081 - Junior Engineering Design Clinic I

Actual Credits 2

Course
- MENG3041 - Mechanical Engineering Technical Writing

Actual Credits 3

Year	Semester	Actual Credits
Year 3, Semester 6	Spring	17

Course
- ES3032 - Electrical Engineering

Actual Credits 3

Course
- MENG3082 - Junior Engineering Design Clinic II

Actual Credits 2

Course
- ES3050 - Heat & Mass Transfer

Actual Credits 3

Course
- Humanities

Actual Credits 3

Course
- Area 6: Creative and Fine Arts (BS, BA, or BGS Degree) (3 credits)

Actual Credits 3

Course
- MENG4021 & MENG4021L: Finite Element Analysis & Design and Lab

Actual Credits 3

Year	Semester	Actual Credits
Year 4, Semester 7	Fall	18

Course
- MENG4081 - Senior Engineering Design Clinic I

Actual Credits 3

Course
- MENG4005 & MENG4005L: Dynamic Systems & Controls and Lab

Actual Credits 3

Course
- MENG4041 - Dynamics & Vibrations in Structural Design

Actual Credits 3

Course
- MENG4051 - Design of Machine Elements

Actual Credits 3

Course
- Social Sciences

Actual Credits 3

Course
- Technical Electives

Actual Credits 3

Course
- Take FE Exam in this semester (semester 7) (Generic)

Actual Credits -

Year	Semester	Actual Credits
Year 4, Semester 8	Spring	14

Course
- MENG4031 & MENG4031L: Fluid & Thermal Systems and Lab

Actual Credits 3

Course
- MENG4083 & MENG4083L: Mechatronics and Lab

Actual Credits 3

Course
- MENG4031 - Fluid & Thermal Systems

Actual Credits 2

Course
- Technical Electives

Actual Credits 3

Course
- Humanities/Social Science

Actual Credits 3

ME-MENG - M.E. in Mechanical Engineering

[Program Overview]

Program Title
M.E.-MENG

Department(s)
Mechanical Engineering

Degree & Program Code
ME-MENG

Optional Specialization/Concentration(s)
Specialization in Explosives Engineering, Specialization in Mechatronics Systems & Robotics, Specialization in Fluid & Thermal Sciences, Specialization in Solid Mechanics

Program Description
The Mechanical Engineering Department offers each of the Master degrees either as a general Mechanical Engineering degree or with one of four specializations. The four areas of specialization for the masters degrees are listed below with the core classes for each specialization.

Program Information & Policies
Department Requirements for the Master of Science and Master of Engineering degrees in Mechanical Engineering

The Mechanical Engineering Department offers each of the Master degrees either as a general Mechanical Engineering degree or with one of four specializations. The four areas of specialization for the masters degrees are listed below with the core classes for each specialization.

General Mechanical Engineering Degree

12 core class credits are to be taken as any graduate level MENG courses which are approved by the advisory committee.

Specialization in Explosives Engineering

Core Classes: Classes listed under Energetic Systems and Explosive Engineering above.

(Note: Students who have completed the minor in explosives engineering program cannot re-use the classes (including co-listed classes) used for the minor program toward a master's degree in explosives engineering.)

Specialization in Fluid and Thermal Sciences

Core Classes: Classes listed under Fluid and Thermal Sciences above.

Specialization in Mechatronics Systems and Robotics

Core Classes: Classes listed under Intelligent Systems and Mechatronics above.

Specialization in Solid Mechanics

Core Classes: Classes listed under Solid Mechanics above.

Students enrolled in the Master of Engineering program are not required to take MENG 5085. Only one credit of MENG 5085 may be used to fulfill degree requirements. MENG 5085 must be taken for a letter grade if used to fulfill degree requirements.

A minimum of 30 credit hours is required for the Master of Engineering in Mechanical Engineering.

Simple Requisites

Program Requirements
Requirements

A minimum of 30 credit hours is required for the Master of Science or Master of Engineering in Mechanical Engineering.

Core Specialization Courses
Type
Completion Requirement

Additional Comments:
at least 12 credit hours from the selected specialization listed under graduate department requirements. For no specialization, any 12 credit hours from graduate level MENG courses constitute the core requirements.

MENG Elective Courses
Type
Completion Requirement

Additional Comments:
at least 12 credit hours of graduate-level MENG courses. Students may not use MENG 5081, Directed Study, to satisfy Master of Engineering degree requirements. The advisory committee may allow for a maximum of 3 credits of out-of-department graduate level coursework hours to apply to the elective course requirement.

Out-of-Department courses
Type
Completion Requirement

Additional Comments:
6 credit hours of approved upper-division or graduate course work from another department. The advisory committee may determine that a student's previous academic experience has provided breadth and may recommend modification of this

Institute General Requirements
See the Master of Science information found in the Graduate section of the catalog at Master of Science Degree.

No Requirement Level

[Specializations/Dissertation Concentration Options]

Specialization/Dissertation Options

Specialization/Dissertation Title
Specialization in Energetic Systems and Explosive Engineering

Specialization/Dissertation Requirements
• MENG 5013 Impact Dynamics

• MENG 5045 Introduction to Explosives Engineering

• MENG 5046 Detonation Theory

• MENG 5047 Pyrotechnics Theory and Application

• MENG 5049 Wave Propagation

• MENG 5050 Advanced Explosives Engineering

• MENG 5052 Explosives Technology and Applications

• MENG 5056 Compressible Fluid Flow

Specialization/Dissertation Options

Specialization/Dissertation Title
Specialization in Intelligent Systems and Mechatronics

Specialization/Dissertation Requirements
• MENG 5041 Vibrations in Elastic Continuum

• MENG 5035 Drones

• MENG 5043 Control System Design

• MENG 5044 Modern Control Theory

• MENG 5048 Manipulator Based Robotics

• MENG 5051 Optimal Control

• MENG 5061 Digital Image Processing

• MENG 5063 Bioinspiration and Biomimetics

• MENG 5067 Smart Engineering systems

• MENG 5069 AI Concepts and Applications

• MENG 5070 Advanced Mechatronics

• MENG 5072 Sensor Technology

• MENG 5074 Electrical Measurements of Non-Electrical Quantities

• MENG 5084 Smart Materials and Structures

Specialization/Dissertation Options

Specialization/Dissertation Title
Specialization in Fluid and Thermal Sciences

Specialization/Dissertation Requirements
• MENG 5056 Compressible Fluid Flow

• MENG 5075 Advanced Engineering Mathematics

• MENG 5077 Advanced Fluid Mechanics

• MENG 5078 Advanced Thermodynamics

• MENG 5079 Advanced Heat Transfer

• MENG 5080 Computational Fluid Dynamics and Reactive Flow

Specialization/Dissertation Options

Specialization/Dissertation Title
Specialization in Solid Mechanics

Specialization/Dissertation Requirements
• MENG 5004 Advanced Mechanics of Materials

• MENG 5005 Design and Analysis of Experiments

• MENG 5015 Theory of Elasticity

• MENG 5016 Plates and Shells

• MENG 5017 Advanced Finite Element Method

• MENG 5020 Fracture Mechanics

• MENG 5024 Continuum Mechanics

• MENG 5041 Vibration in an Elastic Continuum

• MENG 5049 Wave Propagation

• MENG 5083 Engineering Mechanics of Composite Structures

• MENG 5084 Smart Materials and Structures

[Learning Outcomes]

Outcome
1. Learn to reason well and to evaluate and apply information

Outcome
2. Develop analytical and quantitative skills for competence in science and math

Outcome
3. Communicate to different audiences in multiple forms

Outcome
4. Exercise their role as members of diverse societies and cultures

Outcome
5. Learn responsible values and ethics for their professional lives

Outcome
6. Gain expertise in their chosen field of study

MS-MENG - M.S. in Mechanical Engineering

[Program Overview]

Program Title
Master of Science in Mechanical Engineering

Department(s)
Mechanical Engineering

Degree & Program Code
MS-MENG

Optional Specialization/Concentration(s)
Specialization in Explosives Engineering, Specialization in Mechatronics Systems & Robotics, Specialization in Fluid & Thermal Sciences, Specialization in Solid Mechanics

Program Description
The Mechanical Engineering Department offers each of the Masters of Science degree either as a general Mechanical Engineering degree or with one of four specializations: Specialization in Explosives Engineering, Specialization in Fluid and thermal Sciences, Specialization in Mechatronics Systems and Robotics, and Specialization in Solid Mechanics.

Program Information & Policies

Department Requirements for the Master of Science and Master of Engineering degrees in Mechanical Engineering

The four areas of specialization for the masters degrees are listed below with the core classes for each specialization.

General Mechanical Engineering Degree

12 core class credits are to be taken as any graduate level MENG courses which are approved by the advisory committee.

Specialization in Explosives Engineering

Core Classes: Classes listed under Energetic Systems and Explosive Engineering above.

(Note: Students who have completed the minor in explosives engineering program cannot re-use the classes (including co-listed classes) used for the minor program toward a master's degree in explosives engineering.)

Specialization in Fluid and Thermal Sciences

Core Classes: Classes listed under Fluid and Thermal Sciences above.

Specialization in Mechatronics Systems and Robotics

Core Classes: Classes listed under Intelligent Systems and Mechatronics above.

Specialization in Solid Mechanics

Core Classes: Classes listed under Solid Mechanics above.

Master of Science students must take MENG 5085 each semester offered if the student is in residence. Distance-education students and part-time on-campus students enrolled in the Master of Science program are required to take two semesters of MENG 5085. Students enrolled in the Master of Engineering program are not required to take MENG 5085. Only one credit of MENG 5085 may be used to fulfill degree requirements. MENG 5085 must be taken for a letter grade if used to fulfill degree requirements.

Simple Requisites

Program Requirements
Requirements

A minimum of 30 credit hours is required for the Master of Science or Master of Engineering in Mechanical Engineering.

Core Specialization Courses
Type
Completion Requirement

Additional Comments:
at least 12 credit hours from the selected specialization listed under graduate program requirements. For no specialization, any 12 credit hours from graduate level MENG courses constitute the core requirement.

Elective Courses
Type
Completion Requirement

Additional Comments:
6 credit hours of graduate level MENG courses. The advisory committee may allow for a maximum of 3 credits of out-of-department graduate level coursework hours to apply to the elective course requirement. Students may use no more than 3 credit hours of MENG 5081, Directed Study, toward the MS. MENG 5081 must be taken for a letter grade if used to satisfy degree requirements.

Out-of-Department courses
Type
Completion Requirement

Additional Comments:
6 credit hours of approved upper-division or graduate course work from another department. The advisory committee may determine that a student's previous academic experience has provided breadth and may recommend modification of this requirement.

Thesis
Type
Completion Requirement

Additional Comments:
MENG 5091, (6 credit hours) — A student must prepare and submit a thesis to his/her advisory committee for approval in accordance with the general requirements of the graduate school.

Institute General Requirements
See the Master of Science information found in the Graduate section of the catalog at Master of Science Degree.

No Requirement Level

[Specializations/Dissertation Concentration Options]

Specialization/Dissertation Options

Specialization/Dissertation Title
Specialization in Solid Mechanics

Specialization/Dissertation Requirements
- MENG 5004 Advanced Mechanics of Materials
- MENG 5005 Design and Analysis of Experiments
- MENG 5015 Theory of Elasticity
- MENG 5016 Plates and Shells
- MENG 5017 Advanced Finite Element Method
- MENG 5020 Fracture Mechanics
- MENG 5024 Continuum Mechanics
- MENG 5041 Vibration in an Elastic Continuum
- MENG 5049 Wave Propagation
- MENG 5083 Engineering Mechanics of Composite Structures
- MENG 5084 Smart Materials and Structures

Specialization/Dissertation Options

Specialization/Dissertation Title
Specialization in Fluid and Thermal Sciences

Specialization/Dissertation Requirements
- MENG 5056 Compressible Fluid Flow
- MENG 5075 Advanced Engineering Mathematics
- MENG 5077 Advanced Fluid Mechanics
- MENG 5078 Advanced Thermodynamics
- MENG 5079 Advanced Heat Transfer
- MENG 5080 Computational Fluid Dynamics and Reactive Flow

Specialization/Dissertation Options

Specialization/Dissertation Title
Specialization in Intelligent Systems and Mechatronics

Specialization/Dissertation Requirements
- MENG 5041 Vibrations in Elastic Continuum
- MENG 5035 Drones
- MENG 5043 Control System Design
- MENG 5044 Modern Control Theory
- MENG 5048 Manipulator Based Robotics
- MENG 5051 Optimal Control
- MENG 5061 Digital Image Processing
- MENG 5063 Bioinspiration and Biomimetics
- MENG 5067 Smart Engineering systems
- MENG 5069 AI Concepts and Applications
- MENG 5070 Advanced Mechatronics
- MENG 5072 Sensor Technology
- MENG 5074 Electrical Measurements of Non-Electrical Quantities
- MENG 5084 Smart Materials and Structures

Specialization/Dissertation Options

Specialization/Dissertation Title
Specialization in Energetic Systems and Explosive Engineering

Specialization/Dissertation Requirements
- MENG 5013 Impact Dynamics
- MENG 5045 Introduction to Explosives Engineering
- MENG 5046 Detonation Theory
- MENG 5047 Pyrotechnics Theory and Application
- MENG 5049 Wave Propagation
- MENG 5050 Advanced Explosives Engineering
- MENG 5052 Explosives Technology and Applications
- MENG 5056 Compressible Fluid Flow

[Learning Outcomes]

Outcome
1. Learn to reason well and to evaluate and apply information

Outcome
2. Develop analytical and quantitative skills for competence in science and math

Outcome
3. Communicate to different audiences in multiple forms

Outcome
4. Exercise their role as members of diverse societies and cultures

Outcome
5. Learn responsible values and ethics for their professional lives

Outcome
6. Gain expertise in their chosen field of study

PHD-MENG - Ph.D. in Mechanical Engineering

[Program Overview]

Program Title
Doctor of Philosophy in Mechanical Engineering

Department(s)
Mechanical Engineering

Degree & Program Code
PHD-MENG

Program Description
The prospective doctoral candidate should develop a strong background in energetics, intelligent systems, and fundamental aspects of mechanical engineering. Candidates will also develop the ability to integrate aspects of these fields and apply them to cutting-edge research.

Specific programs of study are developed by the student and their advisory committee, subject to the requirements listed below:

Simple Requisites

Program Requirements

A student is required to take 66-credit hours of graduate courses beyond the Bachelor's degree (or equivalent), including 42-credit hours of coursework and 24-credit hours of dissertation research:

Student's with Bachelor's Degrees in Mechanical Engineering
Type
Completion Requirement

Energetics Core Segment & Intelligent Systems Core Segment

Earn at least 12 credits from the following:

- Intelligent Systems and Mechatronics
- Energetic Systems and Explosives Engineering

Fundamental Engineering and Science Core Segment

Earn at least 9 credits from the following:

- Fluid and Thermal Sciences
- Solid Mechanics

Additional Comments:
18 credit hours of elective courses with at least 6 credit hours from 500-level courses, as approved by the graduate advisory committee, with a maximum of 6 credit hours of Directed Study (MENG 5081) which must be graded.

3 credit hours of Graduate Seminar (MENG 5085)

24 credit hours minimum of Dissertation Research

Student with a Master's degree in Mechanical Engineering (or closely related discipline) must complete the following minimal requirements of 42-credit hours beyond the Master's degree, including 18-credit hours of coursework and 24-credit hours of dissertation research:

Students with Master's Degrees in Mechanical Engineering Requirements
Type
Completion Requirement

Energetic Core Systems & Intelligent Core Systems

Earn at least 9 credits from the following:

- Intelligent Systems and Mechatronics
- Energetic Systems and Explosives Engineering

Fundamental Engineering and Science Core Segment

Earn at least 3 credits from the following:

- Fluid and Thermal Sciences
- Solid Mechanics

Additional Comments:
3 credit hours of additional coursework, as approved by the graduate advisory committee, with a maximum of 3 credit hours of Directed Study (MENG 5081) ,which must be graded.

3 credit hours of graduate seminar (MENG 5085)

24 credits minimum of Dissertation Research

Qualifying Examination
Type
Completion Requirement

Qualifying Examination:

Core competency in mechanical engineering fundamentals must be demonstrated. The qualifying exam will also assess a student's ability to rationally approach novel problems and apply engineering analytical tools. The student will take written exams in three of the following topic areas as selected by the student with approval of the academic advisor.

Exam Topic Areas

- Control theory
- Dynamics
- Thermodynamics
- Fluid dynamics
- Heat transfer
- Mechanics of Materials
- Structural analysis

The exam questions will be written and graded by department faculty members. These exams will be used to evaluate the student's knowledge of mechanical engineering topics at the undergraduate level and their ability to a) apply advanced knowledge of mathematics, science, and engineering, b) identify, formulate, and solve engineering problems.

The exam will be offered the week before the start of each fall and spring semester. The exam must be first taken before the beginning of the 3rd semester and is subject to the following:

Students must take exams from three selected topics at the first exam attempt.

A student who does not pass a topic exam may retake that topic exam (or another topic exam with advisor approval) at the next offering; they do not need to retake exams that they have passed.

A student who has not passed exams in three topics by the completion of their second exam attempt does not advance, and will leave the program. The student will be able to pursue a M.S. or M.E. in Mechanical Engineering subject to those degree requirements.

Additional Comments:

Candidacy Examination
Type
Completion Requirement

Candidacy Examination:

Written dissertation proposal in New Mexico Tech thesis template format

Presentation of written proposal and oral exam on the proposal and related IES coursework

Must be taken no fewer than 12 months after passing the qualifying exam

Three possible outcomes:

1. **Pass**: Student advances to Candidacy
2. **Pass with conditions**: Six months window to correct minor deficiencies; student advances to Candidacy only after the Graduate Advisory Committee determines deficiencies have been corrected.
3. **Fail**: Student does not advance to Candidacy and will leave the program.

Additional Comments:

Publication of Research
Type
Completion Requirement

Publication of Research:

The student must demonstrate dissemination of research results by publishing at least one article in a peer-reviewed science or engineering journal.

Additional Comments:

Dissertation & Defense
Type
Completion Requirement

Dissertation & Defense:

Written Dissertation

Oral presentation with public and private (committee only) question and answer discussion time. Defense must take place no fewer than 12 months after passing the Candidacy Examination

Possible Outcomes: Pass with conditions: Student must correct minor deficiencies. Note that the deficiencies should be minor and not require a second defense.

Fail: Student has not satisfactorily presented/defended their dissertation and leaves the program.

Additional Comments:
If a PhD student would like to earn an MS while completing PhD requirements, they may initiate the process by petitioning the department. The student may complete an MS in Mechanical Engineering with any associated Specialization by completing the MS requirements and Thesis and Thesis defense as stated in the catalog. All coursework may count toward both the MS and PhD degrees. Up to 6 credits of MENG 5095 may be used in lieu of MENG 5091 to complete the MS degree, which may not be double counted toward the PhD degree.

Institute General Requirements

No Requirement Level

[Learning Outcomes]

Outcome
1. An ability to apply advanced knowledge of mathematics, science, and engineering

Outcome
2. An ability to identify, formulate, and solve engineering problems

Outcome
3. An ability to design, document, and conduct experiments, as well as to analyze and interpret data

Outcome
4. An ability to analyze requirements, propose design, and evaluate practical realization of an engineering system

Outcome
5. An ability to communicate effectively

Outcome
6. An understanding of professional and ethical responsibility

Outcome
7. The broad education necessary to understand the impact of engineering solutions in a global and societal context

Outcome
8. A recognition of the need for, and an ability to engage in life-long learning

Outcome
9. A knowledge of contemporary (within the profession) issues

Outcome
10. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Courses

AE3011 - Aerodynamics I

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Fundamental concepts of aerodynamics, equations of compressible flows, irrotational flows and potential flow theory, singularity solutions, circulation and vorticity, Kutta-Joukowski theorem, thin airfoil theory, finite wing theory, slender body theory, subsonic compressible flow and Prandtl-Glauert rule, supersonic thin airfoil theory, introduction to performance, basic concepts of airfoil design

Equivalent Courses: Previous & Current Courses
AE311

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- MENG216 - Engineering Fluid Mechanics
  OR ES216 - Engineering Fluid Mechanics

Additional Comments:

No Requirement Level

AE3013 - Orbital Mechanics

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This is a first upper-division course covering the Newtonian mechanics of orbits. Applications include ballistic missiles, satellites, and lunar and interplanetary orbits. (Same as PHYS 313.)

Equivalent Courses: Previous & Current Courses
AE313, AE313D, PHYS3013, PHYS313

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisites

Complete ALL of the following Courses:

- PHYS1320 - g3:Calculus-based Physics II
- MATH3032 - Vector Analysis
  OR MENG3005 - Numerical Methods & Analysis

Additional Comments:

No Requirement Level

AE3018 - Experimental Methods in Aerodynamics

General

Credit Hrs
Credit Hrs:
2

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Experimental approach to problem solving and validation of theoretical/ computational methods. Uncertainties in measurement. Review of fundamental equations of fluid dynamics, properties of gasses and liquids, similarity laws. Wind tunnels, water channels, simulation of phenomena in processing equipment. Pressure sensors, including optically-reactive surface paint. Measurement of skin friction by direct force sensors, Preston and Stanton-tubes, diffusion analogies, liquid crystals. Flow visualization with laser light sheet; Schlieren, shadowgraph and interferometric methods. Future trends; flow control, impact of microelectronic sensors and actuators.

Equivalent Courses: Previous & Current Courses
AE318

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- ES216 - Engineering Fluid Mechanics
  OR MENG216 - Engineering Fluid Mechanics

Additional Comments:

No Requirement Level

AE3018L - Experimental Methods in Aerodymanics Lab

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Laboratory demonstrations and exercises using available instrumentation in the Mechanical Engineering Department.

Equivalent Courses: Previous & Current Courses
AE318L

Simple Requisites

Course Requisite Requirements

Corequisite
Type
Corequisite

Corequisite

Complete ALL of the following Courses:

- AE318 - Experimental Mthd in Aerodynam (Inactive)

Additional Comments:

No Requirement Level

AE4012 - Aerospace Systems

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
The course explores formulation, development and implementation of a comprehensive approach to the design, analysis, and life-cycle cost management of highly complex, often adaptive systems. An appreciation for the strength of integrated, multidisciplinary skills, within a structured framework for concept development is a desired outcome of the course. A number of case studies are examined as leading examples for completion of a final class project in systems conceptualization and development management.

Equivalent Courses: Previous & Current Courses
AE412, AE412D

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:
- ES111 - Computer Programming for Engineers
- MATH3035 - Ordinary Differential Equation
- MENG3005 - Numerical Methods & Analysis

Additional Comments:

Corequisite
Type
Corequisite

Corequisite

Complete ALL of the following Courses:
- MENG4005 - Dynamic Systems & Controls
- MENG4051 - Design of Machine Elements

Additional Comments:

No Requirement Level

AE4014 - Aerospace Structures

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Behavior, analysis and design of discrete and continuous plates and shells, membrane and bending behavior, numerical methods of solution, Composite structures, Macro-mechanics to Structural design and development. Development of analytical procedures for determining material properties. Effective experimental methods and prediction of structural behavior.

Equivalent Courses: Previous & Current Courses
AE414, AE414D

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:
- MENG3004 - Advanced Strength of Materials
- MENG3005 - Numerical Methods & Analysis

Additional Comments:

No Requirement Level

AE4015 - Aerodynamics II

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
The course is covering advanced aerodynamic theories and their application. Includes airfoil shape, drag, velocity, lift, thrust, stability and control. Also included are advanced principles of performance including airplane capabilities and limitations, performance design criteria, load factors, weight and balance, comparative analysis of aircraft and aircraft certification.

Equivalent Courses: Previous & Current Courses
AE415, AE415D

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:
- AE3011 - Aerodynamics I

Additional Comments:

No Requirement Level

AE4016 - Aircraft Flight Dynamics & Control

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
The application of aerodynamic surfaces to determine the trajectory and the attitude of flight vehicles involves knowledge of the forces and moments applied to the vehicle from the surrounding media in subsonic, transonic and supersonic flow regimes. Methods of either specifying, or estimating the performance parameters of a flight vehicle, operating in a particular velocity range are introduced, including the critical factors in determining the size, shape and placement of control surfaces, and the forces or torques required to reliably and accurately position such surfaces in desired states. Time-domain methods are taught for simulating flight vehicles and synthesizing robust, stable control schemes.

Equivalent Courses: Previous & Current Courses
AE416, AE416D

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- EE3032 - Electricity and Magnetism
- MATH2420 - Applied Linear Algebra
- MATH3035 - Ordinary Differential Equation
- MENG4005 - Dynamic Systems & Controls
- AE3011 - Aerodynamics I
- AE4012 - Aerospace Systems

Additional Comments:

No Requirement Level

AE4017 - Aerospace Propulsion

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Aerospace propulsion can be classified into four categories: propeller, jet, ramjet and rocket propulsion. Among them gas turbine engines and jet propulsion are the essentials for modern aircraft. In this course, the fundamentals of different propulsion systems will be first introduced. Then the course focus will be on gas turbine engines. The material can be divided into four parts: (1) review of thermodynamics and compressible flow; (2) one-dimensional gas dynamics analysis of gas engine performance; (3) analysis and performance of air breathing propulsion system; and (4) the analysis and design of gas turbine engine components, e.g. inlets, nozzles, turbomachinery (compressors, turbines, turbofan, turbopropeller) and combustors. Further, the fundamentals of ramjet and rocket propulsion will also be discussed in this course.

Equivalent Courses: Previous & Current Courses
AE417, AE417D

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisites

Complete ALL of the following Courses:

- MENG216 - Engineering Fluid Mechanics
  OR ES216 - Engineering Fluid Mechanics

Additional Comments:

No Requirement Level

AE4018 - Structural Dynamic Aerospace Engineering

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course explores structural dynamic topics covering a broad range of aerospace applications. Vibration of single and multi-degree-of-freedom systems is reviewed in the context of modeling the aerospace structural systems. Essential structural elements – bars, beams, and plates are addressed in the dynamics of continuous systems section. Structural response to transient, shock, and random loads is discussed and practical aspects of dynamic testing are presented.

Equivalent Courses: Previous & Current Courses
AE418

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisites

Complete ALL of the following Courses:

- MATH2532 - Calculus III
- AE4014 - Aerospace Structures

Additional Comments:

No Requirement Level

AE4020 - Compressible Fluid Flow

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
An introductory study of compressible fluid flow and gas dynamics. The course covers one-dimensional flows including isentropic flow, normal shockwaves, Fanno flow, and Rayleigh flow. Oblique shock waves and expansion fans are discussed including applications to high-speed aerodynamics. One-dimensional unsteady flow is taught, including a detailed study of wave diagrams for various problems including shock tubes and as models for explosions. Applications of compressible flow are discussed including wind tunnels, aerodynamics, and explosives. An understanding of simple refractive imaging techniques is imparted to allow analysis of compressible flows from flow visualizations.

Equivalent Courses: Previous & Current Courses
AE420, AE420D

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisites

Complete ALL of the following Courses:

- ES216 - Engineering Fluid Mechanics

Additional Comments:

No Requirement Level

AE4035 - Drones

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Drones will present the design, fundamentals, programming (Mat lab), and analysis of different types of drones. This course introduces the basics of aerospace engineering, the classification and applications of drones, and techniques and approaches to the design and manufacturing of drones, including fixed-wing unmanned and micro air vehicles (UAV & MAV), flapping-wing drones, tilt-rotors/tilt-wings, multi-rotors, etc. Same as MENG 4035, shares lectures with MENG 5035 but is graded separately.

Equivalent Courses: Previous & Current Courses
AE435, MENG4035, MENG435, MENG5035, MENG535

Simple Requisites

Course Requisite Requirements

Prerequisites: Junior standing

No Requirement Level

AE4063 - Bioinspiration & Biomimetics

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course discusses the knowledge learned and inspired by nature and biological systems to solve concrete engineering problems. Topics including bioinspired drag reductions techniques, locomotion, navigation, control, sensing, and design of bioinspired concepts/robots will be covered in this course. Same as MENG 4063, shares lectures with MENG 5063 but is graded separately.

Equivalent Courses: Previous & Current Courses
MENG4063, MENG5063

Simple Requisites

Course Requisite Requirements

***Prerequisites**: Junior standing or consent of instructor.*

No Requirement Level

AE4091 - Directed Study

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Equivalent Courses: Previous & Current Courses
AE491

No Requirements

EXPL4016 - Energetic Material Chemistry

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Standard Letter

Course Description
An introduction to the chemical aspect of energetic Materials. Based on basic/advanced chemical and thermo-chemical concepts and dynamics, understand the characteristic and typical properties of energetic Materials.

Equivalent Courses: Previous & Current Courses
CH E4075, CH E475, EXPL416, EXPL416D

Simple Requisites

Course Requisite Requirements

Prerequisites: Upper class standing or consent of instructor and advisor

No Requirement Level

EXPL4017 - Energetic Material Safety

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Standard Letter

Course Description
Development of the concept of detonation process or Detonation-Deflagration Transition (DDT) mechanics. Analysis of the thermo-dynamic behavior of explosives, hydro hot-spot theory, shock initiation, explosives cook off, explosive sensitization.

Equivalent Courses: Previous & Current Courses
EXPL417, EXPL417D

Simple Requisites

Course Requisite Requirements

Prerequisites: Upper class standing or consent of instructor and advisor

No Requirement Level

EXPL4045 - Introduction to Explosives Eng

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Introduction to the broad field of explosives science and technology. Basic organic chemistry, decomposition reactions, properties of explosives, thermodynamics of explosives, shock wave theory, detonation theory, initiators, Gurney equations, blast effects and demolition.

Equivalent Courses: Previous & Current Courses
EXPL445, EXPL445D

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- ES216 - Engineering Fluid Mechanics

Additional Comments:

Prerequisites: ES 216, ES 3002, and ES 3047 (or MTLS350/CHE349) or consent of instructor and advisor

No Requirement Level

EXPL4047 - Theory of Propellent & Pyrotec

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Standard Letter

Course Description
Fundamentals of basic concepts of pyrotechnic. Thermo-mechanical/chemical aspects of pyrotechnics, formulation and mixing of pyrotechnic mixtures, application of pyrotechnic including illumination, tracers, incendiaries, delays, etc.

Equivalent Courses: Previous & Current Courses
EXPL447, EXPL447D

Simple Requisites

Course Requisite Requirements

Prerequisites: ES 216, ES 3002, and ES 3047 (or MTLS350/CHE349) or consent of instructor and advisor

No Requirement Level

EXPL4049 - Wave Propagation

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Standard Letter

Course Description
An in-depth study of the propagation of waves in various media. The derivation and application of the Rankine-Hugoniot jump equations. The concept of the rarefaction wave and various wave interactions. Derivation and application of the Mie-Gruneisen equation of state. The differential form of the conservation equations, as well as some numerical solutions for simple cases. Shares lecture with ME/MENG 5049, with additional expectations for graduate credit.

Equivalent Courses: Previous & Current Courses
EXPL449, EXPL449D, ME5049, ME549, MENG5049, MENG549

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- EXPL4045 - Introduction to Explosives Eng

or consent of instructor and advisor

Additional Comments:

No Requirement Level

EXPL4052 - Explosives Technology & Application

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Focus on the application of explosives mechanics. Fundamentals of explosive welding/cutting, shaped charges, explosive-driven flux-compression generators, spallation's, explosives initiation methods, explosives applied testing methods, etc.

Equivalent Courses: Previous & Current Courses
EXPL452, EXPL452D

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- EXPL4045 - Introduction to Explosives Eng

or consent of instructor and advisor

Additional Comments:

No Requirement Level

EXPL4053 - Computer Modelling of Detonation Behaviors

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Standard Letter

Course Description
Introduction to the numerical/hydrocode modeling of detonation behaviors. Focus on the area of detonation initiation, behavior of heterogeneous explosives, explosive/propellant performances, experiment interpretations, and numerical expressions of explosives related theories.

Equivalent Courses: Previous & Current Courses
EXPL453

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Prerequisite: EXPL 4045 or consent of instructor and advisor.

Complete ALL of the following Courses:

- EXPL4045 - Introduction to Explosives Eng

Additional Comments:

No Requirement Level

EXPL4055 - Shock Propagation in Air

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Standard Letter

Course Description
An in-depth study of structural behaviors on blast and vibration. Structure damage prediction/estimation, blasting shockwave mitigation methods/ concepts, shockwave propagation/properties on structures, structure failure criteria.

Equivalent Courses: Previous & Current Courses
EXPL455, EXPL455D

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- EXPL4045 - Introduction to Explosives Eng

or consent of instructor and advisor

Additional Comments:

No Requirement Level

EXPL4062 - Experimental Explosive Science

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
2

Credit Hours Operator:
TO

Grade Modes
Audit, Standard Letter

Course Description
An introduction to the explosive testing date acquisition systems. Basic concepts of the measurement of detonation product properties and characteristics of detonation process. Analysis of material properties under high pressure shock compression, and data interpretations

Equivalent Courses: Previous & Current Courses
EXPL462

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- EXPL4045 - Introduction to Explosives Eng

or consent of instructor and advisor

Additional Comments:

No Requirement Level

EXPL4062L - Experimental Explosive Lab

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
3

Credit Hours Operator:
TO

Grade Modes
Audit, Standard Letter

Course Description
An introduction to the explosive testing data acquisition systems. Basic concepts of explosives initiation and the measurement/characterization of detonation effects. Experimental analysis of energetic Materials and explosives devices utilizing various state-of-art testing equipment. Ultra-high speed camera, VISAR, shock measurement systems, etc. Analysis of material properties under high-pressure shock compression, and data interpretations.

Equivalent Courses: Previous & Current Courses
EXPL462;

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- EXPL4045 - Introduction to Explosives Eng

or consent of instructor and advisor

Additional Comments:

Corequisite
Type
Corequisite

Corequisite

Complete ALL of the following Courses:

- EXPL4062 - Experimental Explosive Science

Additional Comments:

No Requirement Level

MENG110 - Introduction to Mechanical Engineering

General

Credit Hrs

Credit Hrs:
2

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
A broad overview of mechanical engineering, including an introduction to mechatronics, explosives, thermal and fluid sciences, solid and structural mechanics. An introduction to basic engineering problem solving techniques and engineering tools. Students will engage in a semester-long team design project where they use modern engineering tools including basic computer drafting and computations to address mechanical engineering problems.

Equivalent Courses: Previous & Current Courses
ES110

Simple Requisites

Course Requisite Requirements

Corequisite
Type
Corequisite

Corequisites

Complete ALL of the following Courses:

- MENG110L - Introduction to Mechanical Engineering Lab
- *MATH1220 or higher*

Additional Comments:

No Requirement Level

MENG110L - Introduction to Mechanical Engineering Lab

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
A broad overview of mechanical engineering, including an introduction to mechatronics, explosives, thermal and fluid sciences, solid and structural mechanics. An introduction to basic engineering problem solving techniques and engineering tools. Students will engage in a semester-long team design project where they use modern engineering tools including basic computer drafting and computations to address mechanical engineering problems.

Equivalent Courses: Previous & Current Courses
ES110L

Simple Requisites

Course Requisite Requirements

Corequisite
Type
Corequisite

Corequisites

Complete ALL of the following Courses:

- MENG110 - Introduction to Mechanical Engineering
- *MATH 1220 or higher*

Additional Comments:

No Requirement Level

MENG210 - Sophomore Design & Measurements

General

Credit Hrs
Credit Hrs:
2

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Fundamentals of mechanical engineering design and instrumentation. This course introduces basic engineering measurement techniques and approaches, including analog to digital conversion, binary numbers, logic gates, sensors and data processing. Mat lab programming will be introduced and used to collect and analyze experimental data. Data analysis will include calculation of statistical quantities and methodologies for graphing results. Elements of linear algebra such as vectors, matrices, determinants, eigenvalue problems and solution of systems of linear algebraic equations will be discussed and practiced in Mat lab. A semester-long design project will implement instrumentation, programming, and analysis topics. Laboratory experiments will include Mat lab programming, programming of data acquisition systems, application of a range of mechanical engineering instrumentation techniques, and basic design principles.

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- MENG110 - Introduction to Mechanical Engineering
  AND PHYS1310 - g3:Calculus-based Physics I

or equivalent

Additional Comments:

Corequisite
Type
Corequisite

Corequisite

Complete ALL of the following Courses:

- MENG210L - Sophomore Design & Measurements Lab

Additional Comments:

No Requirement Level

MENG210L - Sophomore Design & Measurements Lab

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
MENG 210 L will present Fundamentals of mechanical engineering instrumentation. This course introduces basic engineering measurement techniques and approaches, including analog to digital conversion, binary numbers, logic gates, sensors, and data processing. Mat lab programming will be introduced and used to collect and analyze experimental data. Data analysis will include calculation of statistical quantities and methodologies for graphing results.

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- MENG110 - Introduction to Mechanical Engineering
  AND PHYS1310 - g3:Calculus-based Physics I

or equivalent

Additional Comments:

Corequisite
Type
Corequisite

Corequisite

Complete ALL of the following Courses:

- MENG210 - Sophomore Design & Measurements

Additional Comments:

No Requirement Level

MENG216 - Engineering Fluid Mechanics

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Fundamentals of fluid mechanics including fluid statics, velocity of continuous media, continuity, and momentum balance. Introduction of laminar and turbulent flows, similitude, dimensionless analysis, Bernoulli's equation, friction factor, introduction to pump and compressor selection.

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- ES201 - Statics

Additional Comments:

Corequisite
Type
Completion Requirement

Corequisite

Complete ALL of the following Courses:

- MATH2532 - Calculus III

Additional Comments:

No Requirement Level

MENG421D - Finite Elem Analysis & Design

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisites: MENG 3004, MENG 3005 or consent of instructor and advisorIntroduction to the theory of finite element analysis for structural and heat transfer analysis. Use of finite element analysis in engineering design.

Equivalent Courses: Previous & Current Courses
MENG4021

No Requirements

MENG3002L - Mechanics of Materials Lab

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Experiments in mechanics of Materials, testing methods, and measurement techniques.

Equivalent Courses: Previous & Current Courses
MENG302L

Simple Requisites

Course Requisite Requirements

Corequisite
Type
Completion Requirement

Corequisite

Complete ALL of the following Courses:

- ES3002 - Mechanics of Materials

Additional Comments:

No Requirement Level

MENG3004 - Advanced Strength of Materials

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Unsymmetrical loading of beams, shear flow and shear center in thin-walled beams, curved beams, thin plates, thick walled cylinders, stress concentrations, thermal stresses, impact loads, and vibration loads. Applying energy methods to various solid mechanics and beam problems.

Equivalent Courses: Previous & Current Courses
MENG304

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Completion Requirement

Prerequisite

Complete ALL of the following Courses:

- ES3002 - Mechanics of Materials

passed with C or better

Additional Comments:

No Requirement Level

MENG3005 - Numerical Methods & Analysis

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course presents applied numerical methods and analysis for mechanical engineering students with a focus on implementing solutions using C, Mat lab or Python programming. This course focuses on implementation of basic numerical methods to solve systems of equations, ordinary differential equations, and partial differential equations. Mechanical engineering problems will be used to frame the implementation of the numerical techniques to demonstrate optimization of engineering design and analysis of experimental data. Presentation of numerical results will be discussed including graphing philosophy, numerical errors, a comparison with analytical solutions. Topics include numerical error and accuracy, finite difference methods, integration, regression, initial value problems, discrete Fourier transforms, root finding, and optimization.

Equivalent Courses: Previous & Current Courses
MENG305

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- ES216 - Engineering Fluid Mechanics
  OR MENG216 - Engineering Fluid Mechanics
- ES3002 - Mechanics of Materials
- MATH3035 - Ordinary Differential Equation

Additional Comments:

No Requirement Level

MENG3041 - Mechanical Engineering Technical Writing

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course is designed to offer instruction in theory and practice of effective technical communication, particularly as applied to Mechanical Engineering and the junior/senior design clinic. Students who successfully complete this course should be able to plan, organize, draft, revise, and edit technical communication that is professional in content and appearance and appropriately designed for its intended audience.

Equivalent Courses: Previous & Current Courses
MENG341, MENG341D

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- ENGL1110 - g1:Composition I
  AND ENGL1120 - g1:Composition II
- *or the equivalent passed with a grade of C or better.*
- *Junior Standing*

Additional Comments:

No Requirement Level

MENG3081 - Junior Engineering Design Clinic I

General

Credit Hrs
Credit Hrs:
2

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
An academic-year-long engineering design project. Organized and directed by a faculty member. Weekly intensive workshops in specialized design topics pertinent to actual design projects. Junior-level students are under the direct supervision of the faculty members and the senior-level students assigned to the project.

Equivalent Courses: Previous & Current Courses
MENG381

Simple Requisites

Course Requisite Requirements

Prerequisite

Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- MENG210 - Sophomore Design & Measurements
- Junior standing

Additional Comments:

Corequisite
Type
Completion Requirement

Corequisites

Complete ALL of the following Courses:

- ES216 - Engineering Fluid Mechanics
  OR MENG216 - Engineering Fluid Mechanics
- ES3002 - Mechanics of Materials

Additional Comments:

No Requirement Level

MENG3082 - Junior Engineering Design Clinic II

General

Credit Hrs
Credit Hrs:
2

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
A continuation of MENG 3081 academic-year-long engineering design project.

Equivalent Courses: Previous & Current Courses
MENG382

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Completion Requirement

Prerequisite

Complete ALL of the following Courses:

- MENG3081 - Junior Engineering Design Clinic I

Additional Comments:

Corequisite
Type
Completion Requirement

Corequisite

Complete ALL of the following Courses:

- ES3016 - Engineering Economics

Additional Comments:

No Requirement Level

MENG4005 - Dynamic Systems & Controls

General

Credit Hrs
Credit Hrs:
2

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
A practical survey course examining the basic components of instrumentation, measurement, and process control systems common to the field of engineering. Sensing and measurement (temperature, pressure, flow rate, level, stress-strain, concentration, etc.), signal generation and data acquisition, control loops and controllers, and process control theory.

Equivalent Courses: Previous & Current Courses
MENG405

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- ES3032 - Electrical Engineering

or consent of the instructor

Additional Comments:

Corequisite
Type
Corequisite

Corequisite

Complete ALL of the following Courses:

- MENG4005L - Dynamic Systems & Controls Lab

Additional Comments:

No Requirement Level

MENG4005L - Dynamic Systems & Controls Lab

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Laboratory exercises involving instrumentation and design of basic control systems.

Equivalent Courses: Previous & Current Courses
MENG405L

Simple Requisites

Course Requisite Requirements

Corequisite
Type
Corequisite

Corequisite

Complete ALL of the following Courses:
- MENG4005 - Dynamic Systems & Controls

Additional Comments:

No Requirement Level

MENG4021 - Finite Element Analysis & Design

General

Credit Hrs
Credit Hrs:
2

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Introduction to the theory of finite element analysis for structural and heat transfer analysis. Use of finite element analysis in engineering design.

Equivalent Courses: Previous & Current Courses
MENG421, MENG421D

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:
- MENG3004 - Advanced Strength of Materials
- MENG3005 - Numerical Methods & Analysis

or consent of instructor and advisor

Additional Comments:

No Requirement Level

MENG4021L - Finite Element Analysis & Design Lab

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Application of finite element computer codes to solve complex engineering design problems.

Equivalent Courses: Previous & Current Courses
MENG421L

Simple Requisites

Course Requisite Requirements

Corequisite
Type
Corequisite

Corequisite

Complete ALL of the following Courses:
- MENG4021 - Finite Element Analysis & Design

Additional Comments:

No Requirement Level

MENG4031 - Fluid & Thermal Systems

General

Credit Hrs
Credit Hrs:
2

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
A capstone course in the thermal-fluid sciences of Mechanical Engineering. The course combines the basic concepts and analysis techniques that were developed throughout the fundamental undergraduate thermodynamics, fluid dynamics, and heat transfer courses, to perform in depth analysis and design of complete thermal-fluid systems. Topics will include analysis and design of piping systems, heat exchangers, and pump systems, and their incorporation into complete systems such as refrigeration and power cycles. Advanced dimensional analysis, mathematical relationships, and computational analysis will be used to solve problems.

Equivalent Courses: Previous & Current Courses
MENG431, MENG431D

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:
- ES216 - Engineering Fluid Mechanics
  OR MENG216 - Engineering Fluid Mechanics

- ES3047 - Thermodynamics

Additional Comments:

Corequisite
Type
Corequisite

Corequisites

Complete ALL of the following Courses:

- MENG4031L - Fluid & Thermal Systems Lab
- ES3050 - Heat & Mass Transfer

Additional Comments:

No Requirement Level

MENG4031L - Fluid & Thermal Systems Lab

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Experimental analysis of fluid flow, heat transfer and thermodynamic systems. Experimental techniques common to the fluid-thermal sciences fields will be used in hands-on laboratory experiments. Techniques include wind tunnel measurements, pitot-static systems, temperature measurement, flow visualization, pump power, and use of data acquisition systems. A final project including the application of measurement techniques and use of experimental facilities in the field of fluid and thermal sciences is required for each laboratory group. Laboratory reports are presented.

Equivalent Courses: Previous & Current Courses
MENG431L

Simple Requisites

Course Requisite Requirements

Corequisite
Type
Corequisite

Corequisite

Complete ALL of the following Courses:

- MENG4031 - Fluid & Thermal Systems

Additional Comments:

No Requirement Level

MENG4035 - Drones

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Drones will present the design, fundamentals, programming (Mat lab), and analysis of different types of drones. This course introduces the basics of aerospace engineering, the classification and applications of drones, and techniques and approaches to the design and manufacturing of drones, including fixed-wing unmanned and micro air vehicles (UAV & MAV), flapping-wing drones, tilt-rotors/tilt-wings, multi-rotors, etc. Same as AE 4035, shares lectures with MENG 5035 but is graded separately.

Equivalent Courses: Previous & Current Courses
AE4035, AE435, MENG435, MENG5035, MENG535

Simple Requisites

Course Requisite Requirements

Prerequisites: Junior standing

No Requirement Level

MENG4041 - Dynamics & Vibrations in Structural Design

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Definition of various dynamic loads. Design and synthesis of structural systems and machine members subject to impact and periodic load conditions. Seismic and blast loads on structures. Relevant failure criteria for dynamically loaded systems in structural and mechanism design.

Equivalent Courses: Previous & Current Courses
MENG441, MENG441D

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- MATH3035 - Ordinary Differential Equation
- MENG3005 - Numerical Methods & Analysis

ES3032 recommended

Additional Comments:

No Requirement Level

MENG4051 - Design of Machine Elements

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Principles of design and failure analysis of mechanical machine elements such as fasteners, shafts, columns, and gears. Design of mechanical drives such as roller chains, belts, speed reducers, and hydraulic transmissions

Equivalent Courses: Previous & Current Courses
MENG451, MENG451D

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

Prerequisites

Complete ALL of the following Courses:

- ES3003 - Engineering Dynamics
- MENG3004 - Advanced Strength of Materials
- MTLS202 - Materials Engineering I
  AND MTLS202L - Materials Engineering I Lab

Additional Comments:

No Requirement Level

MENG4060 - Intro to Biomedical Engineering

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
An overview of research in biomedical engineering, biomechanics, biocompatibility, tissue engineering, biomedical instrumentation, and moral and ethical issues.

Equivalent Courses: Previous & Current Courses
MENG460, MENG460D

Simple Requisites

Course Requisite Requirements

Prerequisite: Sophomore classification or consent of instructor and advisor

No Requirement Level

MENG4063 - Bioinspiration & Biomimetics

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course discusses the knowledge learned and inspired by nature and biological systems to solve concrete engineering problems. Topics including bioinspired drag reductions techniques, locomotion, navigation, control, sensing, and design of bioinspired concepts/robots will be covered in this course. Same as AE 4063, shares lectures with MENG 5063 but is graded separately.

Equivalent Courses: Previous & Current Courses
AE4063, AE463, MENG463, MENG5063, MENG563

Simple Requisites

Course Requisite Requirements

Prerequisites: Junior standing or consent of instructor.

No Requirement Level

MENG4065 - Biorheology

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Concepts of rheology. Rheology of body fluids. Different rheological models of fluids and applications in diagnosis and treatment of diseases. Laboratory experiments of plasma and blood rheological characterization (viscosity, elasticity, plasticity, etc.).

Equivalent Courses: Previous & Current Courses
MENG465

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- MENG4031L - Fluid & Thermal Systems Lab

or consent of instructor and advisor

Additional Comments:

No Requirement Level

MENG4081 - Senior Engineering Design Clinic I

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
An academic-year-long engineering design project. Organized and directed by a faculty member. Senior-level students are under the direct supervision of the faculty member. Weekly intensive workshops in specialized design topics pertinent to actual design projects. Topics include costing of capital equipment, cost of Materials and labor, design optimization concepts, as well as specialized topics. Formal reports, fabrication drawings, and cost estimates prepared and submitted to faculty and outside industrial reviewers. Formal presentation to reviewing group.

Equivalent Courses: Previous & Current Courses
MENG481

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- MENG3082 - Junior Engineering Design Clinic II
- MENG3041 - Mechanical Engineering Technical Writing

Additional Comments:

No Requirement Level

MENG4082 - Senior Engineering Design Clinic II

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
A continuation of MENG 4081 academic-year-long engineering design project.

Equivalent Courses: Previous & Current Courses
MENG482

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- MENG4081 - Senior Engineering Design Clinic I

Additional Comments:

No Requirement Level

MENG4083 - Mechatronics

General

Credit Hrs
Credit Hrs:
2

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course is an in-depth examination of the field of mechatronics, which is a consolidation of computer science (software), electrical engineering (microprocessor control), and mechanical engineering (machine design). Topics covered include: system analysis/ control theory, robotics, dynamic systems and control, elements of mechatronics systems, modeling and simulation of mechatronic systems and computer aided mechatronics.

Equivalent Courses: Previous & Current Courses
MENG483, MENG483D

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- ES3032 - Electrical Engineering

or consent of instructor and advisor

Additional Comments:

Corequisite
Type
Corequisite

Corequisite

Complete ALL of the following Courses:

- MENG4083L - Mechatronics Lab

Additional Comments:

No Requirement Level

MENG4083L - Mechatronics Lab

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This is a hands-on lab where the student will design and build a simple mechatronics system. The student will learn the principles of instrumentation and sensors as they relate to the robotic control. The student will also learn the programming methods for the microprocessor controller.

Equivalent Courses: Previous & Current Courses
MENG483L

Simple Requisites

Course Requisite Requirements

Corequisite
Type
Corequisite

Corequisite

Complete ALL of the following Courses:
- MENG4083 - Mechatronics

Additional Comments:

No Requirement Level

MENG4084L - Design Clinic Lab

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
The Design Clinic Lab Course will introduce students to critical skills important in the engineering design and verification process. Weekly sessions will be conducted in specialized topics pertinent to the design process. Topics include Computer Aided Engineering (CAE), Computer Aided Design (CAD) using Solidworks, mechanical drawing layout, mechanical assemblies, clearances and tolerances, analytical modeling, concepts in machining of components, and the joining of components.

Equivalent Courses: Previous & Current Courses
MENG484L

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:
- ES110 - Intro to Engineering Design
  OR MENG110 - Introduction to Mechanical Engineering
- ES110L - Intro. to Engineering Lab
  OR MENG110L - Introduction to Mechanical Engineering Lab

Additional Comments:

Corequisite
Type
Corequisite

Corequisite

Complete ALL of the following Courses:
- MENG3081 - Junior Engineering Design Clinic I

Additional Comments:
or consent of the instructor

No Requirement Level

MENG4085 - Advanced Design Clinic

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Enables students to enhance their understanding of the engineering design and verification process for mechanical design projects. Weekly seminars in specialized topics pertinent to the design process. Students focus on developing best practices for completing mechanical design projects. These best practices are used to improve the performance of design clinic project teams. Students participate in design project teams, contributing as senior technical members and/or advisers. Students contribute to the formal reports and oral presentations of these teams.

Equivalent Courses: Previous & Current Courses
MENG485

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:
- MENG4082 - Senior Engineering Design Clinic II

Additional Comments:

No Requirement Level

MENG4086 - Special Topics Biomedical Eng

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Equivalent Courses: Previous & Current Courses
MENG486, MENG486D

No Requirements

MENG5000 - Directed Research

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
12

Credit Hours Operator:
TO

Grade Modes
Pass/Fail, No Report

Course Description
Research under the guidance of a faculty member. This course may not be used to fulfill graduate degree requirements.

Equivalent Courses: Previous & Current Courses
MENG500

No Requirements

MENG5004 - Advanced Mechanics of Materials

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Development of advanced mechanics of Materials principles and techniques for use in engineering design and problem solving. Topics include material yielding, torsion, unsymmetrical bending of beams, shear stresses in thin-walled structures, curved beams, beams on elastic foundations, axisymmetric thin-walled shells and thick-walled cylinders, column stability, stress concentrations, and material failure behavior under steady and cyclic loading.

Equivalent Courses: Previous & Current Courses
MENG504, MENG504D

Simple Requisites

Course Requisite Requirements

Prerequisite Type

Prerequisite

Prerequisite

Complete ALL of the following Courses:

- MENG3004 - Advanced Strength of Materials

or graduate standing

Additional Comments:

No Requirement Level

MENG5005 - Design & Analysis of Experiments

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This class will focus on statistically designed experiments, measurement standards, data analysis, regressions and general and detailed uncertainty analysis, including statistical treatment of experimental data. This course is intended to give you a broad introduction to statistical concepts used to design, conduct, and interpret your own experiments and to better your analysis of data presented in the scientific literature.

Equivalent Courses: Previous & Current Courses
MENG505, MENG505D

Simple Requisites

Course Requisite Requirements

***Prerequisites**: Graduate standing or consent of instructor*

No Requirement Level

MENG5013 - Impact Dynamics

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
A specialized but very important branch of engineering mechanics deals with the collision of multiple bodies throughout a broad range of relative velocities. The physical phenomenon during impact and subsequent response of each of the bodies is dependent on the mechanical Material properties of each, the impact velocities, and the relative size and orientation of each of the bodies. Impact response is most easily categorized based on the impact velocity (relative approach velocity of two bodies), ranging from elastic response with little change in temperature at low velocities, through plastic deformation and/or fracture at higher velocities, to physical state changes of bodies or a portion of a body at hyper-velocity impacts (>1 km/sec).

Equivalent Courses: Previous & Current Courses
MENG513

Simple Requisites

Course Requisite Requirements

Prerequisite: *Graduate standing or consent of instructor and advisor*

No Requirement Level

MENG5015 - Theory of Elasticity

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
An introduction to tensor analysis, analysis of stress, balance laws, infinitesimal and finite theories of motion, strain and rotation tensors, compatibility equations, constitutive equations, Materials symmetry, uniqueness of the solution, solution of two-dimensional elasticity problems. Airy stress function, application of complex variable technique in elasticity, three-dimensional elasticity problems, energy methods, bending theory of plates. (Same as ME 515)

Equivalent Courses: Previous & Current Courses
ME5015, ME515, MENG515, MENG515D

Simple Requisites

Course Requisite Requirements

Prerequisite: *Graduate standing or consent of the instructor*

No Requirement Level

MENG5016 - Plates and Shells

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Behavior, analysis and design of discrete and continuous plates and shells, membrane and bending behavior, numerical methods of solution.

Equivalent Courses: Previous & Current Courses
MENG516

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisites

Complete ALL of the following Courses:

- MENG3005 - Numerical Methods & Analysis
- MENG4051 - Design of Machine Elements

or the approval of the instructor

Additional Comments:

No Requirement Level

MENG5017 - Advanced Finite Element Analysis

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
An introduction to the numerical analysis calculus of variation, weak form of a differential equation, weighted residual techniques, solution of one-dimensional problems by the finite element method, bending problems, Lagrange and Hermite interpolation functions, isoparametric elements, numerical integration, two-dimensional problems, solution of Poisson and Laplace equations, triangular and quadrilateral elements, elasticity problems, theorem of minimum potential

Equivalent Courses: Previous & Current Courses
ME5017, ME517, MENG517, MENG517D

Simple Requisites

Course Requisite Requirements

Prerequisite: *Graduate standing or consent of the instructor*

No Requirement Level

MENG5019 - Adaptive Structures

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Adaptive structures with embedded intelligent sensors and actuators, self-monitoring and self healing characteristics, biological system/ structures.

Equivalent Courses: Previous & Current Courses
MENG519, MENG519D

Simple Requisites

Course Requisite Requirements

Prerequisite
Type

Prerequisite

Prerequisite

Complete ALL of the following Courses:

- MENG3005 - Numerical Methods & Analysis

Additional Comments:

Pre/Corequisite
Type
Completion Requirement

pre/corequisites

Complete ALL of the following Courses:

- MENG5089 - Adv Topics in Mech Eng

or approval of the instructor

Additional Comments:

No Requirement Level

MENG5020 - Fracture Mechanics

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
An introduction to the theory of elasticity, singular stress fields, Westergaard method, complex variable technique, stress intensity factor, fracture energy, numerical and experimental methods in determination of stress intensity factor, fracture toughness, J-integral Elastoplastic fracture. (Same as ME 520)

Equivalent Courses: Previous & Current Courses
ME5020, ME520, MENG520, MENG520D

Simple Requisites

Course Requisite Requirements

Prerequisite: *Graduate standing or consent of the instructor*

No Requirement Level

MENG5021 - Elastic Stability

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Classical theory of elastic stability for beams, plates, and shell structures. Geometric non-linear equations for thin-walled structures. Linear, linearized, and non-linear solutions of problems. Approximate analytic methods and numerical methods for problem solving.

Equivalent Courses: Previous & Current Courses
MENG521

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- MENG3004 - Advanced Strength of Materials

or consent of the instructor

Additional Comments:

No Requirement Level

MENG5022 - Mechanics Inelastic Continuum

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Modeling systems that yield inelastic equations, coupled with methods for their solutions and analysis. Development of insight into the fundamental behavior of inelastic systems.

Equivalent Courses: Previous & Current Courses
MENG522

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- MENG5015 - Theory of Elasticity
- MENG5024 - Continuum Mechanics

or approval of the instructor

Additional Comments:

No Requirement Level

MENG5023 - Engineering Mechanical Cellular Structures

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Cellular structures with combinations of mechanical, energy-absorption, thermal and acoustic/vibration characteristics and their implementation in diverse applications.

Equivalent Courses: Previous & Current Courses
MENG523

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:
- MENG3005 - Numerical Methods & Analysis

Additional Comments:

Pre/Corequisites
Type
Completion Requirement

Pre/Corequisites

Complete ALL of the following Courses:
- MENG5089 - Adv Topics in Mech Eng

or approval of the instructor

Additional Comments:

No Requirement Level

MENG5024 - Continuum Mechanics

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Matrix, indicial and direct notation, tensor calculus, deformation analysis; general principles of stress, curvilinear coordinates.

Equivalent Courses: Previous & Current Courses
MENG524, MENG524D

Simple Requisites

Course Requisite Requirements

***Prerequisites**: Graduate Standing or approval of the instructor*

No Requirement Level

MENG5031 - Mechanics of Viscous Fluids

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Fundamental laws of motion for a viscous fluid. Navier-Stokes equation. Laminar fluid flow, turbulent boundary layer topics. Compressible and incompressible flow problems.

Equivalent Courses: Previous & Current Courses
MENG531

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

Prerequisites

Complete ALL of the following Courses:
- MENG4031 - Fluid & Thermal Systems

or the consent of the instructor

Additional Comments:

No Requirement Level

MENG5035 - Drones

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Drones will present the design, fundamentals, programming (Mat lab), and analysis of different types of drones. This course introduces the basics of aerospace engineering, the classification and applications of drones, and techniques and approaches to the design and manufacturing of drones, including fixed-wing unmanned and micro air vehicles (UAV & MAV), flapping-wing drones, tilt-rotors/tilt-wings, multi-rotors, etc. Shares lectures with AE 4035 and MENG 4035, with additional expectations for graduate credit.

Equivalent Courses: Previous & Current Courses
AE4035, AE435, MENG4035, MENG435, MENG535

Simple Requisites

Course Requisite Requirements

Prerequisites: Graduate standing

No Requirement Level

MENG5041 - Vibrations in an Elastic Context

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Analysis of single and multi degree-of-freedom systems for time dependent loads, including periodic and impact loads. Thin-walled structures—beams, plates, and shells. Dynamic stability of thin-walled structures.

Equivalent Courses: Previous & Current Courses
MENG541, MENG541D

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisites

Complete ALL of the following Courses:

- ES3002 - Mechanics of Materials
- ES3003 - Engineering Dynamics
- MENG4041 - Dynamics & Vibrations in Structural Design

or consent of instructor and advisor

Additional Comments:

No Requirement Level

MENG5043 - Control System Design

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course provides an introduction to the analysis and design of advanced control systems. The frequency domain analysis, root locus analysis, design process, PID controller and compensator design will be emphasized. Fundamental limitations of feedback will be discussed and advanced PID design techniques will be presented. Model-based techniques such as pole placement will be discussed for the SISO case. Throughout the course we will emphasize the concepts of robust control, including tradeoffs between sensitivity and performance.

Equivalent Courses: Previous & Current Courses
MENG543

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- MENG4005 - Dynamic Systems & Controls

or graduate standing or consent of instructor and advisor

Additional Comments:

No Requirement Level

MENG5044 - Modern Control Theory

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Designing and analyzing modern control systems that can be devised from dealing exclusively in the time domain. Methods of expanding control concepts from simple single-input single-output processes to full multi-input multi-output, continuous and discrete, linear and nonlinear systems will be explored. Students will submit a semester-long research paper.

Equivalent Courses: Previous & Current Courses
MENG544, MENG544D

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- MENG4005 - Dynamic Systems & Controls

or consent of instructor and advisor

Additional Comments:

No Requirement Level

MENG5045 - Introduction to Explosives Engineering

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Introduction to the broad field of explosives science and technology. Basic organic chemistry, decomposition reactions, properties of explosives, thermodynamics of explosives, shock wave theory, detonation theory, initiators, Gurney equations, blast effects and demolition. Students will submit a semester-long research report.

Equivalent Courses: Previous & Current Courses
MENG545, MENG545D

Simple Requisites

Course Requisite Requirements

***Prerequisites**: Graduate Standing or consent of instructor and advisor*

No Requirement Level

MENG5046 - Detonation Theory

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Development of classical detonation model for full order detonation of secondary explosives. Ideal versus non-ideal detonation. Burn-rate models for pyrotechnics. Derivation and application of the Mie-Gruneisen equation of state. The concept of deflagration to detonation transition. (Same as ME 546)

Equivalent Courses: Previous & Current Courses
ME5046, ME546, ME546D, MENG546, MENG546D

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- MENG5049 - Wave Propagation

or consent of instructor and advisor

Additional Comments:

No Requirement Level

MENG5047 - Theory of Propellants and Pyrotechnics

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Fundamentals of basic concepts of pyrotechnic. Thermo-mechanical/chemical aspects of pyrotechnics, formulation and mixing of pyrotechnic mixtures, application of pyrotechnic including illumination, tracers, incendiaries, delays, etc.

Equivalent Courses: Previous & Current Courses
MENG547, MENG547D

Simple Requisites

Course Requisite Requirements

***Prerequisites**: Graduate Standing or consent of instructor and advisor*

No Requirement Level

MENG5048 - Manipulator Based Robotics

General

Credit Hrs
Credit Hrs:
4

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Fundamentals of the multi-disciplinary field of robotics. Emphasis is placed on understanding how to model and control robotic manipulators while providing an appreciation of the importance of sensing to robotic applications. Topics include: forward, inverse, and motion kinematics; dynamic modeling; position, velocity, and force control. Shares lecture/lab with EE 4048, but is graded separately, and additional graduate-level work is required. (Same as EE 548)

Equivalent Courses: Previous & Current Courses
EE4048, EE448, EE5048, EE548, MENG548

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- MENG4005 - Dynamic Systems & Controls

or equivalent or consent of instructor and advisor

Additional Comments:

No Requirement Level

MENG5049 - Wave Propagation

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
An in-depth study of the propagation of waves in various media. The derivation and application of the Rankine-Hugoniot jump equations. The concept of the rarefaction wave and various wave interactions. The differential form of the conservation equations, as well as some numerical solutions for simple cases. Shares lecture with EXPL 4012, with additional expectations for graduate credit. (Same as ME 549)

Equivalent Courses: Previous & Current Courses
EXPL4012, EXPL412, ME5049, ME549, MENG549, MENG549D

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- MENG5045 - Introduction to Explosives Engineering

or consent of instructor and advisor

Additional Comments:

No Requirement Level

MENG5050 - Advanced Explosives Engineering

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
The detonation of non-ideal explosives, equation of state for porous media, shaped charge effect and explosively formed projectiles. Shock compaction of powders, explosive welding and experimental methods used in the evaluation of explosives and their applications. The dynamic fracture of ductile and brittle Materials. (Same as ME 550)

Equivalent Courses: Previous & Current Courses
ME5050, ME550, MENG550, MENG550D

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- MENG5049 - Wave Propagation

or consent of instructor and advisor

Additional Comments:

No Requirement Level

MENG5051 - Optimal Control Systems

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Formulation of stochastic dynamic systems models, combined with optimal full-state and reduced-state estimators are introduced. Various cost functionals are defined and used to design real-time control algorithms that produce specific desired system responses. Mathematical measures of control robustness are defined which allow the student to gain an appreciation for predicting and measuring system stability margins under sub-optimal conditions.

Equivalent Courses: Previous & Current Courses
MENG551, MENG551D

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- ES3032 - Electrical Engineering
- MATH3035 - Ordinary Differential Equation
- MENG4005 - Dynamic Systems & Controls
- MATH2420 - Applied Linear Algebra

or equivalent

Additional Comments:

No Requirement Level

MENG5052 - Explosives Technology & Applications

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Focus on the application of explosives mechanics. Fundamentals of explosive welding/cutting, shaped charges, explosive-drives flux compression generators, spallation's, explosives initiation methods, explosives applied testing methods, etc. Students will submit a semester-long research report.

Equivalent Courses: Previous & Current Courses
MENG552, MENG552D

Simple Requisites

Course Requisite Requirements

Prerequisites: *Graduate standing or consent of instructor and advisor*

No Requirement Level

MENG5053 - Computer Modeling of Detonations

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Introduction to hydrodynamic modeling applied to explosives. Numerical methods for modeling shock physics, detonation, and material response. Finite difference, finite element and smoothed particle hydrodynamic methods, equation of state and strength models, and numerical fracture and fragmentation.

Equivalent Courses: Previous & Current Courses
MENG553, MENG553D

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- MENG5045 - Introduction to Explosives Engineering

or consent of instructor and advisor

Additional Comments:

No Requirement Level

MENG5054 - Embedded Control Systems

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Micro-controller or microcomputer based embedded control systems. A comparative survey of currently available embedded computers/controllers including SBC's, PIC's, basic-stamps, and single-chip computer solutions. Real time operating systems including real-time UNIX, and hard real-time process requirements. Projects will include the implementation of an embedded real-time control solution. (Same as EE 554)

Equivalent Courses: Previous & Current Courses
EE5054, EE554, MENG554

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Completion Requirement

Prerequisites

Complete ALL of the following Courses:

- EE4043 - Intermediate Control Theory
  OR MENG4005 - Dynamic Systems & Controls

or equivalent or consent of instructor and advisor

Additional Comments:

No Requirement Level

MENG5055 - Shock Propagation in Air

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
An in-depth study of shock propagation in air in an engineering point of view. Estimation of overpressure, blast wave and its parameters, normal/oblique shock reflection analysis, blast wave scaling with Buckingham pi theory, and structural response under airblast including shockwave mitigation methods/concepts.

Equivalent Courses: Previous & Current Courses
MENG555, MENG555D

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- MENG5045 - Introduction to Explosives Engineering

or consent of instructor and advisor

Additional Comments:

No Requirement Level

MENG5056 - Compressible Fluid Flow

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
An introductory study of compressible fluid flow and gas dynamics. The course covers one-dimensional flows including isentropic flow, normal shockwaves, Fanno flow, and Rayleigh flow. Oblique shock waves and expansion fans are discussed including applications to high-speed aerodynamics. One-dimensional unsteady flow is taught, including a detailed study of wave diagrams for various problems including shock tubes and as models for explosions. Applications of compressible flow are discussed including wind tunnels, aerodynamics, and explosives. An understanding of simple refractive imaging techniques is imparted to allow analysis of compressible flows from flow visualizations.

Equivalent Courses: Previous & Current Courses
MENG556, MENG556D

Simple Requisites

Course Requisite Requirements

Prerequisites: *Graduate standing or consent of instructor.*

No Requirement Level

MENG5057 - Multiphase Flow

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Selected topics in multiphase flows with emphasis on engineering applications. Topics include basic two-phase flow equations, pressure drop in two-phase flow, gas-liquid, gas-solid and liquid-solid two-phase flows.

Equivalent Courses: Previous & Current Courses
MENG557

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- MENG4031 - Fluid & Thermal Systems

or equivalent or consent of the instructor

Additional Comments:

No Requirement Level

MENG5058 - Non-Newtonian Fluid Mechanics

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course offers the specific techniques and understanding necessary for being able to compute and understand issues associated with non-Newtonian fluid dynamics. Issues of rheology and analytic techniques are covered

Equivalent Courses: Previous & Current Courses
MENG558, MENG558D

Simple Requisites

Course Requisite Requirements

***Prerequisite**: consent of the instructor*

No Requirement Level

MENG5059 - Theory and Design of Internal Combustion Engines

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Thermodynamic analysis and performance characteristics of spark ignition and compression ignition engines. Effects of thermodynamics, heat transfer and combustion on engine power, efficiency and emissions. Design of internal combustion engines; stress analysis, kinematics and dynamics of the crank mechanism, design of piston, connecting rod and crankshaft.

Equivalent Courses: Previous & Current Courses
MENG559

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- ES3047 - Thermodynamics
- ES3050 - Heat & Mass Transfer
- MENG3004 - Advanced Strength of Materials
- MENG4021 - Finite Element Analysis & Design

or consent of the instructor

Additional Comments:

No Requirement Level

MENG5060 - Principles of Combustion

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Covers the fundamentals of combustion. Topics include chemical reactions, calculation of adiabatic flame temperature, chemical kinetics and flammability limit, characteristics of premixed, diffusion, laminar and turbulent flames.

Equivalent Courses: Previous & Current Courses
MENG556, MENG556D

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisites

Complete ALL of the following Courses:

- ES3047 - Thermodynamics

or consent of the instructor

Additional Comments:

No Requirement Level

MENG5061 - Digital Image Processing

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This class will provide an introduction to digital image processing, beginning with a discussion of imaging systems and storage of digital images then progressing to image filtering, segmentation, correlations, and applications in mechanical and aerospace engineering. Basic image manipulation including subtraction, addition, dilation, and smoothing will be covered using binary images. Grayscale images will then be used to discuss histogram manipulation, edge detection routines, and filtering, including Fourier-based techniques. Image correlation will be covered, including its applications for fluid-dynamic measurement systems like Particle Image Velocimetry (PIV) and Digital Image Correlation (DIC). Color theory will be presented including conversion of images between color schemes including RGB and HSI. Additional applications for machine vision and scene reconstruction will be discussed. The course will use MATLAB to perform all image manipulations; all students are expected to have working knowledge of MATLAB and undergraduate-level programming skills

Equivalent Courses: Previous & Current Courses
MENG561, MENG561D

Simple Requisites

Course Requisite Requirements

***Prerequisites**: Graduate standing or consent of instructor*

No Requirement Level

MENG5062 - Experimental Explosive Sciene

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
An introduction to the explosive testing date acquisition systems. Basic concepts of the measurement of detonation product properties and characteristics of detonation process. Analysis of material properties under high pressure shock compression, and data interpretations

Equivalent Courses: Previous & Current Courses
MENG562

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- MENG5045 - Introduction to Explosives Engineering

or consent of instructor and advisor

Additional Comments:

No Requirement Level

MENG5062L - Experimental Explosive Science Lab

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Pass/Fail, Standard Letter

Course Description
An introduction to the explosive testing data acquisition systems. Basic concepts of explosives initiation and the measurement/characterization of detonation effects. Experimental analysis of energetic Materials and explosives devices utilizing various state-of-art testing equipment. Ultra-high speed camera, VISAR, shock measurement systems, etc. Analysis of material properties under high-pressure shock compression, and data interpretations.

Equivalent Courses: Previous & Current Courses
MENG562L

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- MENG5045 - Introduction to Explosives Engineering

or consent of instructor or advisor

Additional Comments:

Corequisite
Type
Corequisite

Corequisite

Complete ALL of the following Courses:

- MENG5062 - Experimental Explosive Sciene

Additional Comments:

No Requirement Level

MENG5063 - Bioinspiration & Biomimetics

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course discusses the knowledge learned and inspired by nature and biological systems to solve concrete engineering problems. Topics including bioinspired drag reductions techniques, locomotion, navigation, control, sensing, and design of bioinspired concepts/robots will be covered in this course. Shares lectures with AE 4063 and MENG 4063, with additional expectations for graduate credit.

Equivalent Courses: Previous & Current Courses
AE4063, AE463, MENG4063, MENG463

Simple Requisites

Course Requisite Requirements

Prerequisites: Graduate standing or consent of instructor.

No Requirement Level

MENG5067 - Smart Engineering Systems I

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Artificial neural networks, with emphasis on multiplayer feedback networks, self-organizing networks, and Hopfield-style networks. Learning algorithms. Introduction to fuzzy systems and evolutionary computing. Engineering applications of soft computing.

Equivalent Courses: Previous & Current Courses
MENG567, MENG567D

Simple Requisites

Course Requisite Requirements

Prerequisites: *Graduate standing or consent of instructor.*

No Requirement Level

MENG5068 - Smart Engineering Systems II

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Overview of the major paradigms of soft computing: neural networks, fuzzy systems, and evolutionary computing. In-depth coverage of selected topics in each area as relevant to intelligent systems. Recent advances in the field, and case studies of intelligent systems. Coursework includes a large-scale project.

Equivalent Courses: Previous & Current Courses
MENG568

Simple Requisites

Course Requisite Requirements

Prerequisites: *Graduate standing or consent of instructor.*

No Requirement Level

MENG5069 - Artificial Intelligence Concepts

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisites: Graduate standing or Consent of Instructor. This course is an introductory course that presents a survey of AI concepts. The students will learn what AI is and what its applications and limitations are. The course covers search, optimization, constraint satisfaction, game playing, logic, planning, Bayesian networks, Kalman and particle filters, machine learning, hidden Markov

modeling, and natural language processing in applied mechanical engineering contexts, such as computer vision, robotics, and intelligent systems. The course offers basic Python-based examples, and elementary-level knowledge of Python is suggested. Shares lecture with MENG 4069, but is graded separately.

Simple Requisites

Course Requisite Requirements

Prerequisites: Graduate standing or consent of instructor.

No Requirement Level

MENG5070 - Advanced Mechatronics

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
The theory, design, manufacture and use of instrumentation and control in the various sciences. The use of electrical and electronic instruments and equipment to measure, monitor and/or record physical phenomena. Measurements of force, mass dimension, strain; displacement, velocity, and acceleration; tensile, impact and comprehensive strength; temperature and thermal properties; time and frequency; thrust and torque; pressure vacuum and flow; electrical quantities; photo-optics and radiation.

Equivalent Courses: Previous & Current Courses
MENG570, MENG570D

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- MENG4005 - Dynamic Systems & Controls
  OR EE4043 - Intermediate Control Theory

or equivalent or consent of instructor and advisor

Additional Comments:

No Requirement Level

MENG5071 - Haptic Systems, Teleoperation, & Virtual Reality

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Haptic and virtual-reality interfaces are designed with the sensing, control, and actuation capabilities of both humans and robots in mind. This course provides a practical introduction to select aspects of these capabilities. Mathematical formulations fundamental to the course will be derived. Students' ability to comprehend and synthesize the often dense and technical content of research papers will be improved through frequent reading and discussion assignments. Students will design computer algorithms throughout the semester that will culminate in a final programming project.

Equivalent Courses: Previous & Current Courses
MENG571

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- MENG4005 - Dynamic Systems & Controls
  OR EE4043 - Intermediate Control Theory

or equivalent or consent of instructor and advisor

Additional Comments:

No Requirement Level

MENG5072 - Sensor Technology

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
The operating principles and properties of sensors/transducers for the measurement of physical quantities in the mechanical domain, as well as the associated interface circuits. Focus is on commercially available sensors, but where appropriate, recent trends toward miniaturization, integration, and higher quality performance will be addressed.

Equivalent Courses: Previous & Current Courses
MENG572, MENG572D

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- MENG4005 - Dynamic Systems & Controls
- EE3032 - Electricity and Magnetism
  OR EE4043 - Intermediate Control Theory

or equivalent, or consent of instructor and advisor

Additional Comments:

No Requirement Level

MENG5074 - Electric Measurements of Non-Electric Quantities

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course is particularly reliant on advances in scientific knowledge. Establishment of units and scales of measurement, their development, realization, maintenance and dissemination, as well as the performance of traceable measurements. Hence, this course serves a key factor of modern manufacture through automation, which both enhances productivity and ensures consistent quality. The demand for improved and assured quality means ever better instrumentation. Focus on the course will be on measurement science, design principles for instrument systems, electrical measurements of thermal quantities, electrical measurements of mechanical quantities, electrical measurements of optical quantities, and electrical measurements of chemical quantities.

Equivalent Courses: Previous & Current Courses
MENG574

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- EE3032 - Electricity and Magnetism
- MENG4005 - Dynamic Systems & Controls
  OR EE4043 - Intermediate Control Theory

or equivalent, or consent of instructor and advisor

Additional Comments:

No Requirement Level

MENG5075 - Advanced Engineering Mathematics

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
A comprehensive study of applied mathematics. Vector analysis, tensors and Eigenvalue problems. Analytical solutions to linear ordinary and partial differential equations. Separation of variables, boundary value problems, and Laplace and Fourier transforms. Numerical analysis of non-linear ordinary and partial differential equations with emphasis on engineering applications. Complex Analysis; complex numbers, Cauchy-Riemann equations and conformal mapping.

Equivalent Courses: Previous & Current Courses
MENG575, MENG575D

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- MENG3005 - Numerical Methods & Analysis

or consent of the instructor

Additional Comments:

No Requirement Level

MENG5076 - Biomedical Mechatronics

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course will give students direct experience with computational tools used to create simulations of human movement. Lectures and labs cover animation of movement; kinematic models of joints; forward dynamic simulation; computational models of muscles, tendons, and ligaments; creation of models from medical images; control of dynamic simulations; collision detection and contact models. The course is intended as an introduction to medical device design for graduate engineering students because the class will have a significant design and prototyping emphasis.

Equivalent Courses: Previous & Current Courses
MENG576, MENG576D

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- MENG4005 - Dynamic Systems & Controls
  OR EE4043 - Intermediate Control Theory
  OR EE3032 - Electricity and Magnetism

or equivalent or consent of instructor and advisor

Additional Comments:

No Requirement Level

MENG5077 - Advanced Fluid Mechanics

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Fundamental concepts and analysis of Fluid Mechanics. Derivation of the partial differential equations governing the conservation of mass, momentum and energy. Introduction to potential flows. Exact solutions of the Navier-Stokes equations. Laminar and turbulent boundary layers. Compressible and incompressible flow problems.

Equivalent Courses: Previous & Current Courses
MENG577, MENG577D

Simple Requisites

Course Requisite Requirements

***Prerequisites**: Graduate standing or consent of the instructor*

No Requirement Level

MENG5078 - Advanced Thermodynamics

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
The first and second laws of thermodynamics. Clapeyron relation, availability concepts and analysis, equations of state, non-reacting mixtures and thermodynamics of chemical reactions.

Equivalent Courses: Previous & Current Courses
MENG578, MENG578D

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Completion Requirement

Prerequisites

Complete ALL of the following Courses:

- ES3047 - Thermodynamics

or consent of the instructor

Additional Comments:

No Requirement Level

MENG5079 - Advanced Heat Transfer

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Covers analytical and numerical techniques in conduction, convection, radiation with emphasis on combined heat transfer.

Equivalent Courses: Previous & Current Courses
MENG579, MENG579D

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Completion Requirement

Prerequisites

Complete ALL of the following Courses:

- ES3050 - Heat & Mass Transfer

or consent of the instructor

Additional Comments:

No Requirement Level

MENG5080 - Computational Fluid Dynamics & Reacting Flow Problems

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Introduction to Computational Fluid Dynamics and application of CFD tools to thermal and fluid flow problems. Coupling of fluid flow with combustion chemistry. Discussion of combustion modeling, importance of the mixing intensity, heterogeneous and homogeneous chemical reactions, and application of computer analysis to chemically reacting flow problems.

Equivalent Courses: Previous & Current Courses
MENG580, MENG580D

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- MENG5060 - Principles of Combustion
- MENG5077 - Advanced Fluid Mechanics

or consent of the instructor

Additional Comments:

No Requirement Level

MENG5081 - Directed Study

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
12

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, Standard Letter

Equivalent Courses: Previous & Current Courses
MENG581

No Requirements

MENG5082 - Nondestructive Evaluation & Structural Health Monitoring

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This multi-disciplinary course introduces key physical concepts in elasticity, Material science, acoustics, optics, and electromagnetics applied to system condition monitoring, Material characterization, structural damage detection and failure prevention. A broad spectrum of nondestructive evaluation (NDE) methods and emerging structural health monitoring (SHM) technologies is discussed including ultrasonic inspection, vibration monitoring, acoustic emission, radiography, eddy currents, electrical and magnetic testing. Examples of practical NDE/SHM applications in scientific research and industrial practice are presented.

Equivalent Courses: Previous & Current Courses
MENG582, MENG582D

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- MENG3004 - Advanced Strength of Materials
- MENG3005 - Numerical Methods & Analysis
- MATH3035 - Ordinary Differential Equation

or consent of instructor and advisor

Additional Comments:

No Requirement Level

MENG5083 - Engineering Mechanics of Composite Structures

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Composite structures, Macro-mechanics to Structural design and development. Development of analytical procedures for determining material properties, effective experimental methods and prediction of structural behavior.

Equivalent Courses: Previous & Current Courses
MENG583, MENG583D

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- MENG3005 - Numerical Methods & Analysis

Additional Comments:

Pre/Corequisite
Type
Completion Requirement

Pre/Corequisites

Complete ALL of the following Courses:

- MENG5023 - Engineering Mechanical Cellular Structures

or consent of the instructor

Additional Comments:

No Requirement Level

MENG5084 - Smart Materials and Structures

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
The Smart Materials and Structures course will focus on basic concepts and applications in several types of smart materials and structural systems. First, this class introduces smart materials and structural systems and applications in various fields. Then, it provides theoretical backgrounds of smart materials through modeling mechanical and electrical systems and mathematical representations of smart materials. Second, building upon the basic concepts of smart materials, lectures regarding three representative smart materials (i.e., piezoelectric materials, shape memory alloys, and electroactive polymer materials) are given. Last, state-of-the-art smart materials and structural systems are introduced and discussed in the class.

Equivalent Courses: Previous & Current Courses
MENG584

Simple Requisites

Course Requisite Requirements

***Prerequisites**: Graduate standing or consent of instructor.*

No Requirement Level

MENG5085 - Graduate Faculty Seminar

General

Credit Hrs

Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Equivalent Courses: Previous & Current Courses
MENG585, MENG585D

No Requirements

MENG5091 - Thesis

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
12

Credit Hours Operator:
TO

Grade Modes
Pass/Fail, No Report

Equivalent Courses: Previous & Current Courses
MENG591

No Requirements

MENG5095 - Dissertation

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
12

Credit Hours Operator:
TO

Grade Modes
No Report

Equivalent Courses: Previous & Current Courses
MENG595

Simple Requisites

Course Requisite Requirements

***Prerequisites**: Successful completion of PhD candidacy exam and Academic Advisor recommendation for candidacy*

No Requirement Level

Mineral Engineering Department

CONTACT US		
Office: MSEC 296		
State & Zip: NM 87801		
Phone: (575) 835-5836		
Website: https://www.nmt.edu/academics/mining/		

- ***Professors*** *Chávez, Mojtabai*
- ***Associate Professors*** *Razavi (Chair of the Department), Moradian*
- ***Assistant Professors*** *Arya, Khaniani*
- ***Adjunct Faculty Members*** *McLemore, Saiang, Kim, Li, McDaniel, Roghanchi, Haneberg, Mostefanejad*
- ***Emeritus Professors*** *Aimone-Martin, Fakhimi*

Degrees Offered: *B.S. in Mineral Engineering; B.S. in Mineral Engineering with Emphasis in Explosives Engineering; M.S. in Mineral Engineering; Ph.D in Mineral Engineering.*

Department Mission Statement

- Provide the students with an education in the fundamentals of engineering that will allow immediate entry into industry, government, research, or academia and provide a solid theoretical and applied foundation for future professional development and growth.
- Maintain a high level of commitment and excellence in teaching and research, provide the time and effort to understand the individual student's particular learning abilities and needs, give guidance, and provide the environment to achieve those abilities.
- Prepare students for the opportunities and challenges of a diversified professional career in the rapidly changing mineral engineering-related disciplines through exposure to various aspects of applied technology.

Program Educational Objectives

Program graduates will:

1. Develop creativity in thinking and skills in problem-solving to enhance their employer's ability to be competitive within the industry as they advance in their professional career.
2. Develop leadership communication skills within the framework of a team while demonstrating the ability to work independently.
3. Maintain a strong sense of professional and ethical responsibility with a solid corresponding social awareness.
4. Advance in engineering or management status and demonstrate measurable progress in achieving personal and professional goals after graduation.

Student Outcomes for Undergraduate Program

Graduates of the Bachelor of Science in Mineral Engineering program will have demonstrated:

- an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
- an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
- an ability to communicate effectively with a range of audiences
- an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
- an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
- an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
- an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Mineral engineering is concerned with exploring and developing minerals and earth Materials most efficiently while protecting the environment. The undergraduate program is oriented toward developing the student's understanding of and skill in engineering design. Proficiency in project management and leadership is encouraged through coursework and projects that emphasize professional-quality written and oral communication skills. The program's objective is to provide the student with an education in the fundamentals of engineering that will allow immediate entry into industry or research work while providing a good opportunity for continued professional growth. Emphasis is placed on developing a responsible professional with a sense of social awareness.

The curriculum includes basic engineering principles that provide the foundation for applied engineering design concepts. The program provides a concentrated study in mechanics, mineral evaluation and economics, ground and environmental control, environmental issues, and project management. Engineering design is introduced in courses covering surface and underground mining, ventilation, mineral processing, equipment selection, drilling and blasting, soil and rock mechanics, hydraulic structures, and geomechanics. Instruction in the environmental aspects of minerals development and production includes mine permitting and reclamation, extending to the legal issues and concerns in natural resources development.

A large-scale design project is undertaken in the senior year. This project integrates engineering principles and design in one of three areas: economic evaluation and exploration for mineral properties; design and planning of a mining project; or the planning and implementation of geotechnical construction projects, such as landfills, tailings impoundments, earth dams, and structures.

The department has modern, well-equipped laboratories for instruction and research in soil and rock mechanics, ventilation, blast vibrations, mineral evaluation, and computer applications. Students are provided the opportunity to work on a wide range of applied research projects within both the department and the Institute. Students are encouraged to obtain summer jobs in mines across the Southwest, providing excellent industrial experience.

Programs

Mineral Engineering (minor)

[Program Overview]

Program Title
Minor in Mineral Engineering

Department(s)
Mineral Engineering

Program Description
Minimum of 18 Credits are required

Simple Requisites

Program Requirements

Minor in Mineral Engineering
Type
Completion Requirement

18 Credits chosen from the following courses

Earn at least 18 credits from the following:

- ME3020 - Economic Analysis
- ME3040 - Geostatistics & Mineral Evaluation
- ME3060 - Exploration & Field Mapping
- ME3080 - Surface Mine Design
- MENG3081 - Junior Engineering Design Clinic I
- ME4010 - Environmental Issues
- ME4013 - Foundation Engineering
- ME4020 - Soil Mechanics
- ME4022 - Rock Mechanics
- ME4024 - Materials Handling & Equip (Inactive)
- ME4025 - Occupational Health & Safety and Professional Responses
- ME4035 - Rock Slope Engineering
- ME4037 - Tunneling & Underground Excavations
- ME4040 - Mine Ventilation
- ME4062 - Mineral Deposits

Other courses can be used with the department's approval.

Additional Comments:

Institute General Requirements

See the Institute **General Education Core Requirements.**

No Requirement Level

BS-ME - B.S. in Mineral Engineering

[Program Overview]

Program Title
B.S.-ME

Department(s)
Mineral Engineering

Degree & Program Code
BS-ME

Program Description
Mineral engineering is concerned with the exploration for and development of minerals and earth Materials in the most efficient manner while protecting the environment. The undergraduate program is oriented toward developing the student's understanding of, and skill in, engineering design. Proficiency in project management and leadership are encouraged through coursework and projects that emphasize professional-quality written and oral communication skills. The objective of the program is to provide the student with an education in the fundamentals of engineering that will allow immediate entry into industry or research work while providing a good opportunity for continued professional growth. Emphasis is placed on developing a responsible professional with a sense of social awareness.

The curriculum includes basic engineering principles that provide the foundation for applied engineering design concepts. The program provides a concentrated study in mechanics, mineral evaluation and economics, ground and environmental control, environmental issues, and project management. Engineering design is introduced in courses covering surface and underground mining, ventilation, mineral processing, equipment selection, drilling and blasting, soil and rock mechanics, hydraulic structures, and geomechanics. Instruction in the environmental aspects of minerals development and production include mine permitting and reclamation, extending to the legal issues and concerns in natural resources development.

A large-scale design project is undertaken in the senior year. This project integrates engineering principles and design in one of three areas: economic evaluation and exploration for mineral properties; design and planning of a mining project; or the planning and implementation of geotechnical construction projects, such as landfills, tailings impoundments, earth dams, and structures.

The department has modern well-equipped laboratories for instruction and research in soil and rock mechanics, ventilation, blast vibrations, mineral evaluation, and computer applications. Students are provided the opportunity to work on a wide range of applied research projects within both the department and the Institute. Students are encouraged to obtain summer jobs available in mines across the Southwest, providing excellent industrial experience.

Simple Requisites

Program Requirements

Minimum Credit Hours Required—127 In addition to the General Education and Institute Core Curriculum, the following courses are required
Type
Completion Requirement

Math Requirement

Complete ALL of the following Courses:
- MATH2532 - Calculus III
- MATH335 - Ordinary Differential Equation (Inactive)

Engineering Science Requirement

Complete ALL of the following Courses:
- ES201 - Statics
- ES216 - Engineering Fluid Mechanics
- ES3002 - Mechanics of Materials
- ES3003 - Engineering Dynamics
  OR ES3047 - Thermodynamics

Geology Requirement

Complete ALL of the following Course Sets:
- GEOL1110 & GEOL1110L: Physical Geology and Lab
- GEOL200 & GEOL200L: Introduction to Minerology and Lab

Mineral Engineering Courses

Complete ALL of the following Courses:
- ME101 - Intro to Mineral Engineering
- ME3020 - Economic Analysis
- ME3040 - Geostatistics & Mineral Evaluation
- ME3060 - Exploration & Field Mapping
- ME3080 - Surface Mine Design
- ME3081 - Underground Mine Design
- ME4010 - Environmental Issues
- ME4013 - Foundation Engineering
- ME4020 - Soil Mechanics
- ME4022 - Rock Mechanics
- ME4025 - Occupational Health & Safety and Professional Responses
- ME4035 - Rock Slope Engineering
- ME4037 - Tunneling & Underground Excavations
- ME4040 - Mine Ventilation
- ME4062 - Mineral Deposits
- ME4070 - Senior Design I
- ME4071 - Senior Design II

Other Requirements

Fulfill ALL of the following requirements:
Technical Elective (3), Three approved courses from any of the explosive engineering courses offered on campus.

All ME majors must take the Fundamentals in Engineering (FE) exam as a requirement for graduation.

Additional Comments:

Institute General Requirements

Generl Education Requirements for Bachelor of Science

Type
Completion Requirement

Area 1: Communications Requirement for Bachelor of Science

Complete ALL of the following Course Sets:
- Area 1: Communications (BS Degree) (9 credits)

Area 2: Mathematics and Quantitative Reasoning Requirements for Bachelor of Science

Complete ALL of the following Course Sets:
- Area 2: Mathematics (BS Degree) (8 credits)

Area 3: Science Requirements for a Bachelor of Science

Complete ALL of the following Course Sets:
- Area 3: Science (BS Degree) (18 credits)

Area 4: Social and Behavioral Science Requirements for a Bachelor of Science

Complete ALL of the following Course Sets:
- Area 4: Social and Behavioral Science (BS or BGS Degree) (6 credits)

Area 5: Humanities Course Requirements for a Bachelor of Science

Complete ALL of the following Course Sets:
- Area 5: Humanities (BS or BGS Degree) (6 credits)

Area 6: Creative & Fine Art Requirement for a Bachelor of Science

Complete ALL of the following Course Sets:
- Area 6: Creative and Fine Arts (BS, BA, or BGS Degree) (3 credits)

Area 7: Additional Humanities/Social Science Requirement for a Bachelor of Science

Complete ALL of the following Course Sets:
- Area 7: Additional Courses from Areas 4, 5, 6 (BS, BA, or BGS Degree) (3 credits)

Additional Comments:

No Requirement Level

[Learning Outcomes]

Outcome
an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics

Outcome
an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors

Outcome
an ability to communicate effectively with a range of audiences

Outcome
an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

Outcome
an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives

Outcome
an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions

Outcome
an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

[Sample 4-Year Curriculum Plan(s)]

Degree Map Name
Sample Curriculum for the Bachelor of Science in Mineral Engineering
Total Degree Map Credits
116
Degree Map Effective Catalog Year
2025 -

Year	Semester	Actual Credits
Year 1	Fall	16

Course
- ME101 - Intro to Mineral Engineering

Actual Credits 1

Course
- GEOL1110 & GEOL1110L: Physical Geology and Lab

Actual Credits 4

Course
- MATH1510 - g2:Calculus I

Actual Credits 4

Course
- CHEM1215 & CHEM1215L: g:General Chemistry I and Lab

Actual Credits 4

Course
- ENGL1110 - g1:Composition I

Actual Credits 3

Year	Semester	Actual Credits
Year 1	Spring	17

Course
- ENGL1120 - g1:Composition II

Actual Credits 3

Course
- MATH1520 - g2:Calculus II

Actual Credits 4

Course
- CHEM1225 & CHEM1225L: g: General Chemistry II and Lab

Actual Credits 4

Course
- Humanities/Social Science (Course Attributes)

Actual Credits 3

Course
- Humanities/Social Science (Course Attributes)

Actual Credits 3

Year	Semester	Actual Credits
Year 2	Fall	14

Course
- PHYS1310 & PHYS1310L: g:Calculus-Physics I and Lab

Actual Credits 5

Course
- MATH2532 - Calculus III

Actual Credits 4

Course
- Humanities/Social Science (Course Attributes)

Actual Credits 3

Course
- ME3020 - Economic Analysis

Actual Credits 2

Year	Semester	Actual Credits
Year 2	Spring	15

Course
- PHYS1320 & PHYS1320L: g:Calculus-Based Physics II and Lab

Actual Credits 5

Course
- ES201 - Statics

Actual Credits 3

Course
- GEOL200 & GEOL200L: Introduction to Minerology and Lab

Actual Credits 4

Course
- ENGL3041 - i1:Technical Writing

Actual Credits 3

Year	Semester	Actual Credits
Year 3	Fall	12

Course
-

Actual Credits -

Course
- ME4020 & ME4020L: Soil Mechanics and Lab

Actual Credits 3

Course
- ME3040 - Geostatistics & Mineral Evaluation

Actual Credits 3

Course
- ME4062 - Mineral Deposits

Actual Credits 3

Course
- ES3002 - Mechanics of Materials

Actual Credits 3

Year	Semester	Actual Credits
Year 3	Spring	12

Course
- ME4013 - Foundation Engineering

Actual Credits 3

Course
-

Actual Credits -

Course
- ES216 - Engineering Fluid Mechanics

Actual Credits 3

Course
- ME3080 - Surface Mine Design

Actual Credits 3

Course
- ME3081 - Underground Mine Design

Actual Credits 3

Year	Semester	Actual Credits
Year 4	Fall	16

Course
- ME4070 - Senior Design I

Actual Credits 1

Course
- ME4035 - Rock Slope Engineering

Actual Credits 3

Course
- MATH3035 - Ordinary Differential Equation

Actual Credits 3

Course
- ME4040 - Mine Ventilation

Actual Credits 3

Course
- ES3047 - Thermodynamics
  OR
- ES3003 - Engineering Dynamics

Actual Credits 3

Course
- Humanities/Social Science (Course Attributes)

Actual Credits 3

Year	Semester	Actual Credits
Year 4	Spring	14

Course
- ME4071 - Senior Design II

Actual Credits 2

Course
- ME4025 - Occupational Health & Safety and Professional Responses

Actual Credits 3

Course
-

Actual Credits -

Course
- ME4037 - Tunneling & Underground Excavations

Actual Credits 3

Course
- Technical Electives

Actual Credits 3

Course
- Humanities/Social Science (Course Attributes)

Actual Credits 3

BS-ME - B.S. in Mineral Engineering with Emphasis in Explosives Engineering

[Program Overview]

Program Title
B.S. in Mineral Engineering with Emphasis in Explosives Engineering

Department(s)
Mineral Engineering

Degree & Program Code
BS-ME

Simple Requisites

Program Requirements

Minimum Credit Hours Required—136 In addition to the General Education and Institute Core Curriculum, the following courses are required
Type
Completion Requirement

Math Requirement

Complete ALL of the following Courses:
- MATH2532 - Calculus III
- MATH3035 - Ordinary Differential Equation

Engineering Science Requirement

Complete ALL of the following Courses:
- ES201 - Statics
- ES216 - Engineering Fluid Mechanics
- ES3002 - Mechanics of Materials
- ES3032 - Electrical Engineering
- ES3003 - Engineering Dynamics
  OR ES3047 - Thermodynamics

Geology Requirement

Complete ALL of the following Course Sets:
- GEOL1110 & GEOL1110L: Physical Geology and Lab
- GEOL2160 & GEOL2160L: Introduction to Mineralogy and Lab

Mineral Engineering Courses

Complete ALL of the following Courses:
- ME101 - Intro to Mineral Engineering
- ME3020 - Economic Analysis
- ME3040 - Geostatistics & Mineral Evaluation
- ME3060 - Exploration & Field Mapping
- ME3080 - Surface Mine Design
- ME3081 - Underground Mine Design
- ME4010 - Environmental Issues
- ME4020 - Soil Mechanics
- ME4022 - Rock Mechanics
- ME4024 - Materials Handling & Equip (Inactive)
- ME4025 - Occupational Health & Safety and Professional Responses
- ME4035 - Rock Slope Engineering
- ME4037 - Tunneling & Underground Excavations
- ME4040 - Mine Ventilation
- ME4062 - Mineral Deposits
- ME4070 - Senior Design I
- ME4071 - Senior Design II

Technical Electives

Three approved courses from any of the explosive engineering courses offered on campus

Technical Electives (3)

Additional Comments:
All ME majors must take the Fundamentals in Engineering (FE) exam as a requirement for graduation.

Institute General Requirements

Generl Education Requirements for Bachelor of Science
Type
Completion Requirement

Area 1: Communications Requirement for Bachelor of Science

Complete ALL of the following Course Sets:
- Area 1: Communications (BS Degree) (9 credits)

Area 2: Mathematics and Quantitative Reasoning Requirements for Bachelor of Science

Complete ALL of the following Course Sets:
- Area 2: Mathematics (BS Degree) (8 credits)

Area 3: Science Requirements for a Bachelor of Science

Complete ALL of the following Course Sets:

- Area 3: Science (BS Degree) (18 credits)

Area 4: Social and Behavioral Science Requirements for a Bachelor of Science

Complete ALL of the following Course Sets:

- Area 4: Social and Behavioral Science (BS or BGS Degree) (6 credits)

Area 5: Humanities Course Requirements for a Bachelor of Science

Complete ALL of the following Course Sets:

- Area 5: Humanities (BS or BGS Degree) (6 credits)

Area 6: Creative & Fine Art Requirement for a Bachelor of Science

Complete ALL of the following Course Sets:

- Area 6: Creative and Fine Arts (BS, BA, or BGS Degree) (3 credits)

Area 7: Additional Humanities/Social Science Requirement for a Bachelor of Science

Complete ALL of the following Course Sets:

- Area 7: Additional Courses from Areas 4, 5, 6 (BS, BA, or BGS Degree) (3 credits)

Additional Comments:

No Requirement Level

[Sample 4-Year Curriculum Plan(s)]

Degree Map Name
Sample Curriculum for the Bachelor of Science in Mineral Engineering
Total Degree Map Credits
130 - 131
Degree Map Effective Catalog Year
2025 -

Year	Semester	Actual Credits
Year 1	Fall	16

Course
- ME 101: Intro to Mineral Engineering (Generic)

Actual Credits 1

Course
- GEOL1110 & GEOL1110L: Physical Geology and Lab

Actual Credits 4

Course
- MATH1510 - g2:Calculus I

Actual Credits 4

Course
- CHEM1215 & CHEM1215L: g:General Chemistry I and Lab

Actual Credits 4

Course
- ENGL1110 - g1:Composition I

Actual Credits 3

Year	Semester	Actual Credits
Year 1	Spring	17

Course
- ENGL1120 - g1:Composition II

Actual Credits 3

Course
- MATH1520 - g2:Calculus II

Actual Credits 4

Course
- CHEM1225 & CHEM1225L: g: General Chemistry II and Lab

Actual Credits 4

Course
- Area 7 (Huma/SS) (Course Attributes)

Actual Credits 3

Course
- Area 7 (Huma/SS) (Course Attributes)

Actual Credits 3

Year	Semester	Actual Credits
Year 2	Fall	17

Course
- PHYS1310 & PHYS1310L: g:Calculus-Physics I and Lab

Actual Credits 5

Course
- MATH2532 - Calculus III

Actual Credits 4

Course
- ES201 Statics (Generic)

Actual Credits 3

Course
- Humanities/Social Science (Course Attributes)

Actual Credits 3

Course
- ME3020 - Economic Analysis

Actual Credits 2

Year	Semester	Actual Credits

Year 2	Spring	15

Course
- PHYS1320 & PHYS1320L: g:Calculus-Based Physics II and Lab

Actual Credits 5

Course
- ES3002 - Mechanics of Materials

Actual Credits 3

Course
- GEOL2160 & GEOL2160L: Introduction to Mineralogy and Lab

Actual Credits 4

Course
- ME3040 - Geostatistics & Mineral Evaluation

Actual Credits 3

Year	Semester	Actual Credits
Year 3	Fall	18

Course
- ME3060 - Exploration & Field Mapping

Actual Credits 3

Course
- ENGL3041 - i1:Technical Writing

Actual Credits 3

Course
- ME4020 & ME4020L: Soil Mechanics and Lab

Actual Credits 3

Course
- ME3080 - Surface Mine Design

Actual Credits 3

Course
- ME3081 - Underground Mine Design

Actual Credits 3

Course
- ES 216 Fluid Mechanics (Generic)

Actual Credits 3

Year	Semester	Actual Credits
Year 3	Spring	15

Course
- ME4013 - Foundation Engineering

Actual Credits 3

Course
- ME4020 & ME4020L: Soil Mechanics and Lab

Actual Credits 3

Course
- MATH3035 - Ordinary Differential Equation

Actual Credits 3

Course
- ES3047 - Thermodynamics

Actual Credits 3

Course
- Humanities/Social Science (Course Attributes)

Actual Credits 3

Year	Semester	Actual Credits
Year 4	Fall	15 - 16

Course
- ME4070 - Senior Design I

Actual Credits 1

Course
- ME4035 - Rock Slope Engineering

Actual Credits 3

Course
- ME4024 - Materials Handling & Equip (Inactive)

Actual Credits 2 - 3

Course
- ME4040 - Mine Ventilation

Actual Credits 3

Course
- ME4062 - Mineral Deposits

Actual Credits 3

Course
- Humanities/Social Science (Course Attributes)

Actual Credits 3

Year	Semester	Actual Credits
Year 4	Spring	17

Course
- ME4071 - Senior Design II

Actual Credits 2

Course
- ME4025 - Occupational Health & Safety and Professional Responses

Actual Credits 3

Course
- ME4010 - Environmental Issues

Actual Credits 3

Course
- ME4037 - Tunneling & Underground Excavations

Actual Credits 3

Course
- Technical Elective (Generic)

Actual Credits 3

Course
- Humanities/Social Science (Course Attributes)

Actual Credits 3

MS-ME - M.S. in Mineral Engineering

[Program Overview]

Program Title
M.S.-ME

Department(s)
Mineral Engineering

Degree & Program Code
MS-ME

Program Description
Admission to the Master of Science in Mineral Engineering program requires competence in mathematics, chemistry, physics, and engineering science comparable to the bachelor of science degree in mineral engineering. Applicants without an engineering degree may apply for the graduate program in Mineral Engineering. However, the student will be required to take all deficiencies as required by the advisory committee.

Program Information & Policies
The student may select one area of specialization, **Specialization in Mineral Exploration, Specialization in Geotechnical Engineering and Geomechanical Engineering, or Specialization in Explosive Engineering.**

Simple Requisites

Program Requirements
The student's course of study must be approved by the student's advisory committee and fulfill the general requirements for the master's degree.

Of the 30 hours required for the M.S. degree, a minimum of 12 credit hours must be in approved Mineral Engineering courses. All graduate students must complete at least one credit of ME 5072 (graduate seminar). Under special consideration, a student may petition the advisory committee with approval of the Department Chair to pursue a Master of Science degree with Independent Study (three hours of ME 5090). A formal paper will be submitted with an oral presentation to the advisory committee.

The student may select one area of specialization as outlined below; within each specialization, recommended courses are provided.

Specialization in Mineral Exploration
Type
Completion Requirement

Credit Requirements

Earn at least 12 credits from the following:
- ME5011 - Mineral Economics
- ME5021 - Advanced Minerals Exploration
- ME5022 - Advanced Exploration and Field Mapping
- ME5023 - Ore Petrography
- ME5051 - Industrial Minerals
- ME5062 - International Mining Field Trip
- ME5063 - Field Studies-Hydrothermal Alterations

Other courses can be substituted with the approval of the research advisor and committee.

Additional Comments:

Specialization in Geotechnical Engineering and Geomechanical Engineering
Type
Completion Requirement

Credit Requirements

Earn at least 12 credits from the following:
- ME5006 - Soil Mechanics
- ME5008 - Rock Mechanics
- ME5015 - Theory of Elasticity
- ME5017 - Advanced Finite Element Method
- ME5020 - Fracture Mechanics
- ME5025 - Rock and Soil Plasticity
- ME5031 - Advanced Foundation Design & Analysis
- ME5034 - Advanced Drilling & Blasting Engineering
- ME5035 - Stability of Rock Slopes
- ME5037 - Designs & Conditions of Underground Openings
- ME5040 - Computer Applications in Geotechnical Engineering
- ME5041 - Ground Improvement
- ME5061 - Advanced Topics in Engineering Geology

Other courses can be substituted with the approval of the research advisor and committee.

Additional Comments:

Specialization in Explosive Engineering
Type
Completion Requirement

Credit Requirements

Earn at least 12 credits from the following:
- ME5015 - Theory of Elasticity
- ME5017 - Advanced Finite Element Method
- ME5020 - Fracture Mechanics
- ME5034 - Advanced Drilling & Blasting Engineering

- ME5045 - Vibration Analysis & Control
- ME5046 - Detonation Theory
- ME5048 - Rock Fracturing & Fragmentation by Explosives
- ME5049 - Wave Propagation
- ME5050 - Advanced Explosives Engineering
  OR MENG5050 - Advanced Explosives Engineering
- ME5052 - Applied Explosives Engineering
- ME5053 - Computer Modeling-Detonations
  OR MENG5070 - Advanced Mechatronics

Other courses can be substituted with the approval of the research committee and the department.

Additional Comments:

Institute General Requirements

No Requirement Level

[Learning Outcomes]

Outcome
1. Be able to effectively and proficiently communicate in written text, with well-organized and professional-style reports and publications, as well as oral communication. Capable of compiling, organizing, and presenting research and related information in oral form to peers, professionals.

Outcome
2. Be able to contribute to the development of scientific knowledge by producing and publishing high level scientific articles in journals and reputable conferences.

Outcome
3. Be able to identify industrial and scientific problems and conduct research and development to address these problems or provide high level science founded solutions.

Outcome
4. Understand professional codes-of-ethics and know what is expected of them as they enter the professional environment.

PHD-ME - Ph.D. in Mineral Engineering

[Program Overview]

Program Title
Doctor of Philosophy in Mineral Engineering

Department(s)
Mineral Engineering

Degree & Program Code
PHD-ME

Program Description
The proposed Mineral Engineering PhD degree is a multi-disciplinary and interdisciplinary program. Some level of flexibility is allowed to meet the focused research area of the student. However, the student's graduate committee, the department chair, and the dean of graduate studies must approve all courses.

Program Information & Policies
Only applicants with a closely related MS degree are considered for admission to the PhD program.

Simple Requisites

Program Requirements

1. Required credits - A student with a closely related Master of Science degree must complete at least 12 credits of graduate level courses, plus one seminar credit (ME 5072), and 24 credit hours of dissertation (ME 5095). Courses from other departments can be accepted with the approval of the research committee.
2. Formation of Research Committee – The student must form their research committee during the first year.
3. Qualifying exam – The qualifying exam determines if the student is prepared and has sufficient background in their research area. It is recommended that the student take and pass the qualifying exam during the first year, where the student will be given a published paper in their area of study to be analyzed and critiqued. The research committee will decide whether the student is prepared to move on to the next step. The committee may recommend specific courses to be taken as either deficiency or to prepare the student to do research in the chosen field of study. If the student fails the exam, they may retake it only once. If the student fails the second exam, they will be terminated from the program. The student may appeal for another opportunity to remain in the program.
4. Candidacy Exam – Following passing the qualifying exam, the student must present a detailed proposal for their research work. An oral presentation to the research committee must be presented after passing the qualifying exam. The presentation is open to the public. The candidate must pass the exam to advance to Candidacy.

Additional requirements include the New Mexico Institute of Mining and Technology Graduate Program requirements.

Institute General Requirements

No Requirement Level

[Learning Outcomes]

Outcome
1. Be able to effectively and proficiently communicate in written text, with well-organized and professional-style reports and publications, as well as oral communication, capable of compiling, organizing, and presenting research and related information in oral form to peers, professionals.

Outcome
2. Be able to contribute to the development of scientific knowledge by producing and publishing high level scientific articles in journals and reputable conferences.

Outcome
3. Be able to identify industrial and scientific problems and conduct research and development to address these problems or provide high level science founded solutions.

Outcome
4. Understand professional codes-of-ethics and know what is expected of them as they enter the professional environment.

Courses

ME101 - Intro to Mineral Engineering

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
The fundamentals of geology and mineral resource exploration and development applied to engineering. The role of the mineral engineer in mining, exploration, and geotechnical engineering. Field trips to mining and construction operations as well as guest speakers from industry, government, and research.

Equivalent Courses: Previous & Current Courses
ME1001

No Requirements

ME215 - Health & Safety

General

Credit Hrs
Credit Hrs:
2

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
The roles of health and safety in the construction, operation, and maintenance of extractive mineral facilities. Federal and state health and safety codes. Laboratory and field work.

Equivalent Courses: Previous & Current Courses
ME2015

No Requirements

ME3020 - Economic Analysis

General

Credit Hrs
Credit Hrs:
2

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Economic principles applied to decision-making problems in mineral engineering. Compound interest, depreciation, present worth and rate of return pertinent to project evaluation.

Equivalent Courses: Previous & Current Courses
ME320

Simple Requisites

Course Requisite Requirements

Corequisite
Type
Corequisite

Corequisite

Enroll in the following Courses:
- MATH1510 - g2:Calculus I

Additional Comments:

No Requirement Level

ME3040 - Geostatistics & Mineral Evaluation

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Introduction to statistics. Obtaining, evaluating, and presenting mineral resource information. Ore reserves estimation using geometric weighting techniques and geostatistical methods. The use of computers is emphasized.

Equivalent Courses: Previous & Current Courses
ME340

Simple Requisites

Course Requisite Requirements

Corequisites
Type
Corequisite

Corequisites

Enroll in the following Courses:
- ME3020 - Economic Analysis
  OR ES3016 - Engineering Economics

Additional Comments:

No Requirement Level

ME3060 - Exploration & Field Mapping

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
The acquisition and presentation of field geological data applied to engineering site characterization and mineral exploration. Data presentation. Elements of exploration techniques including field applied mineralogy, geophysics, structural geology, geochemistry, drilling and sampling, and mapping. Laboratory reports and oral presentations.

Equivalent Courses: Previous & Current Courses
ME360

No Requirements

ME3080 - Surface Mine Design

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Surface mining methods and design, mine road and ramp design, introduction to drilling and blasting design, surface mining materials handling systems; truck and shovel, dragline, conveyor belt.

Equivalent Courses: Previous & Current Courses
ME380

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

ME 3080 prerequisite

Complete ALL of the following Courses:
- ME3040 - Geostatistics & Mineral Evaluation

Additional Comments:

No Requirement Level

ME3081 - Underground Mine Design

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Underground mining methods; caving, unsupported, and supported methods, shaft sinking, elements of underground blasting, underground materials handling systems; hoisting and train haulage.

Equivalent Courses: Previous & Current Courses
ME380

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:
- ME3040 - Geostatistics & Mineral Evaluation

Additional Comments:

No Requirement Level

ME4010 - Environmental Issues

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Mine waste characteristics; regulations affecting mine operations; site selection, design and stability analysis of tailings impoundments. Water quality issues and control in mining. Mine waste management. Mine permitting requirements and reclamation. Design projects.

Equivalent Courses: Previous & Current Courses
ME410

Simple Requisites

Course Requisite Requirements

Corequisite
Type
Corequisite

Corequisite

Enroll in the following Courses:
- ME4013 - Foundation Engineering

Additional Comments:

No Requirement Level

ME4013 - Foundation Engineering

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Principles of soil mechanics and foundation engineering. Immediate and time dependent settlements, service loads, lateral loads, loading, approximate analysis methods, performance requirements, shallow foundations, lateral earth pressure, design of retaining walls, deep foundations, special footings, slope stability, and computer modeling of foundations. (Same as CE 4013).

Equivalent Courses: Previous & Current Courses
CE413, CEE5043, CEE543, ME413, ME5031, ME531

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

ME 4013 prerequisite

Complete ALL of the following Courses:
- ME4020 - Soil Mechanics

Additional Comments:

No Requirement Level

ME4020 - Soil Mechanics

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Phase relationships, soil classification, clay mineralogy, compaction, flow of water in soils, effective stress, Mohr circle, stress-strain relationships and failure criteria, Mohr-Coulomb failure criterion, shear strength, consolidation, and consolidation settlement.

Equivalent Courses: Previous & Current Courses
ME420

No Requirements

ME4020L - Soil Mechanics Lab

General

Credit Hrs
Credit Hrs:
0

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Corequisite for ME 4020

No Requirements

ME4022 - Rock Mechanics

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Mechanical properties of intact rock and rock masses, classification of rock masses for engineering purposes, rock failure criteria, in situ stress measurement techniques, rock deformability. Labs consists of sample preparation, point load test, Brazilian test, Uniaxial test, and Triaxial test

Equivalent Courses: Previous & Current Courses
ME422

No Requirements

ME4025 - Occupational Health & Safety and Professional Responses

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
An overview of mine health and safety, Effective health and safety management systems, applications of behavioral science to health and safety, regulation and enforcement, incident reporting and analysis, industrial hygiene in mining.

Equivalent Courses: Previous & Current Courses
ME425

Simple Requisites

Course Requisite Requirements

***Prerequisites**: Junior standing*

No Requirement Level

ME4034 - Drilling & Blasting Engineering

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Introductory course in the application of explosives to rock fragmentation; theory of detonation and mechanisms of rock failure, dynamics, and propagation. The effects of rock properties on breakage. Blasting systems and production blasting techniques used in both surface and underground designs; environmental considerations and regulations. Principles of blast-hole drilling and drill performance. Drilling and blasting economics.

Equivalent Courses: Previous & Current Courses
ME434

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- ES3002 - Mechanics of Materials

Additional Comments:

No Requirement Level

ME4035 - Rock Slope Engineering

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Field exploration and presentation of geologic data pertaining to rock slope engineering. Shear strength of rock discontinuities. Structural analyses and application of stereonets and stereographic projection. Basic mechanics and modes of slope failure. Plane, wedge, and toppling failure analyses. Effect of groundwater. Improvement of slope stability by drainage and support. Monitoring. Computer applications. Shares lecture with ME 5035, with additional expectations for graduate credit.

Equivalent Courses: Previous & Current Courses
ME435

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- ES201 - Statics

Additional Comments:

No Requirement Level

ME4037 - Tunneling & Underground Excavations

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Field exploration and presentation of geologic data pertaining to underground excavations in rock. Rock mass classification systems. Empirical design and support selections, structural analysis and block stability. Application of stereonets and stereographic projection. Stress and rock mass strength, elastic and elasto-plasic analysis. Applications of numerical modeling. Review of machine excavation methods. Shares lecture with ME 5037, with additional expectations for graduate credit.

Equivalent Courses: Previous & Current Courses
ME437, ME5037, ME537

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:
- ME4035 - Rock Slope Engineering

Additional Comments:

No Requirement Level

ME4040 - Mine Ventilation

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Control of underground environmental problems; dusts, gasses, temperature, and humidity. Analysis of natural and mechanical ventilation systems and equipment. Measurement techniques

Equivalent Courses: Previous & Current Courses
ME440

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

ME 4040 Prerequistes

Complete ALL of the following Courses:
- ME3081 - Underground Mine Design
- ES216 - Engineering Fluid Mechanics

Additional Comments:

No Requirement Level

ME4062 - Mineral Deposits

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Ore formation processes and ore mineralogy; geologic and geochemical characterization of ore deposits using hand specimen, petrographic, and field mapping techniques. Visits to prospects and operating mines to observe variations in ore deposit characteristics to document geologic and geochemical parameters used to describe ore-forming systems. (Same as GEOL 4062)

Equivalent Courses: Previous & Current Courses
ME462

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:
- GEOL200 - Introduction to Mineralogy (Inactive)

Additional Comments:

No Requirement Level

ME4062L - Mineral Deposits Lab

General

Credit Hrs
Credit Hrs:
0

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Corequisite for ME 4062

No Requirements

ME4070 - Senior Design I

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Initiation of senior design project including written and oral project proposal; estimation of project design requirements and costing. Preliminary data acquisition and evaluation. Design topics are selected from mineral exploration, mine or geotechnical engineering.

Equivalent Courses: Previous & Current Courses
ME470

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

Prerequisites

Complete ALL of the following Courses:

- ME3080 - Surface Mine Design
  AND ME3081 - Underground Mine Design

Additional Comments:

No Requirement Level

ME4071 - Senior Design II

General

Credit Hrs

Credit Hrs:
2

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Continuation of design projects initiated in ME 4070; implementation and evaluation of design details including cost analysis. Preparation of final project report with written and oral professional-style presentations.

Equivalent Courses: Previous & Current Courses
ME471

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

Prerequisites

Complete ALL of the following Courses:

- ME4070 - Senior Design I

passed with a grade of "C" or better.

Additional Comments:

No Requirement Level

ME4091 - Directed Study

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
4

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Special projects or topics in mining or geological engineering.

Equivalent Courses: Previous & Current Courses
ME491

No Requirements

ME5000 - Directed Research

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
12

Credit Hours Operator:
TO

Grade Modes
Pass/Fail, Standard Letter

Course Description
This course may not be used to fulfill graduate degree requirements. Research under the guidance of a faculty member.

Equivalent Courses: Previous & Current Courses
ME500

No Requirements

ME5006 - Soil Mechanics

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, No Report, Standard Letter

Course Description
Phase relationships, soil classification, clay mineralogy, compaction, flow of water in soils, effective stress, Mohr circle, stress-strain relationships and failure criteria, Mohr-Coulomb failure criterion, shear strength, consolidation, and consolidation settlement.

Equivalent Courses: Previous & Current Courses
ME506

Simple Requisites

Course Requisite Requirements

***Prerequisites**: Graduate standing or Consent of instructor*

No Requirement Level

ME5006L - Soil Mechanics Lab

General

Credit Hrs
Credit Hrs:
0

Grade Modes
Audit, Pass/Fail, No Report, Standard Letter

Course Description
Corequisite for ME 5006

No Requirements

ME5011 - Mineral Economics

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Domestic and international mineral statistics, marketing, trade, conservation, and taxation. Energy economics. Labor economics. Economic calculations for feasibility studies on mineral properties. Participants prepare and present professional-style reports on international mineral development.

Equivalent Courses: Previous & Current Courses
ME511

Simple Requisites

Course Requisite Requirements

***Prerequisite**: ES 3016 recommended, or consent of instructor and advisor*

No Requirement Level

ME5012 - Advanced Rock Mechanics

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Failure process, prediction of rock damage, ground reaction curve, ground support applications, dynamic rock failure and mine seismicity, measurements and monitoring techniques, blast induce rock damage and rock preconditioning, stability assessment techniques, and numerical modeling.

Equivalent Courses: Previous & Current Courses
ME512

Simple Requisites

Course Requisite Requirements

***Prerequisite**: Graduate standing or consent of the instructor*

No Requirement Level

ME5015 - Theory of Elasticity

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
An introduction to tensor analysis, analysis of stress, balance laws, infinitesimal and finite theories of motion, strain and rotation tensors, compatibility equations, constitutive equations, Materials symmetry, uniqueness of the solution, solution of two-dimensional elasticity problems. Airy stress function, application of complex variable technique in elasticity, three-dimensional elasticity problems, energy methods, bending theory of plates. (Same as MENG 5015)

Equivalent Courses: Previous & Current Courses
ME512

Simple Requisites

Course Requisite Requirements

***Prerequisite**: Graduate standing or consent of the instructor*

No Requirement Level

ME5017 - Advanced Finite Element Method

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
An introduction to the numerical analysis calculus of variation, weak form of a differential equation, weighted residual techniques, solution of one-dimensional problems by the finite element method, bending problems, Lgrange and Hermite interpolation functions, isoparametric elements, numerical integration, two-dimensional problems, solution of Poisson and Laplace equations, triangular and quadrilateral elements, elasticity problems, theorem of minimum potential energy stiffness matrix, examples. (Same as MENG 5017)

Equivalent Courses: Previous & Current Courses
ME517

Simple Requisites

Course Requisite Requirements

***Prerequisite**: Graduate standing or consent of the instructor*

No Requirement Level

ME5020 - Fracture Mechanics

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
An introduction to the theory of elasticity, singular stress fields, Westergaard method, complex variable technique, stress intensity factor, fracture energy, numerical and experimental methods in determination of stress intensity factor, fracture toughness, J-integral Elastoplastic fracture. (Same as MENG 5020)

Equivalent Courses: Previous & Current Courses
ME520

Simple Requisites

Course Requisite Requirements

Prerequisite: *Graduate standing or consent of the instructor*

No Requirement Level

ME5021 - Advanced Minerals Exploration

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Practical application of geologic, geochemical, and geophysical exploration techniques to ore search. Remote sensing technology and integration into grassroots exploration programs. Recent developments in geophysical and geochemical prospecting. Case histories. Field application of mineral exploration techniques.

Equivalent Courses: Previous & Current Courses
ME521

Simple Requisites

Course Requisite Requirements

Prerequisite: *Graduate standing or consent of the instructor*

No Requirement Level

ME5022 - Advanced Exploration and Field Mapping

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Detailed mapping of mineral deposits and prospects in collaboration with professional exploration geologists and engineers with application to minerals exploration. Design and implementation of orientation surveys. Field studies will include geochemical and geological laboratory analysis. Written reports and oral presentation of projects will be reviewed by professionals.

Equivalent Courses: Previous & Current Courses
ME522

Simple Requisites

Course Requisite Requirements

Prerequisite: *Graduate standing or consent of the instructor*

No Requirement Level

ME5023 - Ore Petrography

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Identification and description of opaque and semi-opaque minerals using polished sections complemented by reflected-light petrographic techniques. Sampling techniques for exploration, mining, and environmental remediation purposes. Preparation of polished samples from rock, rock chip, ore concentrate, and tailings sample types. Heavy liquid separation techniques for concentration of heavy minerals and quantitative mineral analyses.

Equivalent Courses: Previous & Current Courses
ME523

Simple Requisites

Course Requisite Requirements

Prerequisite: *Graduate standing or consent of the instructor*

No Requirement Level

ME5025 - Rock and Soil Plasticity

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Introduction to the theory of elasticity, Tresca, Von Misses and Mohr-Coulomb failure criteria, flow rule, hardening, softening and perfect plasticity, method of characteristics in solving plasticity problems, kinematics and velocity discontinuity, plastic limit analysis, upper- and lower-bound theorems, examples in soil and rock mechanics.

Equivalent Courses: Previous & Current Courses
ME525

Simple Requisites

Course Requisite Requirements

Prerequisite: *Graduate standing or consent of the instructor*

No Requirement Level

ME5026 - Applied Numerical Methods

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Finite element method, finite difference method, boundary element method, particle interaction method, hybrid methods, elastic modeling and analysis, plastic modeling and analysis, constitutive models and rock mass response, rock mass parameter derivation, failure criteria, boundary conditions, 3D modeling and analysis of real problems.

Equivalent Courses: Previous & Current Courses
ME526

Simple Requisites

Course Requisite Requirements

Prerequisite: *Graduate standing or consent of the instructor*

No Requirement Level

ME5028 - Advanced Mine Ventilation

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Standard Letter

Course Description
Prerequisite: Graduate standing or consent of instructorPrinciples and methodology involved in underground space environmental control, ventilation network design, contamination control, fire and explosion modeling, primary and auxiliary ventilation design.

Equivalent Courses: Previous & Current Courses
ME528

Simple Requisites

Course Requisite Requirements

Prerequisite: *Graduate standing or consent of the instructor*

No Requirement Level

ME5031 - Advanced Foundation Design & Analysis

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Advanced foundation design. Design of construction projects including but not limited to highways, airports, landfills, and slopes. Application of geosynthetics in design. Causes and remediation of structural cracking and foundation failures. Legal aspects. Case studies.

Equivalent Courses: Previous & Current Courses
CE4013, CE413, CEE5043, CEE543, ME4013, ME413, ME531

Simple Requisites

Course Requisite Requirements

Prerequisite: *Graduate standing or consent of the instructor*

No Requirement Level

ME5034 - Advanced Drilling & Blasting Engineering

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Application of explosives to rock fragmentation; theory of detonation and mechanisms of rock failure, dynamics, and propagation. The effects of rock properties on breakage. Blasting systems and production blasting techniques used in both surface and underground designs, environmental considerations and regulations. Principles of blasthole drilling and drill performance. Drilling and blasting economics.

Equivalent Courses: Previous & Current Courses
ME534

Simple Requisites

Course Requisite Requirements

Prerequisite: *Graduate standing or consent of the instructor*

No Requirement Level

ME5035 - Stability of Rock Slopes

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Basic mechanics of slope failure. Field exploration and presentation of geological data. Shear strength of rock and rock discontinuities. Groundwater pressure and flow. Plane, wedge, circular, and toppling failure. Improvement of slope stability by drainage and support. Monitoring of slope displacements. Shares lecture with ME 4035, with additional expectations for graduate credit.

Equivalent Courses: Previous & Current Courses
ME535

Simple Requisites

Course Requisite Requirements

Prerequisite: *Graduate standing or consent of the instructor*

No Requirement Level

ME5037 - Designs & Conditions of Underground Openings

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Rock mass classification systems. Empirical design and support selections, stand-up times, block stability, and structural analysis. Elastoplastic strain around openings. Ground reaction and response. Rock bolting and rock-support interaction analysis. Shares lecture with ME 4037, with additional expectations for graduate credit.

Equivalent Courses: Previous & Current Courses
ME4037, ME437, ME537

Simple Requisites

Course Requisite Requirements

Prerequisite: *Graduate standing or consent of the instructor*

No Requirement Level

ME5040 - Computer Applications in Geotechnical Engineering

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Computer programming using MATLAB, image processing and its applications in geotechnical engineering, introduction to finite difference and finite element methods with applications to various problems in geomechanics including steady-state seepage,, consolidation, slope stability, design of foundations, and underground excavations.

Equivalent Courses: Previous & Current Courses
ME540

Simple Requisites

Course Requisite Requirements

Prerequisite: *Graduate standing or consent of the instructor*

No Requirement Level

ME5041 - Ground Improvement

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Principles of ground improvement; mechanical modification including shallow compaction, dynamic deep compaction, vibro-flotation, and compaction by using explosives; hydraulic modification; modification by inclusions and confinement; physical and chemical modification.

Equivalent Courses: Previous & Current Courses
ME541

Simple Requisites

Course Requisite Requirements

Prerequisite: *Graduate standing or consent of the instructor*

No Requirement Level

ME5045 - Vibration Analysis & Control

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Characteristics and analysis of vibrations from mining and construction blasting, heavy equipment and transient loads. Prediction of ground motions, air blast, and frequency; response spectra, structural response and damping. Damage analysis and prediction; probabilistic study of cracking. Human response. Vibration monitoring equipment and control.

Equivalent Courses: Previous & Current Courses
ME545

Simple Requisites

Course Requisite Requirements

Prerequisite: *Graduate standing or consent of the instructor*

No Requirement Level

ME5046 - Detonation Theory

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Development of classical detonation model for full-order detonation of secondary explosives. Ideal versus non-ideal detonation. Burn-rate models for pyrotechnics. The concept of deflagration to detonation transition. (Same as MENG 5046)

Equivalent Courses: Previous & Current Courses
ME546

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Completion Requirement

Prerequisite

Complete ALL of the following Courses:

- MENG5049 - Wave Propagation
  OR ME5049 - Wave Propagation

or consent of instructor and advisor. MENG 5056 is recommended.

Additional Comments:

No Requirement Level

ME5048 - Rock Fracturing & Fragmentation by Explosives

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Fundamentals of dynamic rock strength, mechanisms of fracturing and fragmentation of rocks by explosives. Theoretical treatment of rock stress induced by internal explosion, methods for computer calculations of rock damage. Brief overview of devices, accessories, and methods used in industrial applications of fragmentation.

Equivalent Courses: Previous & Current Courses
ME548

Simple Requisites

Course Requisite Requirements

Prerequisite: *Graduate or senior standing or consent of instructor and advisor*

No Requirement Level

ME5049 - Wave Propagation

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
An in-depth study of the propagation of waves in various media. The derivation and application of the Rankine-Hugoniot jump equations. The concept of the rarefaction wave and various wave interactions. Derivation and application of the Mie-Gruneisen equation of state. The differential form of the conservation equations, as well as some numerical solutions for simple cases. Shares lecture with EXPL 412, with additional expectations for graduate credit. (Same as MENG 5049)

Equivalent Courses: Previous & Current Courses
ME549

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Completion Requirement

Prerequisite

Complete ALL of the following Courses:

- MENG5045 - Introduction to Explosives Engineering
  OR ME5045 - Vibration Analysis & Control
- MATH3035 - Ordinary Differential Equation

or consent of instructor and advisor

Additional Comments:

No Requirement Level

ME5050 - Advanced Explosives Engineering

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
The detonation of non-ideal explosives, equation of state for porous media, shaped charge effect and explosively formed projectiles. Shock compaction of powders, explosive welding and experimental methods used in the evaluation of explosives and their applications. The dynamic fracture of ductile and brittle Materials. (Same as MENG 5050)

Equivalent Courses: Previous & Current Courses
ME550

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Completion Requirement

Prerequisite

Complete ALL of the following Courses:

- MENG5049 - Wave Propagation
  OR ME5049 - Wave Propagation

or consent of instructor and advisor.

Additional Comments:

No Requirement Level

ME5051 - Industrial Minerals

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Study of basic concepts of production and use of industrial minerals in modern society. Emphasis on complex interactions between economics, geology, processing, marketing, and transportation. Selected industrial minerals studies in detail. Several field trips to operations and occurrences. (Same as GEOL 551)

Equivalent Courses: Previous & Current Courses
ME551

Simple Requisites

Course Requisite Requirements

***Prerequisite**: Graduate standing or consent of instructor and advisor.*

No Requirement Level

ME5052 - Applied Explosives Engineering

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Commercial and other applications of explosives. Basics of thermal decomposition, explosion, shock initiation, and detonation. Laboratory methods of performance evaluation of explosives including shock initiation tests and underwater explosion tests. Techniques of forming and shaping of detonation waves. Some unusual applications of explosives in creating large magnetic fields.

Equivalent Courses: Previous & Current Courses
ME552

Simple Requisites

Course Requisite Requirements

***Prerequisite**: Graduate standing or consent of instructor and advisor.*

No Requirement Level

ME5053 - Computer Modeling-Detonations

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Introduction to hydrodynamic modeling applied to explosives. Numerical methods for modeling shock physics, detonation, and material response. Finite difference, finite element and smoothed particle hydrodynamic methods, equation of state and strength models, and numerical fracture and fragmentation. (Same as MENG 5053)

Equivalent Courses: Previous & Current Courses
ME553

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Completion Requirement

Prerequisite

Complete ALL of the following Courses:

- MENG5049 - Wave Propagation
  OR ME5049 - Wave Propagation

or consent of instructor and advisor. MENG 5017/ME 5017 is recommended.

Additional Comments:

No Requirement Level

ME5061 - Advanced Topics in Engineering Geology

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Study of special topics in geologic hazards, site characterization, and related fields of interest in engineering geology.

Equivalent Courses: Previous & Current Courses
ME561

No Requirements

ME5062 - International Mining Field Trip

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
3

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Field trip in conjunction with the Student Chapter of the Society of Economic Geologists to a geologic and mining interest in a foreign country, usually Chile. Seminar-style class with a required term paper. Students are responsible for preparation of a field-trip guidebook, to be used by students and professionals participating in the field trip.

Equivalent Courses: Previous & Current Courses
ME562

No Requirements

ME5063 - Field Studies-Hydrothermal Alterations

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
A field and lab-based course emphasizing the geochemistry and mineralogy of hydrothermal ore deposits, with substantial hands-on exercises and field-based descriptive work. Lab exercises utilize thin section and polished section samples from hydrothermal ore deposit suites to demonstrate variations in protolith and alteration mineralogy, and result in the production of professional-style reports, interpreting the geochemical and exploration significance of the alteration assemblages observed. Field trips to mineral deposits emphasize the areal extent of hydrothermal alteration associated with porphyry, epithermal and skarn-style ore deposits.

Equivalent Courses: Previous & Current Courses
ME563

Simple Requisites

Course Requisite Requirements

***Prerequisites**: Graduate standing or consent of instructor and advisor*

No Requirement Level

ME5065 - Mine Waste Characterization

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Environmental aspects of mine waste Materials. Geologic, geochemical, and engineering evaluation of tailings, waste rock dumps, and processing chemicals. Sampling and mineralogic analysis of mine wastes. Characterization of physical, chemical, and biological environments surrounding mine sites. Current environmental and mining regulations. Field trips, laboratory studies, and case histories.

Equivalent Courses: Previous & Current Courses
ME565

No Requirements

ME5066 - Mine Waste Management & Control

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Control of wastewater and solid pollutants from mining and processing of minerals. Design of facilities to control and manage waste streams resulting from mine and mill operations. Mine land reclamation and closure design. Design projects and field trips.

Equivalent Courses: Previous & Current Courses
ME566

Simple Requisites

Course Requisite Requirements

Prerequisite Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- ME5065 - Mine Waste Characterization

Additional Comments:

No Requirement Level

ME5070 - Advanced Topics in Explosives Engineering

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Study of special topics in the application of explosives in the fields of rock blasting, structure response to vibrations, and ordnance.

Equivalent Courses: Previous & Current Courses
ME570

Simple Requisites

Course Requisite Requirements

***Prerequisite**: Consent of instructor*

No Requirement Level

ME5071 - Advanced Topics in Mineral Eng

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
3

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, Standard Letter

Equivalent Courses: Previous & Current Courses
ME571

No Requirements

ME5072 - Graduate Seminar

General

Credit Hrs

Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Presentation and discussion of research ideas, including presentation of published papers.

Equivalent Courses: Previous & Current Courses
ME572

Simple Requisites

Course Requisite Requirements

***Prerequisite**: Graduate standing*

No Requirement Level

ME5081 - Directed Study

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
12

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, Standard Letter

Equivalent Courses: Previous & Current Courses
ME581

No Requirements

ME5090 - Independent Study

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
12

Credit Hours Operator:
TO

Grade Modes
Pass/Fail, No Report

Course Description
Independent research organized and conducted by the student under the direction of the student's advisor. Written final report and oral presentation required.

Equivalent Courses: Previous & Current Courses
ME590

No Requirements

ME5091 - Thesis

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
12

Grade Modes
Pass/Fail, No Report

Credit Hours Operator:
TO

Equivalent Courses: Previous & Current Courses
ME591

No Requirements

ME5095 - Dissertation

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
12

Grade Modes
Pass/Fail, No Report

Credit Hours Operator:
TO

Equivalent Courses: Previous & Current Courses
ME595

No Requirements

Optics Department

Optical Science and Engineering

Offered: *Minor in Optical Science and Engineering*

Students in the minor program in Optical Science and Engineering receive a broad introduction to optics as well as to specialized applications related to optical research activities on campus. The areas of research at New Mexico Tech include adaptive optics, interferometry, wavefront propagation, atmospheric turbulence, polarimetry and applications to directed energy, astronomy and communications.

The prime optical research site at New Mexico Tech is the Magdalena Ridge Observatory (MRO), a dedicated astronomical observatory that will support a large optical interferometer and a 2.4m single telescope. This facility provides a world-class facility for scientific research in optics, optical controls and astronomical science applications. On campus, the Etscorn Observatory provides access to commercial telescopes and imaging cameras.

A Tech student may earn a minor in Optical Science and Engineering as part of a Bachelor of Science degree. While fulfilling the requirements for a Bachelor of Science degree the student must complete a minimum of ten (10) hours of core optics courses, three (3) hours of electromagnetic theory, and at least five (5) additional hours from approved optional courses.

Programs

Optics (minor)

[Program Overview]

Program Title
Minor in Optical Science and Engineering

Department(s)
Electrical Engineering, Optics

Program Description
Students in the minor program in Optical Science and Engineering receive a broad introduction to optics as well as to specialized applications related to optical research activities on campus. The areas of research at New Mexico Tech include adaptive optics, interferometry, wavefront propagation, atmospheric turbulence, polarimetry and applications to directed energy, astronomy and communications.
The prime optical research site at New Mexico Tech is the Magdalena Ridge Observatory (MRO), a dedicated astronomical observatory that will support a large optical interferometer and a 2.4m single telescope. This facility provides a world-class facility for scientific research in optics, optical controls and astronomical science applications. On campus, the Etscorn Observatory provides access to commercial telescopes and imaging cameras.
A Tech student may earn a minor in Optical Science and Engineering as part of a Bachelor of Science degree. While fulfilling the requirements for a Bachelor of Science degree the student must complete a minimum of ten (10) hours of core optics courses, three (3) hours of electromagnetic theory, and at least five (5) additional hours from approved optional courses.

Simple Requisites

Program Requirements

Minor Requirements
Type
Completion Requirement

Minor Requirements

Complete ALL of the following Courses:

- OPTC3000 - Introduction to Optics
- OPTC4000 - Mathematical/Computational Opt
- OPTC4010 - Advance Optics

One of:

Complete at least 1 of the following courses:

- PHYS3033 - Electricity & Magnetism
- EE3032 - Electricity and Magnetism
- MTLS4047 - Optical Materials

Two of:

Complete at least 2 of the following courses:

- EE3051 - Microcontrollers
- EE3024 - Semiconductor Theory & Devices
- EE4031 - Electrodynamics
- MTLS4041 - X-Ray Diffraction
- MTLS4052 - Solid State Physics for Engineers
- PHYS3034 - Radiation & Optics
- PHYS4044 - Solid-State Physics
- OPT4020 - Interferometry & Optical Test (Inactive)
- OPT4030 - Thin Films (Inactive)
- OPT4060 - Optical Laboratory (Inactive)
- OPT4090 - Special Topics in Optics (Inactive)

Additional Comments:

Institute General Requirements

No Requirement Level

Courses

OPTC3000 - Introduction to Optics

General

Credit Hrs
Credit Hrs:
4

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisites: PHYS 1320 or 132; MATH 2532An introduction to geometrical optics, aberration theory, image formation, Fourier optics, radiometry and photometry and engineering practice in working with optical systems. The course will also introduce optical fabrication concepts and optical coatings.

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:
- PHYS1320 - g3:Calculus-based Physics II
  OR PHYS132 - General Physics II (Inactive)
- MATH2532 - Calculus III

Additional Comments:

No Requirement Level

OPTC4000 - Mathematical/Computational Opt

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisites: OPT 300; EE 271 or MATH 2420A mathematical approach to optics introducing standard aberration and optical calculation techniques. Topics include paraxial optics, polarization matrices, Seidel aberrations, ray tracing and wavefront propagation through Materials. Students will be introduced to modern ray tracing tools.

Simple Requisites

Course Requisite Requirements

No Requirement Level

Prerequisites
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:
- OPTC3000 - Introduction to Optics
  OR OPT300 - Introduction to Optics (Inactive)
- EE271 - Mathematical Engineering
  OR MATH2420 - Applied Linear Algebra

Additional Comments:

OPTC4010 - Advance Optics

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: OPT 400Topics include image evaluation, wavefront propagation, mode analysis, interferometry, spectrometers, optical testing and multilayer dielectric coatings.

Simple Requisites

Course Requisite Requirements

No Requirement Level

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:
- OPTC4000 - Mathematical/Computational Opt
  OR OPT400 - Mathematical/Computational Opt (Inactive)

Additional Comments:

Petroleum Engineering Department

- ***Professor:*** *Nguyen*
- ***Associate Professors:*** *Ampomah, Chen, Rahnema (Chair of the Department)*
- ***Assistant Professor:*** *Esmaeilpour*
- ***Emeritus:*** *Engler*
- ***Adjuncts:*** *Al-Safran, Balch, Cather, Kelly, Seright, Yu, Zhang*

Degrees Offered: *B.S. in Petroleum and Natural Gas Engineering, M.S. and Ph.D. in Petroleum Engineering*

Petroleum and natural gas engineering is a broad-based discipline primarily concerned with the development, exploration, and conservation of oil and gas resources. Petroleum and natural gas engineers plan and supervise drilling and well-completion programs, design and select drilling and production equipment, optimize the production of oil and natural gas, estimate reserves, and manage oil and gas properties.

The oil and gas industry is a progressive and highly technical business, which offers opportunities to young engineers, both in the United States and abroad. A petroleum and natural gas engineering graduate may obtain a responsible position with an oil company, establish a consulting business, or become an independent oil producer.

Program Educational Objectives

The mission of the Petroleum Engineering program is to prepare students for the challenges of such a diversified career by providing students with the necessary skills to achieve success in their future profession. To achieve this mission, the following educational objectives are emphasized:

- Our graduates will use their highly competitive skills in a range of engineering career paths to become leaders in the energy industry.
- Our graduates will seek out continuing education opportunities, striving for technical excellence
- Our graduates will leverage evolving technology through collaborative engagement in both industry workshops and professional societies.

By graduation, a student will be capable of solving a variety of petroleum engineering problems and be able to integrate petroleum engineering concepts to a practical design project.

Student Outcomes for Undergraduate Program in Petroleum Engineering

Graduates of the Bachelor of Science in Petroleum Engineering program will have demonstrated

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3. An ability to communicate effectively with a range of audiences
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Programs

G.C. in Geothermal Energy

[Program Overview]

Program Title
Graduate Certificate in Geothermal Energy

Department(s)
Petroleum Engineering, E&ES

Program Description
The Graduate Certificate in Geothermal program is created in partnership between the Petroleum and Natural Gas Engineering and Earth and Environmental Science department. This is a 15 credit program, desinged for working professionals, that may be completed in as short as 12-months . Students must complete all four courses within one of the two tracks, and one addtional course from the elective list to meet the 15 credit requirement. All coursework will be offered in a hybrid format, allowing for both in online and in-person instruction.

Simple Requisites

Program Requirements
Track 1 - Ground Source Heat Pumps/Direct Use/Thermal Storage

MENG 5075, Advanced Engineering Mathematics (3 Cred.)

MENG 5078, Advanced Thermodynamics (3 Cred.)

MENG 5079, Advanced Heat Transfer (3 Cred.)

HYDR 5011, Groundwater Hydrology (3 Cred.)

Track 2 - Hydrothermal/Engineered Geothermal Systems

PETR 5046, Advanced Formation Evaluation (3 Cred.)

PETR 5065, Completion for Geothermal Wells (3 Cred.)

PETR 5066, Geothermal Reservoir Simulation (3 Cred.)

PETR 5067, Thermal Recovery (3 Cred.)

The requirements for the Graduate Certificate in Geothermal
Type
Completion Requirement

Track 1 Courses:

Complete ALL of the following Courses:

- MENG5075 - Advanced Engineering Mathematics
  AND MENG5078 - Advanced Thermodynamics
  AND MENG5079 - Advanced Heat Transfer
  AND HYDR5011 - Groundwater Hydrology

Track 2 Courses

Complete ALL of the following Courses:

- PETR5046 - Advanced Formation Evaluation
  AND PETR5065 - Completion for Geothermal Wells
  AND PETR5066 - Geothermal Reservoir Simulation
  AND PETR5067 - Thermal Recovery

Complete at least 3 credits from the following:

Earn at least 3 credits from the following:

- HYDR5016 - Geofluids
  OR HYDR5020 - Data-Driven Modeling for Science & Engineering
  OR HYDR5055 - Rock Fracture in Geology Settings
  OR HYDR5007 - Hydrogeochemistry
  OR PETR4013 - Well Design
  OR PETR5045 - Advanced Production Design

Additional Comments:

Institute General Requirements

No Requirement Level

[Learning Outcomes]

Outcome
1. Learn to reason well and to evaluate and apply information

Outcome
2. Develop analytical and quantitative skills for competence in science and math

Outcome
3. Communicate to different audiences in multiple forms

Outcome
4. Exercise their role as members of diverse societies and cultures

Outcome
5. Learn responsible values and ethics for their professional lives

Outcome
6. Gain expertise in their chosen field of study

Petroleum Engineering (minor)

[Program Overview]

Program Title
Minor in Petroleum Engineering

Department(s)
Petroleum Engineering

Program Description
Minimum of 18 credit hours required to obtain a minor in Petroleum Engineerinng

Simple Requisites

Program Requirements

Minimum credit hours required—18

Minor Requirements
Type
Completion Requirement

The following courses are required

Complete ALL of the following Courses:

- PETR245 - Petroleum Fluids
- PETR3011 - Drilling Engineering
  AND PETR3011L - Drilling Mud Lab
- PETR3045 - Reservoir Engineering I
  AND PETR3045L - Reservoir Engineering Lab
- PETR4024 - Production Engineering
  AND PETR4024L - Production Engineering Lab

Complete at least one of these

Complete at least 1 of the following courses:

- PETR4013 - Well Design
- PETR4045 - Reservoir Engineering II

Additional Comments:

Institute General Requirements

See the NMT Institute Requirements .

No Requirement Level

BS-PETR - B.S. in Petroleum and Natural Gas Engineering

[Program Overview]

Program Title
Bachelor of Science in Petroleum and Natural Gas Engineering

Department(s)
Petroleum Engineering

Degree & Program Code
BS-PETR

Program Description
Petroleum and natural gas engineering is a broad-based discipline primarily concerned with the development, exploration, and conservation of oil and gas resources. Petroleum and natural gas engineers plan and supervise drilling and well-completion programs, design and select drilling and production equipment, optimize the production of oil and natural gas, estimate reserves, and manage oil and gas properties.
The oil and gas industry is a progressive and highly technical business, which offers opportunities to young engineers, both in the United States and abroad. A petroleum and natural gas engineering graduate may obtain a responsible position with an oil company, establish a consulting business, or become an independent oil producer.

Simple Requisites

Program Requirements
Minimum credit hours required—134

In addition to the General Education and Institute Core Curriculum, the following courses are required:

Required Courses
Type
Completion Requirement

Petroleum courses

Complete ALL of the following Courses:

- PETR101 - Intro to Petroleum Engineering
- PETR111 - Computer Applications in Petroleum Engineering
- PETR245 - Petroleum Fluids
  AND PETR245L - Petroleum Fluid Laboratory
- PETR3011 - Drilling Engineering
  AND PETR3011L - Drilling Mud Lab
- PETR3045 - Reservoir Engineering I
  AND PETR3045L - Reservoir Engineering Lab
- PETR3070 - Formation Evaluation
- PETR4013 - Well Design
- PETR4024 - Production Engineering
  AND PETR4024L - Production Engineering Lab
- PETR4025 - Well Completion
  AND PETR4025L - Well Completions Lab
- PETR4045 - Reservoir Engineering II
- PETR4050 - Well Performance
- PETR4070 - Applied Reservoir Simulation
- PETR4071 - Capstone Design I
- PETR4072 - Capstone Design II

Engineering Science courses

Complete ALL of the following Courses:

- ES201 - Statics
- ES216 - Engineering Fluid Mechanics
- ES3002 - Mechanics of Materials
- ES3003 - Engineering Dynamics
- ES3016 - Engineering Economics
- ES3047 - Thermodynamics

Math Requirement

Complete ALL of the following Courses:

- MATH2532 - Calculus III
- MATH3035 - Ordinary Differential Equation

Geology Requirement

Complete ALL of the following Courses:

- GEOL1110 - Physical Geology
  AND GEOL1110L - Physical Geology Lab
- GEOL2330 - Earth's Crust: Mantle, Processes, & Dynamics
- GEOL4060 - Subsurface & Petroleum Geology

Petroleum Electives

Petroleum Electives: Three credit hours of upper-division technical and petroleum and natural gas engineering electives are selected by the student with the faculty advisor's approval to fulfill the requirement of 134 credit hours needed for graduation.

Minimum Grade

Petroleum and natural gas engineering majors must obtain a C or better in all petroleum engineering courses to graduate.

Only courses in Areas 4, 5, and 6 of the general education core curriculum requirements may be taken on an S/U basis.

Additional Comments:

Institute General Requirements

General Education Requirement for Bachelor of Science
Type
Completion Requirement

Area 1: Communications Requirement for Bachelor of Science

Complete ALL of the following Course Sets:

- Area 1: Communications (BS Degree) (9 credits)

Area 2: Mathematics and Quantitative Reasoning Requirements for Bachelor of Science

Complete ALL of the following Course Sets:

- Area 2: Mathematics (BS Degree) (8 credits)

Area 3: Science Requirements for a Bachelor of Science

Complete ALL of the following Course Sets:

- Area 3: Science (BS Degree) (18 credits)

Area 4: Social and Behavioral Science Requirements for a Bachelor of Science

Complete ALL of the following Course Sets:

- Area 4: Social and Behavioral Science (BS or BGS Degree) (6 credits)

Area 5: Humanities Course Requirements for a Bachelor of Science

Complete ALL of the following Course Sets:

- Area 5: Humanities (BS or BGS Degree) (6 credits)

Area 6: Creative & Fine Art Requirement for a Bachelor of Science

Complete ALL of the following Course Sets:

- Area 6: Creative and Fine Arts (BS, BA, or BGS Degree) (3 credits)

Area 7: Additional Humanities/Social Science Requirement for a Bachelor of Science

Complete ALL of the following Course Sets:

- Area 7: Additional Courses from Areas 4, 5, 6 (BS, BA, or BGS Degree) (3 credits)

Additional Comments:

No Requirement Level

[Learning Outcomes]

Outcome
1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics

Outcome
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors

Outcome
3. An ability to communicate effectively with a range of audiences

Outcome
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

Outcome
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives

Outcome
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions

Outcome
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

[Sample 4-Year Curriculum Plan(s)]

Degree Map Name
Bachelor of Science in Petroleum and Natural Gas Engineering Course Map
Total Degree Map Credits
134
Degree Map Effective Catalog Year
2025 -

Year	Semester	Actual Credits
Year 1	Fall	16

Course
- PETR101 - Intro to Petroleum Engineering

Actual Credits 1

Course
- MATH1510 - g2:Calculus I

Actual Credits 4

Course
- CHEM1215 & CHEM1215L: g:General Chemistry I and Lab

Actual Credits 4

Course
- ENGL1110 - g1:Composition I

Actual Credits 3

Course
- GEOL1110 & GEOL1110L: Physical Geology and Lab

Actual Credits 4

Year	Semester	Actual Credits
Year 1	Spring	16

Course
- MATH1520 - g2:Calculus II

Actual Credits 4

Course
- PETR111 - Computer Applications in Petroleum Engineering

Actual Credits 1

Course
- PHYS1310 & PHYS1310L: g:Calculus-Physics I and Lab

Actual Credits 5

Course
- ENGL1120 - g1:Composition II

Actual Credits 3

Course
- Humanities/Social Science

Actual Credits 3

Year	Semester	Actual Credits
Year 2	Fall	16

Course
- MATH2532 - Calculus III

Actual Credits 4

Course
- CHEM1225 & CHEM1225L: g: General Chemistry II and Lab

Actual Credits 4

Course
- PHYS1320 & PHYS1320L: g:Calculus-Based Physics II and Lab

Actual Credits 5

Course
- ES201 - Statics

Actual Credits 3

Year	Semester	Actual Credits
Year 2	Spring	19

Course
- PETR245 & PETR245L: Petroleum Fluids and Lab

Actual Credits 4

Course
- MATH3035 - Ordinary Differential Equation

Actual Credits 3

Course
- ES216 - Engineering Fluid Mechanics

Actual Credits 3

Course
- ES3002 - Mechanics of Materials

Actual Credits 3

Course
- ES3047 - Thermodynamics

Actual Credits 3

Course
- GEOL2330 - Earth's Crust: Mantle, Processes, & Dynamics

Actual Credits 3

Year	Semester	Actual Credits
Year 3	Fall	17

Course
- PETR3011 & PETR3011L: Drilling Engineering and Lab

Actual Credits 4

Course
- PETR3045 & PETR3045L: Reservoir Engineering I and Lab

Actual Credits 4

Course
- ES3003 - Engineering Dynamics

Actual Credits 3

Course
- ENGL3041 - i1:Technical Writing

Actual Credits 3

Course
- Humanities/Social Science

Actual Credits 3

Year	Semester	Actual Credits
Year 3	Spring	18

Course
- PETR3070 - Formation Evaluation

Actual Credits 3

Course
- PETR4050 - Well Performance

Actual Credits 3

Course
- PETR4013 - Well Design

Actual Credits 3

Course
- PETR4045 - Reservoir Engineering II

Actual Credits 3

Course
- GEOL4060 - Subsurface & Petroleum Geology

Actual Credits 3

Course
- Humanities/Social Science

Actual Credits 3

Year	Semester	Actual Credits
Year 4	Fall	16

Course
- PETR4024 & PETR4024L: Production Engineering and Lab

Actual Credits 4

Course
- PETR4070 - Applied Reservoir Simulation

Actual Credits 3

Course
- PETR4071 - Capstone Design I

Actual Credits 3

Course
- ES3016 - Engineering Economics

Actual Credits 3

Course
- Humanities/Social Science

Actual Credits 3

Year	Semester	Actual Credits
Year 4	Spring	16

Course
- PETR4025 & PETR4025L: Well Completions and Lab

Actual Credits 4

Course
- PETR4072 - Capstone Design II

Actual Credits 3

Course
- PETR Elective (Generic)

Actual Credits 3

Course
- Social Science/Humanities/Fine & Creative Arts Requirements

Actual Credits 3

Course
- Humanities/Social Science

Actual Credits 3

MS-PETR - M.S. in Petroleum Engineering

[Program Overview]

Program Title
Master of Science in Petroleum Engineering

Department(s)
Petroleum Engineering

Degree & Program Code
MS-PETR

Program Description
The Petroleum Engineering program offers two options for a Master of Science Degree—with thesis or independent study—and a Doctor of Philosophy degree. All graduate students are required to register for and attend the Graduate Seminar (PETR 570) each semester it is offered. Exceptions may be made only with approval of the student's advisor and the department chair.
The Ph.D. and master's programs are open to students with degrees in fields other than petroleum and natural gas engineering. A special course program will

be tailored for those students who have not completed a B.S. in petroleum and natural gas engineering to provide an appropriate background. Prospective students are encouraged to visit www.nmt.edu/~petro for more details

[Learning Outcomes]

Outcome
1. Demonstrate competence in undergraduate fundamentals in petroleum engineering

Outcome
2. Learn advanced concepts in two of the three areas of Drilling and completions, production, and reservoir engineering/evaluation

Outcome
3. Learn to formulate and complete a research project and document results in a thesis (for thesis option only)

Outcome
4. Learn additional knowledge in one specific area and document work in an independent study report (for independent study option only)

Outcome
5. Effectively communicate

PHD-PETR - Ph.D. in Petroleum Engineering

[Program Overview]

Program Title
PHD--PETR

Department(s)
Petroleum Engineering

Degree & Program Code
PHD-PETR

Program Description
In order to be admitted to the Ph.D. program, a student must meet the requirements as set forth by the Graduate Program and have completed an M.S. degree with thesis.

Simple Requisites

Program Requirements
In order to be admitted to the Ph.D. program, a student must meet the requirements as set forth by the Graduate Program and have completed an M.S. degree with thesis.

A minimum of 60 credit hours past the master's degree is required. New Mexico Tech courses taken to satisfy this requirement must have content different from courses applied to previous degrees. In addition to the department administered preliminary examination, the student is required to successfully complete a candidacy examination and a defense of the dissertation administered by the student's advisory committee. (See the **Petroleum Engineering Graduate Programs** page for more detailed information.)

Doctor of Philosophy in Petroleum Engineering
Type
Completion Requirement

The 60-credit requirements should be distributed as follows:

- Minimum 30 credits regular* courses and Directed Study (581).
- Minimum 12 credits of regular* 5000-level petroleum engineering courses.
- Maximum 9 credits of Directed Study (PETR 5081); maximum 6 credits from the same professor.
- Minimum 6 credits from outside of petroleum engineering in either engineering, engineering management, or science disciplines. Students with degrees in disciplines other than Petroleum engineering may take an additional 6 credits of petroleum engineering courses instead.
- Minimum 24 credits and maximum 30 credits of Dissertation (PETR 5095).
- Registration in Graduate Seminar (PETR 5070) is required.

* Courses are considered regular only if a course title and scheduled meeting time are specified and the course is open to all qualified students.

Credit requirements

Additional Comments:

Institute General Requirements

No Requirement Level

[Learning Outcomes]

Outcome
1. Demonstrate competence in undergraduate fundamentals in petroleum engineering

Outcome
2. Learn advanced concepts in two of the three areas of Drilling and completions, production, and reservoir engineering/evaluation

Outcome
3. Learn to formulate and complete a research project and document results in a thesis (for thesis option only)

Outcome
4. Learn additional knowledge in one specific area and document work in an independent study report (for independent study option only)

Outcome
5. Effectively communicate

Outcome
6. Apply analytical methods, critical thinking, and creativity toward research (for PhD program only)

Courses

PETR101 - Intro to Petroleum Engineering

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Introduction to energy supply and demand. Define reservoir, drilling and production aspects of petroleum engineering. Included are professionalism and ethics in the work environment.

Equivalent Courses: Previous & Current Courses
PETR1001

No Requirements

PETR111 - Computer Applications in Petroleum Engineering

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Development of algorithms in Excel TM to solve petroleum engineering problems: gas z-factor, static and flowing gradients, pump design, well testing functions and others.

Equivalent Courses: Previous & Current Courses
PETR1011

Simple Requisites

Course Requisite Requirements

Corequisite
Type
Corequisite

Complete ALL of the following Courses:
- MATH1240 - Pre-Calculus

Additional Comments:

No Requirement Level

PETR111L - Computer Apps Petro Eng Lab

General

Credit Hrs
Credit Hrs:
0

Credit Hours Max:
1

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Corequisite for PETR 111

No Requirements

PETR245 - Petroleum Fluids

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Characteristics and properties of reservoir fluids. Representation of fluid property data for computer uses with models and regression.

Equivalent Courses: Previous & Current Courses
PETR2045, PETR2045D

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Complete ALL of the following Courses:
- CHEM1225 - g3:General Chemistry II
- MATH1520 - g2:Calculus II

Additional Comments:

Corequisite
Type
Corequisite

Complete ALL of the following Courses:
- PETR111 - Computer Applications in Petroleum Engineering

Additional Comments:

No Requirement Level

PETR245L - Petroleum Fluid Laboratory

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Characterize pressure, volume and temperature relationships using virtual simulation and Laboratory measurement of reservoir fluid properties.

Equivalent Courses: Previous & Current Courses
PETR2045L

Simple Requisites

Course Requisite Requirements

Corequisite
Type
Corequisite

Complete ALL of the following Courses:
- PETR245 - Petroleum Fluids

Additional Comments:

No Requirement Level

PETR311 - Drilling Engineering

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Equivalent Courses: Previous & Current Courses
PETR3011

No Requirements

PETR311L - Drilling Mud Lab

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Equivalent Courses: Previous & Current Courses
PETR3011L

No Requirements

PETR345 - Reservoir Engineering I

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Equivalent Courses: Previous & Current Courses
PETR3045

No Requirements

PETR345L - Reservoir Engineering Lab

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Equivalent Courses: Previous & Current Courses
PETR3045L

No Requirements

PETR424 - Production Engineering

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Equivalent Courses: Previous & Current Courses
PETR4024

No Requirements

PETR424L - Production Engineering Lab

General

Credit Hrs

Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Equivalent Courses: Previous & Current Courses
PETR4024L

No Requirements

PETR470 - Applied Reservoir Simulation

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Equivalent Courses: Previous & Current Courses
PETR4070

No Requirements

PETR471 - Capstone Design I

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Equivalent Courses: Previous & Current Courses
PETR4071

No Requirements

PETR556 - Advanced Drilling

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Equivalent Courses: Previous & Current Courses
PETR5056

No Requirements

PETR570 - Graduate Seminar

General

Credit Hrs

Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Equivalent Courses: Previous & Current Courses
PETR5070

No Requirements

PETR572 - Advanced Topics

General

Credit Hrs

Credit Hrs:
2

Credit Hours Max:
3

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Special topics in petroleum and natural gas engineering.

Equivalent Courses: Previous & Current Courses
PETR5072

No Requirements

PETR590 - Independent Study

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
12

Credit Hours Operator:
TO

Grade Modes
Pass/Fail, No Report

Equivalent Courses: Previous & Current Courses
PETR5090

No Requirements

PETR3011 - Drilling Engineering

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: ES 216Corequisite: ES 3002Introduction to drilling engineering through the study of rig equipment functions. Engineering analysis of drill string buoyancy, drilling mud circulation and flow hydraulics, drill string components, and well control. Preliminary discussion of pore and fracture pressure gradients. Well plan profile including drill bit selection, drilling fluid selection, drill string component section, and well control.

Equivalent Courses: Previous & Current Courses
PETR311

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:
- ES216 - Engineering Fluid Mechanics

Additional Comments:

Corequisite
Type
Corequisite

Corequisite

Complete ALL of the following Courses:
- ES3002 - Mechanics of Materials

Additional Comments:

No Requirement Level

PETR3011L - Drilling Mud Lab

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Corequisite: PETR 3011Basic drilling operations, drilling hydraulics and well control operation using a drillrig simulator. Standard API measurements and design of the properties of drilling fluids.

Equivalent Courses: Previous & Current Courses
PETR311L

Simple Requisites

Course Requisite Requirements

Corequisite
Type
Corequisite

Corequisite

Complete ALL of the following Courses:
- PETR3011 - Drilling Engineering

Additional Comments:

No Requirement Level

PETR3045 - Reservoir Engineering I

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: ES 216Corequisites: PETR 245Properties of reservoir rocks and homogeneous and multiphase fluid flow in reservoirs. Capillary phenomena, relative permeability, compressibility, and fluid saturation distribution. material balances. Statistical analysis using regression, probability concepts, and computer applications to reservoir data.

Equivalent Courses: Previous & Current Courses
PETR345

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Complete ALL of the following Courses:
- ES216 - Engineering Fluid Mechanics

Additional Comments:

Corequisite
Type
Corequisite

Complete ALL of the following Courses:
- PETR245 - Petroleum Fluids

Additional Comments:

No Requirement Level

PETR3045L - Reservoir Engineering Lab

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Corequisite: PETR 3045Laboratory measurement of reservoir fluid/rock properties, core flood tests and experimental data analysis.

Equivalent Courses: Previous & Current Courses
PETR345L

Simple Requisites

Course Requisite Requirements

Corequisite
Type
Corequisite

Complete ALL of the following Courses:
- PETR3045 - Reservoir Engineering I

Additional Comments:

No Requirement Level

PETR3070 - Formation Evaluation

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Introduction to logging tool principles and operation. Evaluation of reservoir properties and interpretation of open hole well logs. Multiwell correlations with application to volumetric calculations. Lab exercises on reservoir mapping and well log case studies. (Same as GEOL 370)

Equivalent Courses: Previous & Current Courses
PETR370

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Course Requirements

Complete ALL of the following Courses:
- PHYS1320 - g3:Calculus-based Physics II
- PETR3045 - Reservoir Engineering I

Additional Comments:

No Requirement Level

PETR3070L - Formation Evaluation Lab

General

Credit Hrs
Credit Hrs:
0

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Corequisite for PETR 3070

No Requirements

PETR4011 - Advanced Drilling

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Drilling operations technology with an emphasis on field practices and techniques. Advanced topics including drilling fluids rheology and hydraulics. Mechanics of BHA in vertical and directional holes. Directional well trajectory predictions and design. Modeling of drag and torque. Dynamics of drill string, wellbore measurements, deep water drilling and heat transfer in wells.

Equivalent Courses: Previous & Current Courses
PETR411

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Course Requirements

Complete ALL of the following Courses:
- PETR3011 - Drilling Engineering

or consent of instructor and advisor

Additional Comments:

No Requirement Level

PETR4013 - Well Design

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Details of the development of pore and fracture pressure gradients. Casing depths using pore and fracture pressure gradients plots. Review of engineering analysis for casing string design. Selection of casing, cement class and well cementing equipment and methods. Development of detailed well plan for drilling and completion of oil and gas wells. Directional and horizontal drilling and drillstring design.

Equivalent Courses: Previous & Current Courses
PETR413

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Complete ALL of the following Courses:
- PETR3011 - Drilling Engineering

Additional Comments:

No Requirement Level

PETR4024 - Production Engineering

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: PETR 3045, ES 216Elements of producing oil and gas wells. Flow of single and multiphase fluids in vertical and horizontal pipes. Choke performance. Nodal analysis systems approach to well production performance optimization. Production decline analysis using exponential, harmonic, and hyperbolic decline curves applied to actual well production data. Introduction to artificial lift techniques.

Equivalent Courses: Previous & Current Courses
PETR424

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Course Requirements

Complete ALL of the following Courses:
- PETR3045 - Reservoir Engineering I
- ES216 - Engineering Fluid Mechanics

Additional Comments:

No Requirement Level

PETR4024L - Production Engineering Lab

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Corequisite: PETR 4024Basic data acquisition system, experimental determination of frictional pressure losses in pipes, comparison of experimental data with published engineering fluid flow data, artificial lift methods, and multiphase flow in wellbores.

Equivalent Courses: Previous & Current Courses
PETR424L

Simple Requisites

Course Requisite Requirements

Corequisite
Type
Corequisite

Complete ALL of the following Courses:
- PETR4024 - Production Engineering

Additional Comments:

No Requirement Level

PETR4025 - Well Completion

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Well completion methods. Design and selection of tubing; perforating performance; sand, water and gas control. Introduction to stimulation operations, selection of stimulation techniques, design of acid and hydraulic fracture treatments.

Equivalent Courses: Previous & Current Courses
PETR425

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Complete ALL of the following Courses:
- PETR3045 - Reservoir Engineering I

Additional Comments:

Corequisite
Type
Corequisite

Complete ALL of the following Courses:
- PETR4013 - Well Design

Additional Comments:

No Requirement Level

PETR4025L - Well Completions Lab

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
The composition, testing, and design of cement slurries and fracturing fluids. Application of hydraulic fracture design using stimulation software.

Equivalent Courses: Previous & Current Courses
PETR425L

No Requirements

PETR4040 - Directional Drilling & Innovative Methods

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Two and three dimensional directional well path design; horizontal drilling; mathematical model deflection tool analysis; 2D and 3D vector application; down-hole motors and MWD techniques; underbalanced drilling; casing while drilling; coiled-tubing drilling.

Equivalent Courses: Previous & Current Courses
PETR440

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:
- PETR3011 - Drilling Engineering

Additional Comments:

No Requirement Level

PETR4041 - Natural Gas Reservior Engineering

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Estimation of gas reserves for dry and gas condensate reservoirs. Evaluation of deliverability tests and subsequent development of flow equations. Determination of gas recovery from unconventional reservoirs; e.g., coalbed methane, tight gas sands, shales. Strategies for gas field development. Additional work is required at graduate level.

Equivalent Courses: Previous & Current Courses
PETR441

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Complete ALL of the following Courses:
- PETR3045 - Reservoir Engineering I

Additional Comments:

No Requirement Level

PETR4045 - Reservoir Engineering II

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Advanced reservoir engineering principles and applications including material balances, decline curve analysis, unsteady flow in porous media, partial penetration, water influx, reservoir heterogeneity, fractional flow, and frontal advance.

Equivalent Courses: Previous & Current Courses
PETR445

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Complete ALL of the following Courses:
- PETR3045 - Reservoir Engineering I

Additional Comments:

No Requirement Level

PETR4046 - Improved Petroleum Recovery

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Water flooding techniques. Water handling. Injection and production well patterns. Productive techniques for economic operations. Introduction to enhanced oil recovery; polymer, surfactant, thermal and miscible flooding.

Equivalent Courses: Previous & Current Courses
PETR446

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Complete ALL of the following Courses:
- PETR4046 - Improved Petroleum Recovery

or consent of instructor and advisor

Additional Comments:

No Requirement Level

PETR4050 - Well Performance

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Diffusivity equation and solutions for slightly compressible liquids; dimensionless variables; type curves; applications of solutions to buildup, drawdown, multi-rate, interference, pulse and deliverability tests; extensions to multiphase flow; analysis of hydraulically fractured wells, production data analysis, rate normalized pressure analysis.

Equivalent Courses: Previous & Current Courses
PETR450

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Complete ALL of the following Courses:
- PETR3045 - Reservoir Engineering I
- MATH3035 - Ordinary Differential Equation

Additional Comments:

No Requirement Level

PETR4060 - Numerical Simulation

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Application of finite difference and finite element techniques for solving reservoir engineering problems.

Equivalent Courses: Previous & Current Courses
PETR460

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Complete ALL of the following Courses:
- PETR4045 - Reservoir Engineering II

Additional Comments:

No Requirement Level

PETR4070 - Applied Reservoir Simulation

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisites: PETR 4045Use reservoir simulator for numerical modeling of petroleum engineering problems beyond classical approaches. Introduction to simulation fundamentals, work with post– and pre-processing software, design and construct black oil, compositional and thermal models. History matching, predict and optimize well performance.

Equivalent Courses: Previous & Current Courses
PETR470

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:
- PETR4045 - Reservoir Engineering II

Additional Comments:

No Requirement Level

PETR4071 - Capstone Design I

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisites: PETR 3070, 4045Corequisite: PETR 4024 Offered fall semesterTeam oriented design project where students apply engineering principles and specifically petroleum engineering knowledge to develop and optimize practical options to a real world problem. This first semester focuses on data acquisition and uncertainty quantification, developing a project management plan, analyzing the information; culminating in a proposed project.

Equivalent Courses: Previous & Current Courses
PETR471

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:
- PETR3070 - Formation Evaluation
- PETR4045 - Reservoir Engineering II

Additional Comments:

Corequisite
Type
Corequisite

Corequisite

Complete ALL of the following Courses:
- PETR4024 - Production Engineering

Additional Comments:

No Requirement Level

PETR4072 - Capstone Design II

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Preparation of an Authority for Expenditure (AFE) on the project proposed from PETR 4071. Emphasis is on economic analysis, evaluation of management decisions, and establishing the effect of risk and uncertainty on the proposed project.

Equivalent Courses: Previous & Current Courses
PETR472

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:
- PETR4071 - Capstone Design I

Additional Comments:

Corequisite
Type
Corequisite

Corequisite

Complete ALL of the following Courses:
- ES3016 - Engineering Economics

Additional Comments:

No Requirement Level

PETR4078 - Petroleum Seminar

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
2

Credit Hours Operator:
OR

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Current topics in petroleum and natural gas engineering. Techniques of oral presentation of research and development data.

Equivalent Courses: Previous & Current Courses
PETR478

Simple Requisites

Course Requisite Requirements

***Prerequisite**: Senior standing or consent of instructor and advisor*

No Requirement Level

PETR4091 - Special Problems in Petroleum & Natural Gas Engineering

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
6

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Individual studies in petroleum and natural gas engineering problems of special interest.

Equivalent Courses: Previous & Current Courses
PETR491

Simple Requisites

Course Requisite Requirements

***Prerequisite**: Senior standing or consent of instructor and advisor*

No Requirement Level

PETR5000 - Directed Research

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
12

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, No Report

No Requirements

PETR5023 - Numerical Simulation

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
The simulation of subsurface fluid reservoirs using numerical models.

Equivalent Courses: Previous & Current Courses
PETR523

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Complete ALL of the following Courses:

- PETR4045 - Reservoir Engineering II

or consent of instructor and advisor; ability to write a computer program

Additional Comments:

No Requirement Level

PETR5024 - Fluid Flow in Porous Media

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Physical concepts involved in the flow of fluids in porous media; aspects of Darcy's Law; multiphase flow concepts of relative permeability and capillary pressure.

Equivalent Courses: Previous & Current Courses
PETR524

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Complete ALL of the following Courses:
- PETR4045 - Reservoir Engineering II

or consent of instructor and advisor.

Additional Comments:

No Requirement Level

PETR5032 - Advanced Well Stimulation

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Theories of hydraulic fracturing, mechanics of fracturing, rheology of fracturing fluids, acid fracturing treatment, models for matrix acidizing, evaluation of stimulation operations.

Equivalent Courses: Previous & Current Courses
PETR532

Simple Requisites

Course Requisite Requirements

Prerequisite: Consent of instructor

No Requirement Level

PETR5041 - Natural Gas Reservior Engineering

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, No Report, Standard Letter

Course Description
Estimation of gas reserves for dry and gas condensate reservoirs. Evaluation of deliverability tests and subsequent development of flow equations. Determination of gas recovery from unconventional reservoirs; e.g., coalbed methane, tight gas sands, shales. Strategies for gas field development. Additional work is required at graduate level.

No Requirements

PETR5044 - Advanced Reservior Engineering

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Studies of natural water drive reservoirs in finite and infinite aquifers. Transient pressure behavior in heterogeneous reservoirs. Material Balance Equations from advanced viewpoint.

Equivalent Courses: Previous & Current Courses
PETR544

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:
- PETR4045 - Reservoir Engineering II

Additional Comments:
or consent of instructor and advisor

No Requirement Level

PETR5045 - Advanced Production Design

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Oil and gas well production principles. Flowing well performance, two-phase vertical flow, theory and design of artificial lift systems

Equivalent Courses: Previous & Current Courses
PETR545

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:
- PETR4025 - Well Completion

or consent of instructor and advisor

Additional Comments:

No Requirement Level

PETR5046 - Advanced Formation Evaluation

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Study of physical and textural properties of reservoir rocks which provide a link between reservoir engineering and well logging. Advanced exploration and production logging. Estimation of geological environment. Quantitative reservoir evaluation in different lithologies from log data. New logging techniques.

Equivalent Courses: Previous & Current Courses
PETR546

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:
- PETR3070 - Formation Evaluation

or consent of instructor and advisor

Additional Comments:

No Requirement Level

PETR5047 - Naturally Fractured Reservoirs

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Geological characterization and reservoir simulation of naturally fractured reservoirs. Description of natural fractures and fracture systems from surface outcrops, core analysis, log interpretation, and well testing. Fluid-flow simulation of fractured reservoirs using numerical models.

Equivalent Courses: Previous & Current Courses
PETR547

No Requirements

PETR5048 - Reservoir Geomechanics

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Fundamentals and issues of coupled fluid-flow/thermal/geomechanics associated with hydrocarbon production. Topics include elasticity, poroelasticity, thermo-poroelasticity, reservoir stress depletion/rebound, productivity of stress-sensitive reservoirs, and waterflood-induced fracturing

Equivalent Courses: Previous & Current Courses
PETR548

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Complete ALL of the following Courses:
- PETR4045 - Reservoir Engineering II

or consent of instructor and advisor

Additional Comments:

No Requirement Level

PETR5056 - Advanced Drilling

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Prerequisite: PETR 3011The following topics will be covered in this class: directional and horizontal drilling, drag and torque modeling, advanced wellbore hydraulics, and innovative drilling methods including underbalanced drilling, casing drilling and coil tubing drilling.

Equivalent Courses: Previous & Current Courses
PETR556

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:
- PETR3011 - Drilling Engineering

Additional Comments:

No Requirement Level

PETR5057 - Advanced Artificial Lift Methods

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This class will cover most of the common artificial lift methods in oil and gas industry including: Electrical Submersible Pump (ESP), Gas Lift, Rod Sucker Pump, Plunger Lift, and Progressive Cavity Pump.

Equivalent Courses: Previous & Current Courses
PETR557

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:
- PETR4024 - Production Engineering

Additional Comments:

No Requirement Level

PETR5058 - Reservoir Geomechanics

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Advanced topics may include surfactant and alkali flooding mechanisms. Polymer flooding and rheology of non-Newtonian fluids. Gas injection methods including carbon dioxide, hydrocarbons, and nitrogen. Thermal recovery.

Equivalent Courses: Previous & Current Courses
PETR558

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Complete ALL of the following Courses:
- PETR4046 - Improved Petroleum Recovery

or consent of instructor and advisor

Additional Comments:

No Requirement Level

PETR5060 - Phase Behavior of Petroleum Fluids

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Use of equations of state for predicting PVT behavior of complex petroleum fluids. Emphasis on the descriptions of fluids used in simulating gas injection recovery processes and multiphase flow in pipes. Correlations for phase viscosity and interfacial tension.

Equivalent Courses: Previous & Current Courses
PETR560

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Complete ALL of the following Courses:
- PETR245 - Petroleum Fluids

or consent of instructor and advisor

Additional Comments:

No Requirement Level

PETR5064 - Advanced Well Testing

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
The partial differential equations for liquid and gas flow in porous media, boundary conditions including skin and well-bore storage effects. Applications of Laplace transformation. Pressure buildup and drawdown tests.

Equivalent Courses: Previous & Current Courses
PETR564

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:

- PETR3070 - Formation Evaluation

or consent of instructor and advisor

Additional Comments:

No Requirement Level

PETR5065 - Completion for Geothermal Wells

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Geothermal well cementing, Tubing selection, Formation isolation, Geothermal Well Cementing, Well integrity, Casing design and material selection, drilling problems associated with geothermal wells, case studies

When Offered
Fall

PETR5066 - Geothermal Reservoir Simulation

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Standard Letter

When Offered
Spring

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Complete ALL of the following Courses:

No selection provided

consent of instructor and advisor.

Additional Comments:

No Requirement Level

PETR5066 - Geothermal Reservoir Sim

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Standard Letter

No Requirements

PETR5067 - Thermal Recovery

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Standard Letter

When Offered
Spring

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Complete ALL of the following Courses:

No selection provided

consent of instructor and advisor.

Additional Comments:

No Requirement Level

PETR5070 - Graduate Seminar

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Presentation and discussion of research ideas. Review of recently published papers/new concepts.

Equivalent Courses: Previous & Current Courses
PETR570

Simple Requisites

Course Requisite Requirements

***Prerequisite**: Senior or graduate standing*

No Requirement Level

PETR5071 - Advanced Topics

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Special topics in petroleum and natural gas engineering.

Simple Requisites

Course Requisite Requirements

***Prerequisite**: Consent of instructor*

No Requirement Level

PETR5072 - Advanced Topics

General

Credit Hrs

Credit Hrs:
2

Credit Hours Max:
3

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Special topics in petroleum and natural gas engineering.

Equivalent Courses: Previous & Current Courses
PETR572

No Requirements

PETR5081 - Directed Study

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
12

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, No Report, Standard Letter

Course Description
Research and literature survey as directed by advisor on subjects of interest pertaining to petroleum and natural gas engineering.

Equivalent Courses: Previous & Current Courses
PETR581

Simple Requisites

Course Requisite Requirements

***Prerequisite**: Consent of instructor*

No Requirement Level

PETR5090 - Independent Study

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
12

Credit Hours Operator:
TO

Grade Modes
Pass/Fail, No Report

Course Description
Independent research organized and conducted by the student under the direction of the student's advisor. Written final report and oral presentation required.

Equivalent Courses: Previous & Current Courses
PETR590

No Requirements

PETR5091 - Thesis

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
12

Credit Hours Operator:
TO

Grade Modes
Pass/Fail, No Report

Equivalent Courses: Previous & Current Courses
PETR591

No Requirements

PETR5095 - Dissertation

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
13

Credit Hours Operator:
TO

Grade Modes
Pass/Fail, No Report

Equivalent Courses: Previous & Current Courses
PETR595

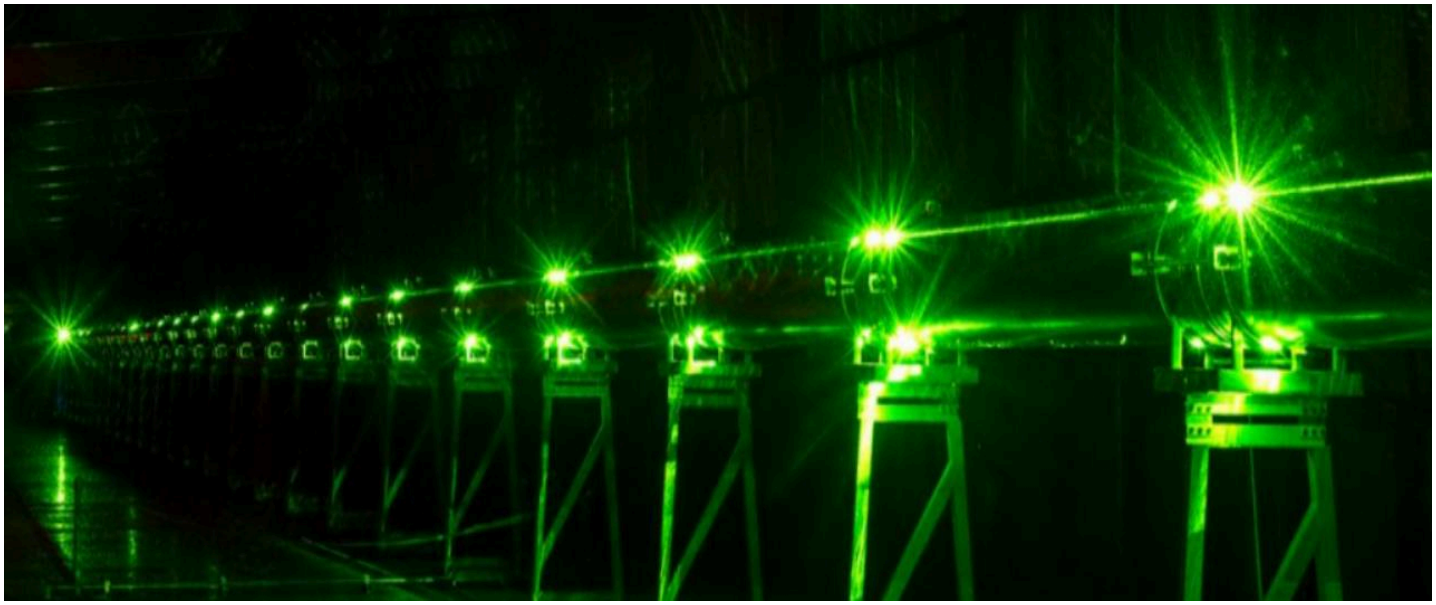
Simple Requisites

Course Requisite Requirements

***Prerequisite**: Successful completion of PhD candidacy exam and Academic Advisor recommendation for candidacy.*

No Requirement Level

Physics Department



CONTACT US		
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Mailing Address: Department of Physics, New Mexico Tech, 801 Leroy Place, Socorro, NM 87801		
Phone: 575-835-5328		
website:***https://www.nmt.edu/academics/physics/index.php***		

- ***Professors**: Creech-Eakman, Hofner, Minschwaner, Morales-Juberias, Romero, Sessions (Chair of Department), Sonnenfeld, Wells*
- ***Associate Professors**: da Silva, Meier*
- ***Assistant Professors**: Norris*
- ***Associate Teaching Professor:** Lopez-Carrillo*
- ***Assistant Teaching Professor**: Mao*
- ***Adjunct Faculty**: Araya, Briggs, Buscher, Butler, Carilli, Dubey, Elvis, Friesen, Gaulme, Haniff, Jurgenson, Kimball, Manney, Myers, Ott, Owen, Si, Spargo, Swain, Thompson, Tilles*
- ***Emeritus Professors**: Eilek, Hankins, Krebiel, LeFebre, Meason, Raymond, Schery, Westpfahl, Winn*
- ***Research Associate Professor**: Fuchs-Stone*

***Degrees Offered:** B.S. in Physics and in Physics with options in Astrophysics, Atmospheric Physics; M.S. in Physics; M.S. in Physics with Concentration in Instrumentation; Ph.D. in Physics; Ph.D. in Physics with dissertation in Astrophysics, Atmospheric Physics, Instrumentation, or Mathematical Physics*

UNDERGRADUATE PROGRAM

Students in the Department of Physics obtain a broad scientific background while mastering both theory and experimental physics. The fundamental courses are offered in the principal areas of physics—atomic and nuclear physics, classical mechanics, electricity and magnetism, optics, quantum mechanics, statistical physics, and thermodynamics. The department also offers several laboratory classes.

There is the opportunity for students to participate in research projects during the semesters and the summertime, over and above the class and lab work. Many undergraduate students become involved in faculty research and often co-author published papers.

There are two options to accompany the basic physics undergraduate degree: astrophysics or atmospheric physics. They are designed around the main research interests of the faculty, so students can take advantage of the expertise of the faculty and the facilities that are offered on or near the campus. In addition, we encourage students to consider a minor in computer science, electrical engineering or mathematics. Several of the faculty have expertise in these areas.

The areas of research in atmospheric physics include thunderstorm electricity, precipitation, cloud dynamics, large-scale atmospheric dynamics, atmospheric chemistry and climate, and the dynamics of planetary atmospheres.

The Langmuir Laboratory for Atmospheric Research, located on a mountaintop a one hour drive from campus, offers unparalleled opportunity for active undergraduate and graduate student participation in observation and research.

The atmospheric physics group also operates a Beowulf cluster for atmospheric modeling, the Lightning Mapping Array, E-field-A lightning interferometer networks, and an active scientific ballooning program focused on charge motion and X-rays produced during storms. In addition, faculty members, as well as undergraduate and graduate students, participate in field programs that use the aircraft and radars of the National Center for Atmospheric Research (NCAR) in Boulder, Colorado.

Research in astrophysics includes pulsar radio emission, the dynamics and kinematics of nearby galaxies, radio galaxies, plasma astrophysics, stellar evolution and mass loss, and star formation. The Jansky Very Large Array (VLA) and Very Long Baseline Array (VLBA) radio telescopes, operated by the National Radio Astronomy Observatory (NRAO), are headquartered on campus and offer unique opportunities for research in radio astronomy for faculty and undergraduate and graduate students alike. In addition, New Mexico Tech's Magdalena Ridge Observatory Interferometer (MROI) is under construction. This last facility is already involving students in research and development activities, especially related to instrumentation.

GRADUATE PROGRAM

New Mexico Tech faculty primarily have expertise in Astrophysics and Atmospheric Physics, but also in nuclear physics and developing instrumentation. Most graduate students work in one of these areas. We also have research opportunities in cooperation with other departments on campus, in particular Mathematics and Electrical Engineering. Other interdisciplinary programs are available through research organizations both on (e.g. shock physics at EMRTC) and off campus (Air Force Research Laboratory, Sandia National Laboratory, and Los Alamos National Laboratory).

Astrophysics

Astrophysics research at NMT encompasses planets, exoplanets, stars, the interstellar medium, galaxies, and active galactic nuclei. Specific faculty interests include stellar formation, galactic dynamics and evolution, and interstellar chemistry. The Jansky Very Large Array (VLA) and the Very Long Baseline Array (VLBA) radio telescopes, operated by the National Radio Astronomy Observatory (NRAO), are headquartered on campus, and offer unique opportunities for research in radio astronomy. The Magdalena Ridge Observatory (MRO) operates a 2.4-meter optical telescope and is developing an optical/infrared interferometer (MROI) that provides both opportunities in optical instrumentation design as well as scientific research once first light is achieved. Students may pursue dissertation work not only with regular faculty but also with a number of NRAO staff who have adjunct appointments at Tech.

Atmospheric Physics

Atmospheric physicists at Tech study convection and dynamics (on Earth and other solar system planets), lightning, atmospheric electricity, and the middle and upper atmosphere (including ozone and space weather). Langmuir Laboratory for Atmospheric Physics is a facility unique in the world, providing an instrumented mountaintop specializing in lightning research. Langmuir also includes balloon-launch facilities and a capability in compact instrumentation appropriate for remote and airborne deployments. The convection and dynamics group has its own Beowulf cluster, while the upper atmospheric group supports extremely sensitive spectrographs. Students in our graduate program can acquire deep, hands-on experience with custom scientific instrumentation and electronics, computer modeling and automated data analysis and theoretical and mathematical methods of physics.

Programs

Accelerated M.S. in Physics (pathway)

[Program Overview]

Program Title	Department(s)
Accelerated Masters in Physics	Physics

Program Description

Qualified students may apply for admission to the Accelerated Masters program in Physics. Students are expected to apply for admission to this program after the first semester of their junior year through the regular graduate admissions process. The student must have a minimum cumulative GPA of 3.0, and also specifically an average minimum GPA of 3.0 in all physics and mathematics courses to be eligible to apply for the program. Meeting the GPA criterion does not automatically guarantee admission to the program.

Upon successful admission, during the student's 7th semester, the candidate should select an advisory committee and research topic for the M.S. Students may apply PHYS 5009 (3 credits) to both the B.S and M.S. degrees, however all other courses must be counted toward either the B.S. or the M.S. exclusively. PHYS 5079 (1 credit) should be taken during semesters 7 through 10 (see sample curriculum on the Department webpages). The curriculum of study must be approved by the candidate's committee, ideally in the 7th or 8th semester. The accelerated M.S. student may take the department's preliminary examination as soon as the 8th semester of study, and must pass the examination by the beginning of the 10th semester to remain in the program.

A student may pursue either a M.S. with Thesis (6 credits) or a M.S. with Independent Study (3 credits), normally taken during the 9th and/or 10th regular semesters of study. The student is strongly encouraged to pursue research or take courses to apply toward the M.S. during the summer between the 8th and 9th semesters.

Simple Requisites

Program Requirements

Program requirements are the same as MS-PHYSICS.

Institute General Requirements

See the Master of Science information found in the Graduate section of the catalog at Master of Science Degree.

No Requirement Level

Graduate Minor in Physics

[Program Overview]

Program Title
Graduate Minor in Physics

Department(s)
Physics

Simple Requisites

Program Requirements
A student seeking a graduate minor in physics must complete at least 6 hours from the list below. The remaining physics courses must be graded, be at least 3000-level or above, and be approved by the minor advisor. A total of 12 credits hours in physics (minimum 6 hours at the 5000-level) are required for a minor at the master level, and 18 hours (minimum 12 hours at the 5000-level) for the doctorate level minor.

Graduate Minor in Physics Requirements
Type
Completion Requirement

Graduate Minor

Earn at least 6 credits from the following:

- PHYS5005 - Advanced Dynamics
- PHYS5008 - Statistical Mechanics
- PHYS5010 - Electromagnetism
- PHYS5011 - Advanced Electromagnetism
- PHYS5018 - Quantum Mechanics
- PHYS5019 - Advanced Quantum Mechanics
- PHYS4025 - Astrophysics III
- PHYS5026 - Fluid Dynamics
- PHYS5027 - Geophysical Fluid Dynamics

Additional Comments:

Institute General Requirements
See the Master of Science information found in the Graduate section of the catalog at **Graduate Degree Requirements.**

No Requirement Level

Physics (minor)

[Program Overview]

Program Title
Minor in Physics

Department(s)
Physics

Program Description
Minimum of 18 credit hours required to obtain a minor in Physics

Simple Requisites

Program Requirements

Minor in Physics
Type
Completion Requirement

Minor in Physics

Minimum credit hours required—18 (beyond general degree requirements)

Complete ALL of the following Courses:

- PHYS2420 - Computational Physics I
- PHYS2425 - Computational Physics II
- AND twelve (12) additional hours of upper-division physics

Additional Comments:

Institute General Requirements

See the Institute **General Education Core Requirements.**

No Requirement Level

BS-PHYSICS - B.S. in Physics

[Program Overview]

Program Title
Bachelor of Science in Physics

Department(s)
Physics

Degree & Program Code
BS-PHYSICS

Optional Specialization/Concentration(s)
Astrophysics Option, Atmospheric Physics Option

Program Description
Students in the Department of Physics are encouraged to pursue a broad scientific background and to master theory as well as experiment. The fundamental courses are offered in the principal areas of physics—atomic and nuclear physics, classical mechanics, electricity and magnetism, optics, quantum mechanics, statistical physics, and thermodynamics. The department also offers several laboratory classes. There is the opportunity for students to participate in research projects during the semesters and the summertime, over and above the class and lab work. Many undergraduate students become involved in faculty research and often co-author published papers.

Program Information & Policies
Minimum credit hours required—120

Simple Requisites

Program Requirements
In addition to General Education and Institutional Core Curriculum Requirements, the following courses are required:

The following courses are required:
Type
Completion Requirement

Program Requirements for B.S. in Physics

Complete ALL of the following Courses:

- PHYS2250 - Comprehensive Physics I
  AND PHYS2250L - Comprehensive Phys I Lab
- PHYS2251 - Comprehensive Physics II
  AND PHYS2251L - Comprehensive Physics II Lab
- PHYS2420 - Computational Physics I
- PHYS2425 - Computational Physics II
- PHYS3021 - Intermediate Mechanics
- PHYS3033 - Electricity & Magnetism
- PHYS3034 - Radiation & Optics
- PHYS3036L - E & M Measurements Lab

- PHYS3040 - Intro to Quantum Theory
- PHYS4011 - Thermodynamics & Statistical Mechanics
- PHYS4043 - Atomic & Nuclear Physics
- PHYS4051 - Senior Laboratory

Math requirements for B.S. in Physics

Complete ALL of the following Courses:

- MATH2532 - Calculus III
- MATH2420 - Applied Linear Algebra
- MATH3032 - Vector Analysis
- MATH3035 - Ordinary Differential Equation
- MATH3036 - Introduction to Partial Differential Equations
- Three hours of upper-division math courses

Other course requirements for B.S. in Physics

- Eight credit hours of science or engineering courses that are not required as part of requirements for Bachelor of Science in Physics. At least 2 of the credits must be lab credits. These courses are not limited to Physics classes. Any Physics elective, including requirements for Astrophysics or Atmospheric Physics options as well as PHYS1113/1113L, may be used to satisfy this requirement. Courses that form a lecture/lab pair must both be taken.
- Language–three hours
- Electives–to complete 120 credit hours; in some instances, additional elective credits may be desired.

Additional Comments:

Institute General Requirements

Bachelor of Science General Education Requirements
Type
Completion Requirement

General Education Requirements

Complete ALL of the following Requirement Sets:

- Bachelor of Science General Requirements

General Education Requirements

Complete ALL of the following Course Sets:

- Area 3: Science (BS Degree) (18 credits)
- Area 4: Social and Behavioral Science (BS or BGS Degree) (6 credits)
- Area 5: Humanities (BS or BGS Degree) (6 credits)
- Area 6: Creative and Fine Arts (BS, BA, or BGS Degree) (3 credits)
- Area 7: Additional Courses from Areas 4, 5, 6 (BS, BA, or BGS Degree) (3 credits)

Additional Comments:

No Requirement Level

[Science Options]

Program Science Option (must be declared with the Registrar Office)

Science Option 1: Title
B.S. in Physics with Astrophysics Option

Requirements
Requirements include the courses listed for the Bachelor of Science Degree in Physics, the General Education Core Curriculum, and the following courses:

PHYS 3025 (3), 3026 (3), 3027L (1), 3028L (1), 4025 (3), 4026 (3)

Program Science Option (must be declared with the Registrar Office)

Science Option 2: Title
B.S. in Physics with Atmospheric Physics Option

Requirements
Requirements include the courses listed for the Bachelor of Science Degree in Physics, the General Education Core Curriculum, and the following courses: PHYS 4027 (3), 4028 (3), 4032 (3), 4033 (3)

Note: PHYS 4027, 4028, and 4032 are offered in alternate years. Students may take one of the following sequences:

1. Junior year: PHYS 4027 (fall); PHYS 4028 (spring)

   Senior year: PHYS 4032 (fall); PHYS 4033 (spring)

2. Junior year: PHYS 4032 (fall), PHYS 4033 (spring)

   Senior year: PHYS 4027 (fall), PHYS 4028 (spring)

3. Junior year: PHYS 4032 (fall)

   Senior year: PHYS 4027 (fall), PHYS 4028, PHYS 4033 (spring)

[Learning Outcomes]

Outcome
1. Students will begin to master the knowledge of physics, including equations of motion, minimization principles, conservation laws, and application of mathematics to physical problems.

Outcome
2. Students will solve physics and physics-related problems using laboratory and computational techniques.

Outcome
3. Students will demonstrate an ability to communicate conceptual and quantitative information effectively.

[Sample 4-Year Curriculum Plan(s)]

Degree Map Name
Bachelor of Science in Physics Degree Map
Total Degree Map Credits
116 - 117
Degree Map Effective Catalog Year
2026 -
Degree Map Description
The following is a sample degree map for a B.S. in Physics. See the physics department website for a Physics Curriculum Flow Chart and consult with your advisor when planning your schedule.

Year	Semester	Actual Credits
Year 1	Fall	16

Course
- PHYS1310 & PHYS1310L: g:Calculus-Physics I and Lab

Actual Credits 5

Course
- MATH1510 & MATH1510L: g:Calculus I & Lab

Actual Credits 4

Course
- CHEM1215 & CHEM1215L: g:General Chemistry I and Lab

Actual Credits 4

Course
- ENGL1110 - g1:Composition I

Actual Credits 3

Year	Semester	Actual Credits
Year 1	Spring	16

Course
- PHYS1320 & PHYS1320L: g:Calculus-Based Physics II and Lab

Actual Credits 5

Course
- MATH1510 & MATH1510L: g:Calculus I & Lab

Actual Credits 4

Course
- CHEM1225 & CHEM1225L: g: General Chemistry II and Lab

Actual Credits 4

Course
- ENGL1120 - g1:Composition II

Actual Credits 3

Year	Semester	Actual Credits
Year 2	Fall	15

Course
- PHYS2250 & PHYS2250L: Comprehensive Physics I and Lab

Actual Credits 5

Course
- PHYS2420 - Computational Physics I

Actual Credits 3

Course
- MATH2532 - Calculus III

Actual Credits 4

Course
- MATH2420 - Applied Linear Algebra

Actual Credits 3

Year	Semester	Actual Credits
Year 2	Spring	14

Course
- PHYS2251 & PHYS2251L: Comprehensive Physics II and Lab

Actual Credits 5

Course
- PHYS2425 - Computational Physics II

Actual Credits 3

Course
- MATH3032 - Vector Analysis

Actual Credits 3

Course
- MATH3035 - Ordinary Differential Equation

Actual Credits 3

Year	Semester	Actual Credits
Year 3	Fall	16

Course
- PHYS3021 - Intermediate Mechanics

Actual Credits 3

Course
- PHYS3033 - Electricity & Magnetism

Actual Credits 3

Course
- MATH3036 - Introduction to Partial Differential Equations

Actual Credits 3

Course
- ENGL3041 - i1:Technical Writing

Actual Credits 3

Course
- Any Level Science or Engineering courses with Lab

Actual Credits 4

Year	Semester	Actual Credits
Year 3	Spring	15

Course
- PHYS3034 - Radiation & Optics

Actual Credits 3

Course
- PHYS3036L - E & M Measurements Lab

Actual Credits 1

Course
- PHYS3040 - Intro to Quantum Theory

Actual Credits 3

Course
- PHYS3080 - Practicum in Problem Solving (Inactive)

Actual Credits 1

Course
- Any Level Science or Engineering courses with Lab

Actual Credits 4

Course
- SSREQ - Social Science Requirement (Inactive)

Actual Credits 3

Year	Semester	Actual Credits
Year 4	Fall	12

Course
- PHYS4011 - Thermodynamics & Statistical Mechanics

Actual Credits 3

Course
- PHYS4043 - Atomic & Nuclear Physics

Actual Credits 3

Course
- Humanities/Language Requirement

Actual Credits 3

Course
- Social Science/Humanities/Fine & Creative Arts Requirements

Actual Credits 3

Year	Semester	Actual Credits
Year 4	Spring	12 - 13

Course
- PHYS4051 - Senior Laboratory

Actual Credits 1 - 2

Course
- Math Electives

Actual Credits 3

Course
- Humanities/Language Requirement

Actual Credits 3

Course
- Humanities/Social Science

Actual Credits 3

Course
- GENELECT (Generic)

Actual Credits 2

Degree Map Name
Bachelor of Science in Physics with Astrophysics Option
Total Degree Map Credits
124
Degree Map Effective Catalog Year
2026 -
Degree Map Description
The following is a sample degree map for a B.S. in Physics with Astrophysics Option. See the Physics Department website for a Physics Curriculum Flow Chart and consult with your advisor when planning your schedule.

Year	Semester	Actual Credits
Year 1, Semester 1	Fall	16

Course
- PHYS1310 & PHYS1310L: g:Calculus-Physics I and Lab

Actual Credits 5

Course
- MATH1510 & MATH1510L: g:Calculus I & Lab

Actual Credits 4

Course
- CHEM1215 & CHEM1215L: g:General Chemistry I and Lab

Actual Credits 4

Course
- ENGL1110 - g1:Composition I

Actual Credits 3

Year	Semester	Actual Credits
Year 1, Semester 2	Spring	16

Course
- PHYS1320 & PHYS1320L: g:Calculus-Based Physics II and Lab

Actual Credits 5

Course
- MATH1520 - g2:Calculus II

Actual Credits 4

Course
- CHEM1225 & CHEM1225L: g: General Chemistry II and Lab

Actual Credits 4

Course
- ENGL1120 - g1:Composition II

Actual Credits 3

Year	Semester	Actual Credits
Year 2, Semester 3	Fall	15

Course
- PHYS2250 & PHYS2250L: Comprehensive Physics I and Lab

Actual Credits 5

Course
- PHYS2420 - Computational Physics I

Actual Credits 3

Course
- MATH2532 - Calculus III

Actual Credits 4

Course
- MATH2420 - Applied Linear Algebra

Actual Credits 3

Year	Semester	Actual Credits
Year 2, Semester 4	Spring	17

Course
- PHYS2251 & PHYS2251L: Comprehensive Physics II and Lab

Actual Credits 5

Course
- PHYS2425 - Computational Physics II

Actual Credits 3

Course
- MATH3032 - Vector Analysis

Actual Credits 3

Course
- MATH3035 - Ordinary Differential Equation

Actual Credits 3

Course
- Humanities/Language Requirement

Actual Credits 3

Year	Semester	Actual Credits
Year 3, Semester 5	Fall	16

Course
- PHYS3021 - Intermediate Mechanics

Actual Credits 3

Course
- PHYS3025&PHYS3027L - Astrophysics I & Lab

Actual Credits 4

Course
- PHYS3033 - Electricity & Magnetism

Actual Credits 3

Course
- MATH3036 - Introduction to Partial Differential Equations

Actual Credits 3

Course
- ENGL3041 - i1:Technical Writing

Actual Credits 3

Year	Semester	Actual Credits
Year 3, Semester 6	Spring	15

Course
- PHYS3026 - Astrophysics II
- **AND** PHYS3028L - Astronomy Laboratory

Actual Credits 4

Course
- PHYS3034 - Radiation & Optics

Actual Credits 3

Course
- PHYS3036L - E & M Measurements Lab

Actual Credits 1

Course
- PHYS3040 - Intro to Quantum Theory

Actual Credits 3

Course
- PHYS3080 - Practicum in Problem Solving (Inactive)

Actual Credits 1

Course
- Social Sciences

Actual Credits 3

Year	Semester	Actual Credits
Year 4, Semester 7	Fall	15

Course
- PHYS4011 - Thermodynamics & Statistical Mechanics

Actual Credits 3

Course
- PHYS4025 - Astrophysics III

Actual Credits 3

Course
- PHYS4043 - Atomic & Nuclear Physics

Actual Credits 3

Course
- Humanities/Social Science

Actual Credits 3

Course
- Humanities/Language Requirement

Actual Credits 3

Year	Semester	Actual Credits
Year 4, Semester 8	Spring	14

Course
- PHYS4026 - Astrophysics IV

Actual Credits 3

Course
- PHYS4051 - Senior Laboratory

Actual Credits 2

Course
- Math Electives

Actual Credits 3

Course
- Social Sciences

Actual Credits 3

Course
- Area 6: Creative and Fine Arts (BS, BA, or BGS Degree) (3 credits)

Actual Credits 3

Degree Map Name
Bachelor of Science in Physics with Atmospheric Physics Option
Total Degree Map Credits
123
Degree Map Effective Catalog Year
2026 -

Year	Semester	Actual Credits
Year 1	Fall	16

Course
- PHYS1310 & PHYS1310L: g:Calculus-Physics I and Lab

Actual Credits 5

Course
- MATH1510 - g2:Calculus I

Actual Credits 4

Course
- CHEM1215 & CHEM1215L: g:General Chemistry I and Lab

Actual Credits 4

Course
- ENGL1110 - g1:Composition I

Actual Credits 3

Year	Semester	Actual Credits
Year 1	Spring	16

Course
- PHYS1320 & PHYS1320L: g:Calculus-Based Physics II and Lab

Actual Credits 5

Course
- MATH1520 - g2:Calculus II

Actual Credits 4

Course
- CHEM1225 & CHEM1225L: g: General Chemistry II and Lab

Actual Credits 4

Course
- ENGL1120 - g1:Composition II

Actual Credits 3

Year	Semester	Actual Credits
Year 2	Fall	15

Course
- PHYS2250 & PHYS2250L: Comprehensive Physics I and Lab

Actual Credits 5

Course
- PHYS2420 - Computational Physics I

Actual Credits 3

Course
- MATH2532 - Calculus III

Actual Credits 4

Course
- MATH2420 - Applied Linear Algebra

Actual Credits 3

Year	Semester	Actual Credits
Year 2	Spring	17

Course
- PHYS2251 & PHYS2251L: Comprehensive Physics II and Lab

Actual Credits 5

Course
- PHYS2425 - Computational Physics II

Actual Credits 3

Course
- MATH3032 - Vector Analysis

Actual Credits 3

Course
- MATH3035 - Ordinary Differential Equation

Actual Credits 3

Course
- Humanities

Actual Credits 3

Year	Semester	Actual Credits
Year 3	Fall	15

Course
- PHYS3021 - Intermediate Mechanics

Actual Credits 3

Course
- PHYS4027 - Atmospheric Physics

OR
- PHYS4032 - Atmospheric Remote Sensing

Actual Credits 3

Course
- PHYS3033 - Electricity & Magnetism

Actual Credits 3

Course
- MATH3036 - Introduction to Partial Differential Equations

Actual Credits 3

Course
- ENGL3041 - i1:Technical Writing

Actual Credits 3

Year	Semester	Actual Credits
Year 3	Spring	15

Course
- PHYS4028 - Climate Physics

OR
- PHYS4033 - Research Experience in Atmospheric Physics

Actual Credits 3

Course
- PHYS3034 - Radiation & Optics

Actual Credits 3

Course
- PHYS3036L - E & M Measurements Lab

Actual Credits 1

Course
- PHYS3040 - Intro to Quantum Theory

Actual Credits 3

Course
- PHYS3080 - Practicum in Problem Solving (Inactive)

Actual Credits 1

Course
- Humanities/Social Science

Actual Credits 4

Year	Semester	Actual Credits
Year 4	Fall	15

Course
- PHYS4011 - Thermodynamics & Statistical Mechanics

Actual Credits 3

Course
- PHYS4032 - Atmospheric Remote Sensing

Actual Credits 3

Course
- PHYS4043 - Atomic & Nuclear Physics

Actual Credits 3

Course
- Social Sciences

Actual Credits 3

Course
- Humanities/Social Science

Actual Credits 3

Year	Semester	Actual Credits
Year 4	Spring	14

Course
- PHYS4033 - Research Experience in Atmospheric Physics

OR
- PHYS4028 - Climate Physics

Actual Credits 3

Course
- PHYS4051L - Senior Lab

Actual Credits 2

Course
- Math Electives

Actual Credits 3

Course
- Social Sciences

Actual Credits 3

Course
- Area 6: Creative and Fine Arts (BS, BA, or BGS Degree) (3 credits)

Actual Credits 3

MS-PHYSICS - M.S. in Physics

[Program Overview]

Program Title
Master in Science in Physics

Department(s)
Physics

Degree & Program Code
MS-PHYSICS

Optional Specialization/Concentration(s)
Concentration in Instrumentation

Program Description
The Master of Science degree in Physics may be earned with thesis or independent study:

With Thesis:
The student's course of study and thesis topic must be approved by the student's advisory committee. A thesis consists of directed research, usually of a nature which would be suitable for publication in a refereed journal, and a write-up of the research. An oral defense of the thesis is required. The thesis is an archival document published electronically and kept in the NMT Library.

Independent Study:
The student's course of study must be approved by the student's advisory committee. A student who elects not to write a thesis will instead write an independent study paper on a topic selected with guidance from their advisory committee. Unlike a thesis, this paper is not archived electronically by the NMT Library.

PhD students who wish to earn an MS
If a PhD student would like to earn an MS while completing PhD requirements, they may initiate the process by petitioning the department. They may choose either the thesis or independent study option. All coursework may count toward both the MS and PhD degree. The independent study paper may be a dissertation proposal, a journal article, or another appropriate written product. For further details, see the Physics Department webpage.

Simple Requisites

Program Requirements

MS in Physics Requirements

Choose from the following Courses according to requirements above:
- PHYS5001 - Intro Resrch & Scientific Comm (must be completed in first two semesters)
- PHYS5002 - Intro Resrch & Scientific Comm (must be completed in first two semesters)

- PHYS5009 - Methods of Theoretical Physics
- PHYS5005 - Advanced Dynamics

OR

- PHYS4025 - Astrophysics III

OR

- PHYS5026 – Fluid Dynamics

OR

- PHYS5027 – Geophysical Fluid Dynamics
- PHYS5079 - Graduate-Faculty Seminar (must be taken during first four semesters)
- PHYS5008 - Statistical Mechanics
- PHYS5010 - Electromagnetism
- PHYS5018 - Quantum Mechanics

While the listed courses are the simplest route to achieving this credit, a student may petition their committee and the department chair either with proposed substitute course work or other prior experience that demonstrates competence in any of these areas.

Procedure for MS students to petition to PhD program

Graduate students wishing to petition to change from M.S. to Ph.D. status can do so no earlier than the end of their second semester and no later than Aug 1 of that year. The petition should include: a) a letter stating the reason for the petition, b) a copy of the first full-year of transcripts, c) a letter of support from the potential research advisor, d) any updates in scores (e.g. GREs, TOEFL/ELTS, Department Prelim) that should be considered as evidence of ability to pursue a Ph.D.

The petition should be copied in email to the Department Chair, Graduate Admissions Committee chair and Dean of the Graduate School. The Graduate Admissions committee will render a decision regarding the petition in writing to the petitioner, Chair and Dean no later than Sept 15 that year. This decision will include both an adjudication of the petitioner's request to pursue a Ph.D. as well as any potential funding commitments from the department.

If the student's petition fails, the student may apply for readmission for the Ph.D. through the regular graduate admissions process after the M.S. degree is completed

Institute General Requirements
See the Master of Science information found in the Graduate section of the catalog at Master of Science Degree.

No Requirement Level

[Specializations/Dissertation Concentration Options]

Specialization/Dissertation Options

Specialization/Dissertation Title
M.S in Physics with Concentration in Instrumentation

Specialization/Dissertation Requirements
Complete ALL of the following Courses:

- PHYS5001 Intro Resrch & Scintific Com I - Intro Resrch & Scientific Comm
- PHYS5002 Intro Resrch & Scintfic Com II - Intro Resrch & Scientific Comm
- PHYS5009 Methods of Theoretical Physics - Methods of Theoretical Physics
- MATH5087 Analy. of Time Series & Spat. - Analy. of Time Series & Spat.
- PHYS5008 Statistical Mechanics - Statistical Mechanics

AND/OR

- PHYS5010 Electromagnetism – Electromagnetism

AND/OR

- PHYS5018 Quantum Mechanics - Quantum Mechanics

[Learning Outcomes]

Outcome
1. Students will master the fundamental knowledge of physics, including (a) Mechanics, Thermodynamics, and Statistical Physics; (b) Electricity, magnetism, and optics; and (c) Quantum mechanics, atomic, and nuclear physics.

Outcome
2. Students will apply physical, mathematical, statistical, and computing skills to a problem in their area of specialization.

Outcome
3. Students will communicate scientific results in written, oral, and graphical form to experts and the public.

Outcome
4. Students will become independent learners and researchers.

PHD-PHYSICS - Ph.D. in Physics

[Program Overview]

Program Title
Doctor of Philosophy in Physics

Department(s)
Physics

Degree & Program Code
PHD-PHYSICS

Optional Specialization/Concentration(s)
Dissertation in Astrophysics, Dissertation in Atmospheric Physics, Dissertation in Instrumentation, Dissertation in Mathematical Physics

Program Description
Students of exceptional ability as demonstrated in previous courses in physics and mathematics may pursue a program leading to the doctoral degree. Our department offers the following five doctoral paths (with requirements for each specified in the next sections.)
• Doctor of Philosophy in Physics with Dissertation in Astrophysics
• Doctor of Philosophy in Physics with Dissertation in Atmospheric Physics
• Doctor of Philosophy in Physics with Dissertation in Instrumentation
• Doctor of Philosophy in Physics with Dissertation in Mathematical Physics
• Doctor of Philosophy in Physics

Doctor of Philosophy in Physics (no dissertation area specified)

In addition to the degree requirements specified, (12) credit hours of graduate physics or appropriate related fields, approved by the student's advisory committee, should be completed in his/her field of specialization.

Simple Requisites

Program Requirements

In addition to the general doctoral degree requirements, the following course requirements apply to all curricula:

- PHYS 5001 – Intro to Research and Scientific Communication (2 cr) (must take in first two semesters)
- PHYS 5002 – Intro to Research and Scientific Communication (2 cr) (must take in first two semesters)
- PHYS 5005 Advanced Dynamics (3 cr)
- PHYS 5008 – Statistical Mechanics (3 cr)
- PHYS 5009 – Methods of Theoretical Physics (3 cr)
- PHYS 5010 – Electromagnetism (3 cr)
- PHYS 5018 – Quantum Mechanics (3 cr)
- PHYS 4025 – Astrophysics III: Plasma Astrophysics (3 cr)
    - OR PHYS 5026 – Fluid Dynamics (3 cr)
    - OR PHYS 5027 – Geophysical Fluid Dynamics (3 cr)
- PHYS 5079 – Graduate-Faculty Seminar (1 cr) (must be taken for the first four semesters)
- 9 credit hours in mathematics beyond that required of an undergraduate physics major.

While the listed courses are the simplest route to achieving this credit, a student may petition their committee and the department chair with proposed substitute course work or other prior experience demonstrating equivalent competence in any of these areas. Further, New Mexico. Tech students who took one of the listed courses as part of a prior degree program at Tech and passed it with a grade of B- or higher are not required to retake the course.

Doctor of Philosophy in Physics In addition to the degree requirements specified above, (12) credit

In addition to the degree requirements specified above, (12) credit hours of graduate physics or appropriate related fields, approved by the student's advisory committee, should be completed in his/her field of specialization.

Institute General Requirements
See the Doctor of Philosophy information found in the Graduate section of the catalog at **Graduate Degree Requirements.**

No Requirement Level

[Specializations/Dissertation Concentration Options]

Specialization/Dissertation Options

Specialization/Dissertation Title
Dissertation in Instrumentation

Specialization/Dissertation Requirements
The concentration in instrumentation teaches graduate physics with an additional focus on laboratory work and practical applications of physics concepts and technologies. The program aims to produce an experimental physicist with broad skills and background in one or more areas of scientific instrumentation. A graduate of this program should be able to create their own custom instrumentation for the study of new areas. The skills of such a graduate are explicitly transferable to industrial design and employment in national labs.

In addition to the degree requirements specified above, students completing their Doctor of Philosophy in Physics with in instrumentation must also complete:

Instrumentation Core: Physics 3001, 5036L, 5045 and PHYS 5080.

Specialized Math Requirement: Of the required 9- credit hours in advanced mathematics, 3 credit hours should be from either MATH 5087 OR MATH 5099 OR MATH 5088.

Instrumentation Breadth Requirement:

Courses may be taken at another institution in consultation with student's committee as appropriate to the area of study. Additional courses in the Physics department may include graduate level disciplinary courses beyond the Physics core.

The following courses are *examples* recommended for the breadth requirement depending on the candidate's interests and dissertation/ professional focus. When labs are associated with these courses, they should also be taken, but will not count toward the 9 credit requirement.

Specialization/Dissertation Options

Specialization/Dissertation Title
Dissertation in Mathematical Physics

Specialization/Dissertation Requirements
In addition to the degree requirements specified above, students completing their dissertation in mathematical physics must also complete:

MATH 4035 (3), MATH 4038 (3), MATH 4042 (3), MATH 4071 (3), MATH 5035 (3). These may be used to satisfy the 9 credit hours in mathematics required for all curricula.

An additional 6 credits in mathematics and 6 credits in physics, approved by the student's advisory committee.

Specialization/Dissertation Options

Specialization/Dissertation Title
Dissertation in Atmospheric Physics

Specialization/Dissertation Requirements
In addition to the degree requirements specified above, students completing their dissertation in atmospheric physics must also complete:

PHYS 4027 (3), 4028 (3)

An additional 6 credit hours must be taken in areas pertinent to the student's program. This can be achieved by taking PHYS 5027 (3), PHYS 5032 (3), PHYS 5033 (3), PHYS 5035 (3), and/or other courses approved by the student's advisory committee.

Specialization/Dissertation Options

Specialization/Dissertation Title
Dissertation in Astrophysics

Specialization/Dissertation Requirements
In addition to the degree requirements specified above, students completing their dissertation in astrophysics must also complete:

6 credit hours chosen from PHYS 4026 (3), PHYS 5064 (3), PHYS 5065 (3), PHYS 5066 (3). PHYS 4026 must be completed unless the student has had equivalent material in previous courses.

6 credit hours chosen from PHYS 4025 (3), PHYS 5062 (3), PHYS 5063 (3), PHYS 5067 (3).

[Learning Outcomes]

Outcome
1. Students will master the fundamental knowledge of physics, including (a) Mechanics, Thermodynamics, and Statistical Physics; (b) Electricity, magnetism, and optics; and (c) Quantum mechanics, atomic and nuclear physics.

Outcome
2. Students will apply physical, mathematical, statistical, and computing skills to a problem in their area of specialization.

Outcome
3. Students will communicate scientific results in written, oral, and graphical form to experts and the public.

Outcome
4. Students will become independent learners and researchers.

Courses

PHYS0289L - Pilot Course

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
3

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, Standard Letter

No Requirements

Simple Requisites

Course Requisite Requirements

Corequisite
Type
Corequisite

Corequisite

Enroll in the following Courses:

- PHYS1113 - g3:Special Topics in Physics

Additional Comments:

No Requirement Level

PHYS1113 - g3:Special Topics in Physics

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course is an algebra-based physics course that provides an introduction to foundational physics concepts in the context of a special topic (such as Climate and Sustainability, Radio Astronomy, Physics for Everyone, etc.). Foundational topics will be selected from kinematics, Newtonian mechanics, conservation principles, energy, electricity and magnetism, thermodynamics, waves, and modern physics.

Simple Requisites

Course Requisite Requirements

Corequisites
Type
Corequisite

Corequisite

Enroll in the following Courses:

- MATH1220 - College Algebra

Additional Comments:

No Requirement Level

PHYS1113L - g3:Special Topics in Physics Lab

General

Credit Hrs

Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Laboratory experiments from the subject matter of PHYS 1113.

PHYS1310 - g3:Calculus-based Physics I

General

Credit Hrs

Credit Hrs:
4

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
A calculus level treatment of classical mechanics and waves, which is concerned with the physical motion concepts, forces, energy concepts, momentum, rotational motion, angular momentum, gravity, and static equilibrium.

Equivalent Courses: Previous & Current Courses
PHYS121

Simple Requisites

Course Requisite Requirements

Corequisites
Type
Corequisite

Corequisite

Enroll in the following Courses:

- PHYS1310L - g3:Calculus-based Physics I Lab
  AND MATH1510 - g2:Calculus I

Additional Comments:

No Requirement Level

PHYS1310L - g3:Calculus-based Physics I Lab

General

Credit Hrs

Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
A series of laboratory experiments associated with the material presented in Calculus-based Physics I. Students will apply the principles and concepts highlighting the main objectives covered in coursework for Calculus-based Physics I

Equivalent Courses: Previous & Current Courses
PHYS121L

Simple Requisites

Course Requisite Requirements

Corequisite
Type
Corequisite

Calculus-based Physics I

Enroll in the following Courses:
- PHYS1310 - g3:Calculus-based Physics I

Additional Comments:

No Requirement Level

PHYS1310R - g3:Calculus-based Physics I Recitation

General

Credit Hrs

Credit Hrs:
0

Credit Hours Max:
1

Credit Hours Operator:
TO

Grade Modes
Non-credit, Pass/Fail

Course Description
Recitation for PHYS 1310

No Requirements

PHYS1320 - g3:Calculus-based Physics II

General

Credit Hrs

Credit Hrs:
4

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
A calculus level treatment of classical electricity and magnetism. It is strongly recommended that this course is taken at the same time as Calculus-based Physics II laboratory.

Equivalent Courses: Previous & Current Courses
PHYS122

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Prerequisite

Complete ALL of the following Courses:
- PHYS1310 - g3:Calculus-based Physics I

Additional Comments:

Corequisites
Type
Corequisite

Corequisite

Enroll in the following Courses:
- MATH1520 - g2:Calculus II
  AND PHYS1320L - g3:Calculus-based Physics II Lab

Additional Comments:

No Requirement Level

PHYS1320L - g3:Calculus-based Physics II Lab

General

Credit Hrs

Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
A series of Laboratory experiments associated with the material presented in Calculus-Based Physics II. Students will apply the principles and concepts highlighting the main objectives covered in coursework for Calculus-Based Physics II.

Equivalent Courses: Previous & Current Courses
PHYS122L

Simple Requisites

Course Requisite Requirements

Corequisite
Type
Corequisite

Corequisite

Enroll in the following Courses:
- PHYS1320 - g3:Calculus-based Physics II

Additional Comments:

No Requirement Level

PHYS2250 - Comprehensive Physics I

General

Credit Hrs
Credit Hrs:
4

Grade Modes
Audit, Standard Letter

Course Description
A treatment of physics for science and engineering students from a modern point of view. The subject is logically developed starting with optics and the theory of relativity. Quantum and classical mechanics are then introduced. This course is required for physics majors.

Equivalent Courses: Previous & Current Courses
PHYS221

Simple Requisites

Course Requisite Requirements

Physics Prerequisites
Type
Prerequisite

Completed Courses

Complete ALL of the following Courses:
- PHYS1310 - g3:Calculus-based Physics I
- MATH1510 - g2:Calculus I

Additional Comments:

Physics Corequisites
Type
Corequisite

Physics Lab

Enroll in the following Courses:
- PHYS2250L - Comprehensive Phys I Lab

Additional Comments:

No Requirement Level

PHYS2250L - Comprehensive Phys I Lab

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Laboratory experiments from the subject matter of PHYS 2250.

Equivalent Courses: Previous & Current Courses
PHYS221L

Simple Requisites

Course Requisite Requirements

Corequisite
Type
Corequisite

Comprehensive Physics I Lab

Enroll in the following Courses:
- PHYS2250 - Comprehensive Physics I

Additional Comments:

No Requirement Level

PHYS2251 - Comprehensive Physics II

General

Credit Hrs
Credit Hrs:
4

Grade Modes
Audit, Standard Letter

Course Description
Continuation of PHYS 2250. Attempts to probe successively smaller scales are explored. The four forces of nature; practical applications of gravity and electromagnetism. Dynamics of large numbers of particles are introduced, resulting in applications to the everyday world. This course is required for physics majors.

Equivalent Courses: Previous & Current Courses
PHYS222

Simple Requisites

Course Requisite Requirements

Physics Prerequisites
Type
Prerequisite

Completed Courses

Complete ALL of the following Courses:
- PHYS2250 - Comprehensive Physics I
- MATH1510 - g2:Calculus I

Additional Comments:

Physics Corequisite
Type
Corequisite

Enrolled Courses

Enroll in the following Courses:
- PHYS2251L - Comprehensive Physics II Lab
- MATH1520 - g2:Calculus II
- PHYS1320 - g3:Calculus-based Physics II

Additional Comments:

No Requirement Level

PHYS2251L - Comprehensive Physics II Lab

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Laboratory experiments from the subject matter of PHYS 2251.

Equivalent Courses: Previous & Current Courses
PHYS222L

Simple Requisites

Course Requisite Requirements

Corequisite
Type
Corequisite

Comprehensive Physics II Lab

Enroll in the following Courses:
- PHYS2251 - Comprehensive Physics II

Additional Comments:

No Requirement Level

PHYS2420 - Computational Physics I

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, No Report, Standard Letter

Course Description
This course will provide an introduction to a programming language and basic algorithms that can be used to solve introductory physics problems (e.g. statics, relative motion, projectile motion) with a computer. Most of the problems will be deterministic in nature and will have analytical solutions that the students will be able to use to verify their numerical solutions. The course will also cover topics related to data analysis and visualization.

Equivalent Courses: Previous & Current Courses
PHYS241

Simple Requisites

Course Requisite Requirements

Physics Prerequisites
Type
Prerequisite

Physics Courses

Complete ALL of the following Courses:
- PHYS1320 - g3:Calculus-based Physics II

Additional Comments:

Physics Corequisites
Type
Corequisite

Math Courses

Enroll in the following Courses:
- MATH2420 - Applied Linear Algebra

Additional Comments:

No Requirement Level

PHYS2425 - Computational Physics II

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course will go more in depth into numerical methods to solve problems involving the numerical solution of differential equations (oscillations, orbital motion, waves and vibrations.) Different algorithms will be compared to determine their level of accuracy and applicability. The course will explore other aspects of physics that cannot be solved using deterministic algorithms (e.g. random walks).

Equivalent Courses: Previous & Current Courses
PHYS242

Simple Requisites

Course Requisite Requirements

Physics Prerequisites
Type
Prerequisite

Physics Courses

Complete ALL of the following Courses:
- PHYS2420 - Computational Physics I

Additional Comments:

No Requirement Level

PHYS3001 - Lab & Shop Techniques

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Instruction in drill and tool bit sharpening, use of hand tools, drill press, lathe, milling machine, shaper, and sheet metal brake.

Equivalent Courses: Previous & Current Courses
PHYS301

No Requirements

PHYS3013 - Orbital Mechanics

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This is a first upper-division course covering the Newtonian mechanics of orbits. Applications include ballistic missiles, satellites, and lunar and interplanetary orbits. Spaceflight is simulated using Kerbal Space Program or similar tools. (Same as AE 3013.))

Equivalent Courses: Previous & Current Courses
PHYS313

Simple Requisites

Course Requisite Requirements

Physics Prerequisites
Type
Prerequisite

Course Requirements

Fulfill ALL of the following requirements:

Physics Courses

Complete ANY of the following Courses:

- PHYS1320 - g3:Calculus-based Physics II
- PHYS2251 - Comprehensive Physics II

AND

Math Courses

Complete ANY of the following Courses:

- MATH3032 - Vector Analysis
- MENG3005 - Numerical Methods & Analysis

Additional Comments:

No Requirement Level

PHYS3021 - Intermediate Mechanics

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
An intermediate course in the dynamics and statics of particles and rigid bodies. Introduction to Lagrangian and Hamiltonian mechanics.

Equivalent Courses: Previous & Current Courses
PHYS321

Simple Requisites

Course Requisite Requirements

Physics Prerequisites
Type
Prerequisite

Completed Courses

Complete ALL of the following Courses:

- PHYS2425 - Computational Physics II
- MATH2420 - Applied Linear Algebra

Transfer students may take PHYS 2420 as a co-requisite

Additional Comments:

Physics Corequisites
Type
Corequisite

Math Courses

Enroll in the following Courses:

- MATH3035 - Ordinary Differential Equation

Additional Comments:

No Requirement Level

PHYS3025 - Astrophysics I

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Astrophysics is the application of physics to the universe. This course begins with a review of relevant physics and then applies those concepts to the lives of stars. The subject matter includes stellar atmospheres, stellar interiors, star formation, stellar evolution, variable stars, and compact objects.

Equivalent Courses: Previous & Current Courses
PHYS325

Simple Requisites

Course Requisite Requirements

Physics Prerequisites
Type
Prerequisite

Physics Courses

Complete ALL of the following Courses:

- PHYS2425 - Computational Physics II

Additional Comments:

No Requirement Level

PHYS3026 - Astrophysics II

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course continues the application of physics to the rest of the universe. Our own solar system and its formation and evolution, normal galaxies, active galaxies, the large-scale structure of the universe, and cosmology.

Equivalent Courses: Previous & Current Courses
PHYS326

Simple Requisites

Course Requisite Requirements

Physics Prerequisites
Type
Prerequisite

Physics Courses

Complete ALL of the following Courses:
- PHYS3025 - Astrophysics I

Additional Comments:

No Requirement Level

PHYS3027L - Astronomy Lab

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
An introduction to astronomical observing and data reduction. Emphasis on the techniques of operating telescopes and their auxiliary equipment, including CCD imaging, photometry, spectroscopy, and data handling. Exercise are chosen from topics in solar system, stellar, galactic, and extragalactic astronomy. This class includes a nighttime observing component.

Equivalent Courses: Previous & Current Courses
PHYS327L

Simple Requisites

Course Requisite Requirements

Physics Corequisite
Type
Corequisite

Physics Course

Enroll in the following Courses:
- PHYS3025 - Astrophysics I

or consent of instructor and advisor.

Additional Comments:

No Requirement Level

PHYS3028L - Astronomy Laboratory

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
An introduction to astronomical observing and data reduction. Emphasis on the techniques of operating telescopes and their auxiliary equipment, including CCD imaging, photometry, spectroscopy, and data handling. Exercise are chosen from topics in solar system, stellar, galactic, and extragalactic astronomy. This class includes a nighttime observing component.

Equivalent Courses: Previous & Current Courses
PHYS328L

Simple Requisites

Course Requisite Requirements

Prerequisite
Type
Prerequisite

Requirements

Fulfill ANY of the following requirements:

Prerequisite

Complete ALL of the following Courses:
- PHYS3027L - Astronomy Lab

or consent of instructor and advisor

Additional Comments:

No Requirement Level

PHYS3033 - Electricity & Magnetism

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Maxwell's four short equations use the language of vector calculus to describe problems involving charge, current, voltage, electric fields, and magnetic fields. These equations will be developed and unpacked, with applications to statics and varying electric fields and magnetic fields, electric circuits, and dielectric materials. Conductors and conductivity of metals, semiconductors and gasses will be considered. Additional topics may include magnetic materials.

Equivalent Courses: Previous & Current Courses
PHYS333

Simple Requisites

Course Requisite Requirements

Physics Prerequisites
Type
Prerequisite

Required Courses

Fulfill ALL of the following requirements:

Physics Courses

Complete ANY of the following Courses:

- PHYS1320 - g3:Calculus-based Physics II
- PHYS2251 - Comprehensive Physics II

AND

Additional Courses

Complete ALL of the following Courses:

- PHYS2425 - Computational Physics II
- MATH3032 - Vector Analysis

Additional Comments:
transfer students may take PHYS 2420 as a co-requisite

Physics Corequisite
Type
Corequisite

Math Courses

Enroll in the following Courses:

- MATH3035 - Ordinary Differential Equation

Additional Comments:

No Requirement Level

PHYS3034 - Radiation & Optics

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course explores the behavior of electromagnetic waves, including optical waves, using Maxwell's equations and the Lorentz force law. Included in the course are the topics of radiation, conservation laws, relativistic and non-relativistic electrodynamics, basic geometrical optics and aberration theory, and specific phenomena such as polarization, diffraction and interference. The class will include discussions of modern optical devices.

Equivalent Courses: Previous & Current Courses
PHYS334

Simple Requisites

Course Requisite Requirements

Physics Prerequisites
Type
Prerequisite

Physics Courses

Complete ALL of the following Courses:

- PHYS3033 - Electricity & Magnetism

Additional Comments:

Physics Corequisites
Type
Corequisite

Math Courses

Enroll in the following Courses:

- MATH3036 - Introduction to Partial Differential Equations

Additional Comments:

No Requirement Level

PHYS3036L - E & M Measurements Lab

General

Credit Hrs
Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
A set of experiments reinforce the concepts of electromagnetism learned in Physics 3033 and give students added facility with common laboratory instrumentation. The behaviors of resistors, capacitors and inductors is studied with oscilloscopes and function generators and understood with the formalism of complex impedance. Transformers, transistors and operational amplifier circuits are studied. Data acquisition and digital control techniques are introduced using the Arduino embedded platform

Equivalent Courses: Previous & Current Courses
PHYS336L

No Requirements

PHYS3040 - Intro to Quantum Theory

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Fundamental ideas of quantum physics including the postulates of quantum theory, wave functions, stationary and non-stationary states, operators, measurements, the Schrodinger equation, one-dimensional and three-dimensional systems including the hydrogen atom.

Equivalent Courses: Previous & Current Courses
PHYS340

Simple Requisites

Course Requisite Requirements

Physics Prerequisites
Type
Prerequisite

Required Courses

Complete ALL of the following Courses:

- PHYS3021 - Intermediate Mechanics
- MATH2420 - Applied Linear Algebra
- MATH3035 - Ordinary Differential Equation

or consent of instructor and advisor

Additional Comments:

No Requirement Level

PHYS3091 - Directed Study

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
6

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, Standard Letter

Equivalent Courses: Previous & Current Courses
PHYS391

No Requirements

PHYS4001 - Introduction to Research and Scientific Communication I

General

Credit Hrs

Credit Hrs:
2

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Pre-req: Senior standing in physics or instructor permission.This course engages students in a modest research project, usually related to ongoing research in the department, and provides a background in scientific communication. The research portion emphasizes independent work by the student, but is supervised by a faculty member. Possible projects include data analysis, software development, theoretical modeling, a literature survey, and design and/or construction of research or teaching equipment. The communication portion incorporates the research topic into several written and oral assignments, including conference abstracts, proposals, oral and poster presentations, and peer-reviewed research papers. Students already involved in department research are especially encouraged to enroll.

No Requirements

PHYS4002 - Intro Reserch & Scintfc Com II

General

Credit Hrs

Credit Hrs:
2

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Pre-req: Senior standing in physics or instructor permission.This course engages students in a modest research project, usually related to ongoing research in the department, and provides a background in scientific communication. The research portion emphasizes independent work by the student, but is supervised by a faculty member. Possible projects include data analysis, software development, theoretical modeling, a literature survey, and design and/or construction of research or teaching equipment. The communication portion incorporates the research topic into several written and oral assignments, including conference abstracts, proposals, oral and poster presentations, and peer-reviewed research papers. Students already involved in department research are especially encouraged to enroll.

Equivalent Courses: Previous & Current Courses
PHYS5002

No Requirements

PHYS4002 - Introduction to Research and Scientific Communication II

General

Credit Hrs

Credit Hrs:
2

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Pre-req: Senior standing in physics or instructor permission.This course engages students in a modest research project, usually related to ongoing research in the department, and provides a background in scientific communication. The research portion emphasizes independent work by the student, but is supervised by a faculty member. Possible projects include data analysis, software development, theoretical modeling, a literature survey, and design and/or construction of research or teaching equipment. The communication portion incorporates the research topic into several written and oral assignments,

including conference abstracts, proposals, oral and poster presentations, and peer-reviewed research papers. Students already involved in department research are especially encouraged to enroll.

Simple Requisites

Course Requisite Requirements

Prerequisite: Sentior Standing in Physics or consent of Instructor.

No Requirement Level

PHYS4011 - Thermodynamics & Statistical Mechanics

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
A course dealing with the effects of heat and work on gases, liquids, and solids. The equations of state and the first and second laws of thermodynamics are presented with applications to heat engines and chemical processes. An introduction is given to kinetic theory and statistical mechanics.

Equivalent Courses: Previous & Current Courses
PHYS411

Simple Requisites

Course Requisite Requirements

Physics Prerequisites
Type
Prerequisite

Course Requirements

Fulfill ALL of the following requirements:

Physics Courses

Complete ANY of the following Courses:

- PHYS1320 - g3:Calculus-based Physics II
- PHYS2251 - Comprehensive Physics II

AND

Physics Courses

Complete ALL of the following Courses:

- PHYS3040 - Intro to Quantum Theory

Additional Comments:

No Requirement Level

PHYS4025 - Astrophysics III

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Plasma and fluid physics govern most of the luminous matter in the universe. This course surveys the many aspects of plasma physics, from microphysics (single particle motions, waves and oscillations, collisions) to macrophysics (the fluid description and magnetohydrodynamic effects). Applications will include a wide variety of astrophysical objects, from the earth's magnetosphere and the solar wind, to accretion disks and radio jets.

Equivalent Courses: Previous & Current Courses
PHYS425

Simple Requisites

Course Requisite Requirements

Physics Prerequisites
Type
Prerequisite

Physics Courses

Complete ALL of the following Courses:

- PHYS3025 - Astrophysics I
- PHYS3026 - Astrophysics II
- PHYS3034 - Radiation & Optics

or graduate standing

Additional Comments:

No Requirement Level

PHYS4026 - Astrophysics IV

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course continues the application of fluid and plasma physics to astrophysics. Radiation processes and diagnostics, shock physics, high energy plasmas, and cosmic ray acceleration. Many applications will come from our galaxy, including the interstellar medium, star formation, supernovae, black holes, and pulsars. We will go beyond the boundaries of our galaxy to study active galactic nuclei and their connection to galaxy formation.

Equivalent Courses: Previous & Current Courses
PHYS426

Simple Requisites

Course Requisite Requirements

Physics Prerequisites
Type
Prerequisite

Physics Courses

Complete ALL of the following Courses:

- PHYS3034 - Radiation & Optics
- PHYS4025 - Astrophysics III

or graduate standing

Additional Comments:

No Requirement Level

PHYS4027 - Atmospheric Physics

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Covers dry and moist thermodynamics, radiative transfer, some microphysics, and dynamics (including hydrostatic balance, geostrophic balance, and thermal wind equation).

Equivalent Courses: Previous & Current Courses
PHYS427

Simple Requisites

Course Requisite Requirements

Physics Prerequisites
Type
Prerequisite

Physics Courses

Complete ALL of the following Courses:

- PHYS1320 - g3:Calculus-based Physics II

or consent of instructor and advisor

Additional Comments:

No Requirement Level

PHYS4028 - Climate Physics

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course, a continuation of PHYS 4027, includes the dynamics needed to understand general circulation (e.g. Rossby waves), also covers basics in climate modeling and observations.

Equivalent Courses: Previous & Current Courses
PHYS428

Simple Requisites

Course Requisite Requirements

Physics Prerequisites
Type
Prerequisite

Required Courses

Complete ALL of the following Courses:

- PHYS4027 - Atmospheric Physics
- MATH3032 - Vector Analysis
- MATH3035 - Ordinary Differential Equation

Additional Comments:

No Requirement Level

PHYS4032 - Atmospheric Remote Sensing

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Standard Letter

Course Description
This course will examine the physics of atmospheric remote sensing using radio, microwave, infrared, visible, and ultraviolet instruments. Topics will include both active and passive systems for measuring atmospheric temperature, composition (such as water vapor and ozone), and dynamics.

Equivalent Courses: Previous & Current Courses
PHYS432

Simple Requisites

Course Requisite Requirements

Physics Prerequisites
Type
Prerequisite

Physics Courses

Complete ALL of the following Courses:

- PHYS1320 - g3:Calculus-based Physics II

Additional Comments:

No Requirement Level

PHYS4033 - Research Experience in Atmospheric Physics

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Normally offered: Spring unless otherwise. Prereq: consent of instructor. Project in which a student works with a member of the atmospheric physics group on current research. This project includes data analysis and a written lab report, conference presentation, or contribution to a published paper. The research includes a lab component that may include experimental, field, or computational investigation and thus counts toward the 2 labcredits for the physics department lab science requirement. The student should contact the appropriate faculty member within the first two weeks of the semester in which the course is to be taken to organize a project.

Equivalent Courses: Previous & Current Courses
PHYS433

Simple Requisites

Course Requisite Requirements

Prerequisite: Consent of Instructor

No Requirement Level

PHYS4043 - Atomic & Nuclear Physics

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Continuation of PHYS 3040. Further topics in atomic and molecular structure, including fine/hyperfine structure, atomic/molecular spectroscopy, many electron systems and quantum statistics. Further topics in nuclear physics including radioactivity, elements of nuclear structure, and nuclear energy sources.

Equivalent Courses: Previous & Current Courses
PHYS443

Simple Requisites

Course Requisite Requirements

Physics Prerequisites
Type
Prerequisite

Physics Courses

Complete ALL of the following Courses:
- PHYS3040 - Intro to Quantum Theory

Additional Comments:

No Requirement Level

PHYS4044 - Solid-State Physics

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Crystalline structure and reciprocal lattices; binding in molecules and crystals; energy bands; electrons in metals; imperfections in solids; electrical, thermal, and magnetic properties of solids; semi-conductor theory and superconductivity.

Equivalent Courses: Previous & Current Courses
PHYS444

Simple Requisites

Course Requisite Requirements

Physics Prerequisites
Type
Prerequisite

Physics Courses

Complete ALL of the following Courses:
- PHYS3040 - Intro to Quantum Theory

or consent of instructor and advisor

Additional Comments:

No Requirement Level

PHYS4048 - Introduction to Particle Physics

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course provides an introduction to elementary particles and their interactions, at a level that does not require quantum field theory. Covered topics include particle phenomenology and conservation laws, relativistic kinematics, symmetries, Feynman diagrams, gauge theories, and the Higgs mechanism.

Equivalent Courses: Previous & Current Courses
PHYS448

Simple Requisites

Course Requisite Requirements

Physics Prerequisites
Type
Prerequisite

Physics Courses

Complete ALL of the following Courses:
- PHYS3040 - Intro to Quantum Theory
- PHYS2251 - Comprehensive Physics II

or consent of instructor and advisor

Additional Comments:

Physics Corequisites
Type
Corequisite

Physics Courses

Enroll in the following Courses:

- PHYS4043 - Atomic & Nuclear Physics

Additional Comments:

No Requirement Level

PHYS4049 - Astrobiology

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
An in-depth and interdisciplinary study of astrobiology, including interactions between living and non-living systems at multiple scales: stellar, planetary, meso- and microscopic. Addresses fundamental questions regarding the origin of life, and the possible extent and distribution of life in the universe. Combines principles of astrophysics, geosciences, planetary science, chemistry, and biology. Innovative interactive exercises and projects working in interdisciplinary groups and individually. Shares lecture with PHYS 5049, with additional expectations for graduate credit. (Same as BIOL 4049 and GEOL 4049)

Equivalent Courses: Previous & Current Courses
PHYS449

Simple Requisites

Course Requisite Requirements

Physics Prerequisites
Type
Prerequisite

Course Requirements

Fulfill ALL of the following requirements:

Required Courses

Complete ALL of the following Courses:

- CHEM1215 - g3:General Chemistry I
- CHEM1225 - g3:General Chemistry II
- PHYS1310 - g3:Calculus-based Physics I
- PHYS1320 - g3:Calculus-based Physics II

Additional Comments:
*one other science course **and** consent of instructor.*

No Requirement Level

PHYS4051 - Senior Laboratory

General

Credit Hrs
Credit Hrs:
1

Credit Hours Max:
2

Credit Hours Operator:
OR

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Experiments in atomic, nuclear, and solid-state physics.

Equivalent Courses: Previous & Current Courses
PHYS451

Simple Requisites

Course Requisite Requirements

***Prerequisites**: Senior status or consent of instructor and advisor*

No Requirement Level

PHYS4051L - Senior Lab

General

Credit Hrs
Credit Hrs:
2

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Corequisite with PHYS 4051

No Requirements

PHYS4089L - Pilot Lab

General

Credit Hrs
Credit Hrs:
0

Credit Hours Max:
1

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, Standard Letter

Equivalent Courses: Previous & Current Courses
PHYS489L

No Requirements

PHYS4091 - Directed Study

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
6

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, Standard Letter

Equivalent Courses: Previous & Current Courses
PHYS491

No Requirements

PHYS5000 - Directed Research

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
12

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, No Report, Standard Letter

Course Description
Research under the guidance of a faculty member.

Equivalent Courses: Previous & Current Courses
PHYS500

No Requirements

PHYS5001 - Introduction to Research and Scientific Communication I

General

Credit Hrs

Credit Hrs:
2

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course involves beginning graduate students in a modest project, usually related to ongoing research in the department, and provides a background in scientific communication. The research portion emphasizes independent work by the student, but is supervised by a faculty member. Possible projects include data analysis, software development, theoretical modeling, a literature survey, and design and/or construction of research or teaching equipment. The communication portion incorporates the research topic into several written and oral assignments, including conference abstracts, proposals, oral and poster presentations, and peer-reviewed research papers. Shares lecture with PHYS 4001 but is graded separately and additional graduate-level work is required.

Equivalent Courses: Previous & Current Courses
PHYS4001, PHYS4002

No Requirements

PHYS5002 - Intro Resrch & Scintfic Com II

General

Credit Hrs

Credit Hrs:
2

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course involves beginning graduate students in a modest project, usually related to ongoing research in the department, and provides a background in scientific communication. The research portion emphasizes independent work by the student, but is supervised by a faculty member. Possible projects include data analysis, software development, theoretical modeling, a literature survey, and design and/or construction of research or teaching equipment. The communication portion incorporates the research topic into several written and oral assignments, including conference abstracts, proposals, oral and poster presentations, and peer-reviewed research papers. Shares lecture with PHYS 4002 but is graded separately and additional graduate-level work is required.

Equivalent Courses: Previous & Current Courses
PHYS4002, PHYS502

No Requirements

PHYS5005 - Advanced Dynamics

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Introduction to classical mechanics: Lagrangian and Hamiltonian formalism, rigid body motion, normal modes. Hamilton-Jacobi Theory, and problems in relativistic mechanics.

Equivalent Courses: Previous & Current Courses
PHYS505

Simple Requisites

Course Requisite Requirements

***Prerequisite**: Graduate standing or consent of instructor and advisor*

No Requirement Level

PHYS5009 - Methods of Theoretical Physics

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
.Covers mathematics essential for PHYS 5010 and 518, including Dirac delta functions, vector spaces, operators and eigenvalues, Dirac notation, Fourier series and transforms, orthogonal polynomials, complex variables, and tensor notation.

Equivalent Courses: Previous & Current Courses
PHYS509

Simple Requisites

Course Requisite Requirements

Prerequisites
Type
Completion Requirement

Course Requirements

Complete ALL of the following Courses:

- MATH2420 - Applied Linear Algebra
- MATH3032 - Vector Analysis
- MATH3036 - Introduction to Partial Differential Equations

or equivalent, or graduate standing.

Additional Comments:

No Requirement Level

PHYS5010 - Electromagnetism

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Electrostatic and magneto static boundary-value problems, electromagnetic radiation generation, wave propagation in Materials and at interfaces, polarization characteristics of radiative processes, and the relativistic covariance of electromagnetism will be covered.

Equivalent Courses: Previous & Current Courses
PHYS510

Simple Requisites

Course Requisite Requirements

Physics Requirement
Type
Prerequisite

Physics Courses

Complete ALL of the following Courses:

- PHYS5009 - Methods of Theoretical Physics

Additional Comments:

No Requirement Level

PHYS5011 - Advanced Electromagnetism

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Selected topics taken from advanced electromagnetism: optical fiber propagation, plasma waves and instabilities, scattering of radiation, optical coherence, and other topics based upon interests of the class.

Equivalent Courses: Previous & Current Courses
PHYS511

Simple Requisites

Course Requisite Requirements

Physics Prerequisites
Type
Prerequisite

Physics Courses

Complete ALL of the following Courses:

- PHYS5010 - Electromagnetism

Additional Comments:

No Requirement Level

PHYS5018 - Quantum Mechanics

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Review of experiments leading to quantum theory: Schroedinger's Equation, applications of simple physical systems, perturbation theory, theory of angular momentum, and Dirac Theory.

Equivalent Courses: Previous & Current Courses
PHYS518

Simple Requisites

Course Requisite Requirements

Physics Prerequisites
Type
Prerequisite

Physics Courses

Complete ALL of the following Courses:

- PHYS5005 - Advanced Dynamics
- PHYS5009 - Methods of Theoretical Physics

Additional Comments:

No Requirement Level

PHYS5019 - Advanced Quantum Mechanics

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Advanced topics in quantum mechanics, including scattering theory, Feynman path integrals, an introduction to quantum field theory, and other topics based upon interests of the class.

Equivalent Courses: Previous & Current Courses
PHYS519

Simple Requisites

Course Requisite Requirements

Physics Requirements
Type
Prerequisite

Physics Courses

Complete ALL of the following Courses:

- PHYS5018 - Quantum Mechanics

Additional Comments:

No Requirement Level

PHYS5021 - Continuum Mechanics

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Stress, strain, rate of strain, and applications of these ideas in fluid dynamics and elastic body mechanics. Statics of elastic bodies and elastic waves.
Navier-Stokes equation, vorticity dynamics, flows at low and high Reynolds number. Examples taken from a broad variety of areas.

Equivalent Courses: Previous & Current Courses
PHYS521

No Requirements

PHYS5026 - Fluid Dynamics

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Basic equations, potential and viscous flow, scaling. Compressible flow including characteristics and shock waves. Magnetohydrodyamics, including MHD waves, shocks, and confinement. Fluid and MHD instabilities. Turbulence.

Equivalent Courses: Previous & Current Courses
PHYS526

Simple Requisites

Course Requisite Requirements

***Prerequisite**: Graduate standing or consent of instructor and advisor*

No Requirement Level

PHYS5027 - Geophysical Fluid Dynamics

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Dynamics of stratified, rotating fluids; governing equations of the ocean and atmosphere, inertia-gravity waves, quasi-geostrophic theory, Rossby waves, instabilities, and jets, diabetic and frictional effects, tropical atmospheric dynamics.

Equivalent Courses: Previous & Current Courses
PHYS527

Simple Requisites

Course Requisite Requirements

***Prerequisite**: Graduate standing or consent of instructor and advisor*

No Requirement Level

PHYS5032 - Atmospheric Remote Sensing

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, No Report, Standard Letter

Course Description
Physics of remote sensing using radio, microwave, infrared, visible, and ultraviolet instruments. Topics will include both passive and active systems for measuring atmospheric temperature, composition, and dynamics. Shares lectures with PHYS 4032, but is graded separately and additional graduate-level work is required.

Equivalent Courses: Previous & Current Courses
PHYS532

Simple Requisites

Course Requisite Requirements

***Prerequisite**: Graduate standing or consent of instructor and advisor*

No Requirement Level

PHYS5033 - Advanced Topics in Atomospheric Physics

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
3

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Specialized coursework in the student's areas of interest. Advanced topics in the area of atmospheric physics. Selection of topics changes from semester to semester. Current faculty interests can be found at the department web site: www.physics.nmt.edu. This course may be repeated for credit if the material covered in each instance is different.

Equivalent Courses: Previous & Current Courses
PHYS533

No Requirements

PHYS5035 - Physics of Lightning

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, No Report, Standard Letter

Course Description
Theory and experimental techniques concerning cloud charging mechanisms. Remote and in-situ sensing of lightning. Lightning phases and properties. Properties of the long spark and leaders in the lab and in the sky. Simple numerical models of cloud charging, lightning initiation, and propagation.

Equivalent Courses: Previous & Current Courses
PHYS535

Simple Requisites

Course Requisite Requirements

Physics Prerequisites
Type
Prerequisite

Course Requirements

Complete ALL of the following Courses:

- PHYS3033 - Electricity & Magnetism
  OR PHYS3034 - Radiation & Optics

Graduate standing, or consent of instructor and advisor

Additional Comments:

No Requirement Level

PHYS5036 - Atmospheric Convection

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, No Report, Standard Letter

Course Description
Governing equations, turbulence, thermodynamics, and microphysics of moist convection. Models for convection ranging from plumes and thermals through numerical simulations are discussed, as well as interactions of convection with the atmospheric environment.

Equivalent Courses: Previous & Current Courses
PHYS536

No Requirements

PHYS5045 - Techniques of Lab Instrumentation

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course provides familiarity with multiple tools used in instrumentation work, developing some applied approaches, and learning best practices for researchers using these tools. Tools and techniques to be covered will be adjusted based on the class but may include: Mechanical design and Solid works, PCB layout and design, data acquisition systems, cryogenics techniques, vacuum techniques, theory of operation of common sensors, other topics. Offered approximately every 2 years or upon request.

Equivalent Courses: Previous & Current Courses
PHYS545

No Requirements

PHYS5046L - Electric & Magnetic Measurements

General

Credit Hrs

Credit Hrs:
1

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Experiments in electricity and magnetism, emphasizing applications to measurements in physics and geophysics. Topics include DC and AC circuits, complex impedance, transformers, magnetic hysteresis, transistors, operational amplifiers, superconductivity, and student selected projects. Shares lab with Physics 3036L but graduate students will face a higher standard on lab reports and be required to do some additional formal study of electronics. The course is recommended for graduate students lacking practical electronics experience.

Equivalent Courses: Previous & Current Courses
PHYS546L

Simple Requisites

Course Requisite Requirements

***Prerequisite**: Graduate standing or consent of instructor and advisor*

No Requirement Level

PHYS5048 - Introduction Particle Physics

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course provides an introduction to elementary particles and their interactions, at a level that does not require quantum field theory. Covered topics include particle phenomenology and conservation laws, relativistic kinematics, symmetries, Feynman diagrams, gauge theories, and the Higgs mechanism. Shares lecture with PHYS 4048, with additional expectations for graduation credit.

Equivalent Courses: Previous & Current Courses
PHYS548

No Requirements

PHYS5049 - Astrobiology

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
An in-depth and interdisciplinary study of astrobiology, including interactions between living and non-living systems at multiple scales: stellar, planetary, meso, and microscopic. Addresses fundamental questions regarding the origin of life, and the possible extent and distribution of life in the universe. Combines principles of astrophysics, geosciences, planetary science, chemistry, and biology. Innovative interactive exercises and projects working in interdisciplinary groups and individually. Shares lecture with PHYS 4049, with additional expectations for graduate credit. (Same as BIOL 5049 and GEOL 5049)

Equivalent Courses: Previous & Current Courses
PHYS549

Simple Requisites

Course Requisite Requirements

***Prerequisite**: Graduate standing or consent of instructor and advisor*

No Requirement Level

PHYS5062 - Stellar Astrophysics

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course covers in-depth the physics of stars, their structure and evolution. Topics include energy generation and transport, nucleosynthesis, equations of state, stellar modeling, asteroseismology, and stellar pulsation and rotation — all studied in the context of the evolution of a star. There are detailed discussions and derivations of the various stages in star formation and evolution, and the end states of stars (e.g. white dwarfs, planetary nebulae, black holes). The course stresses current refereed literature and has occasional guest speakers on various topics.

Equivalent Courses: Previous & Current Courses
PHYS562

Simple Requisites

Course Requisite Requirements

Physics Prerequistes
Type
Prerequisite

Course Requirements

Complete ALL of the following Courses:

- PHYS4025 - Astrophysics III
  OR PHYS4026 - Astrophysics IV

or equivalent or consent of the instructor.

Additional Comments:

No Requirement Level

PHYS5063 - Extragalactic Astrophysics

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
The structure and dynamics of galaxies. Distribution of galaxy types. Potential and orbit theory. Spheroidal galaxies as self-gravitating systems. Instabilities in disk galaxies. Constraints on dark matter and on galaxy formation.

Equivalent Courses: Previous & Current Courses
PHYS563

Simple Requisites

Course Requisite Requirements

Prerequisite Requirements
Type
Completion Requirement

Course Requirements

Complete ALL of the following Courses:

- PHYS4025 - Astrophysics III
  OR PHYS4026 - Astrophysics IV

or equivalent or consent of the instructor.

Additional Comments:

No Requirement Level

PHYS5064 - Relativity and Cosmology

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
General relativity with application to cosmology. Basic principles of relativity. Applications to orbits, gravitational radiation, and black holes. Relativistic cosmography and cosmology. The early universe, galaxy formation, and active galaxies.

Equivalent Courses: Previous & Current Courses
PHYS564

Simple Requisites

Course Requisite Requirements

Prerequisite Requirements
Type
Completion Requirement

Course Requirements

Complete ALL of the following Courses:

- PHYS4025 - Astrophysics III
  OR PHYS4026 - Astrophysics IV

or equivalent or consent of instructor and advisor

Additional Comments:

No Requirement Level

PHYS5065 - Astronomical Techniques

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Optical, IR, X-ray and gamma-ray astronomical telescopes and detectors. Throughput, detector quantum efficiency, the modulation transfer function, noise and estimation error. Photometers and photometric systems, CCD imaging, slit and objective grating spectrometry, Fourier spectroscopy. Astrometry, orbit determination. Computer analysis and astronomical databases. Class work will be augmented by extensive optical observing using local facilities.

Equivalent Courses: Previous & Current Courses
PHYS565

No Requirements

PHYS5066 - Advanced Radio Astronomy

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
The design and operational characteristics of radio telescopes and interferometers . Properties of antennas, telescope optics, feeds, waveguides, receivers, and amplifiers. Spectrometers and spectroscopy. Sensitivity and noise. Amplitude and phase calibration, faint signal detection, astrometry, and mapping. Factors that affect radio data, including instrumental characteristics, atmospheric limitations, and propagation phenomena. The VLA and VLBA and the techniques of radio imaging by aperture synthesis. Hands-on astrophysical exercises to be solved by imaging.

Equivalent Courses: Previous & Current Courses
PHYS566

No Requirements

PHYS5067 - Advanced Topics in Astrophysic

General

Credit Hrs

Credit Hrs:
2

Credit Hours Max:
3

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
.A one-semester tutorial may be selected from any one of the following: our solar system, comets, solar and stellar activity, galactic structure and kinematics, active galaxies and quasars, astrophysical plasmas, accretion disks, black holes, stellar spectroscopy, stellar photometry and astrometry.

Equivalent Courses: Previous & Current Courses
PHYS567

No Requirements

PHYS5071 - Advanced Topics in Physics

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
3

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Study of a special topic not otherwise treated, normally one related to a field of research interest at NMT.

Equivalent Courses: Previous & Current Courses
PHYS571

No Requirements

PHYS5079 - Graduate-Faculty Seminar

General

Credit Hrs

Credit Hrs:
1

Grade Modes
Pass/Fail

Course Description
A seminar in which current research topics are discussed by faculty, students, and outside speakers. Graded S/U, where satisfactory performance consists of regular attendance and participation. Credit earned may not be applied towards the 30 credits required for the M.S. degree.

Equivalent Courses: Previous & Current Courses
PHYS579

No Requirements

PHYS5080 - Internship

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
4

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Internship to be conducted at a national lab, technical company, or observatory/ research center (including those on campus) working on instrumentation design, integration and testing on a project NOT associated with the student's dissertation project. The internship can occur in the US or an international lab/ business. The purpose is to increase the student's breadth of experience, work in a team environment on topics outside their project area, and potentially develop new professional contacts. The internship needs to be approved by the student's committee before it begins. It is suggested that roughly two credits be offered per month of internship duration.

Equivalent Courses: Previous & Current Courses
PHYS580

Simple Requisites

Course Requisite Requirements

***Prerequisites**: Passage of preliminary examination*

No Requirement Level

PHYS5081 - Directed Study

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
12

Credit Hours Operator:
TO

Grade Modes
Pass/Fail, No Report, Standard Letter

Course Description
Study under the guidance of a member of the graduate faculty. In general, subject matter will supplement that available in other graduate course offerings.

Equivalent Courses: Previous & Current Courses
PHYS581

No Requirements

PHYS5089L - Pilot Course Lab

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
3

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, Standard Letter

No Requirements

PHYS5090 - Independent Study

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
12

Credit Hours Operator:
TO

Grade Modes
Pass/Fail, No Report, Standard Letter

Equivalent Courses: Previous & Current Courses
PHYS590

No Requirements

PHYS5091 - Thesis

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
12

Credit Hours Operator:
TO

Grade Modes
Pass/Fail, No Report

Equivalent Courses: Previous & Current Courses
PHYS591

No Requirements

PHYS5095 - Dissertation

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
12

Credit Hours Operator:
TO

Grade Modes
Pass/Fail, No Report

Equivalent Courses: Previous & Current Courses
PHYS595

Simple Requisites

Course Requisite Requirements

Prerequisite: *Successful completion of PhD candidacy exam and Academic Advisor recommendation for candidacy.*

No Requirement Level

Science Teaching (program) Department

Master of Science for Teachers (MST)

- **Interdepartmental Program**

Overview: Provides three distinct pathways to becoming a teacher and/or enhancing STEM knowledge with a graduate degree.

Programs Offered: Master of Science for Teachers (MST), Graduate Certificate: Secondary Alternative Licensure (ALP), Graduate Certificate: Elementry Alternative Licensure (ALP), and Undergraduate Minor in Secondary Education (UMSE).

Programs

Secondary Education (minor)

[Program Overview]

Program Title
Minor in Secondary Education

Department(s)
Science Teaching (program)

Program Description
The Undergraduate Minor in Secondary Education (UMSE) will allow current undergraduate students to become certified teachers for grades 7-12 in New Mexico schools. The program is accredited by New Mexico Public Education Department (NMPED) and includes 5 classes along with supervised field experiences in local secondary schools.

Program Information & Policies

- Minimum of 18 credit hours required to obtain a minor in Secondary Education.
- Note : A grade of C– or higher is required to get ALP or UMSE credit for education courses.

Simple Requisites

Program Requirements

Minimum credit hours required—27

Restriction: If a student takes more than one minor in the CLASS Department, only six (6) credit hours of one minor may be applied towards another minor.

Minor in Secondary Education
Type
Completion Requirement

Education Course Requirements

Complete ALL of the following Courses:

- EDUC3040 - Concepts in Education
- EDUC3041 - Matching Teacher Strategy to Student Learning
- EDUC4001 - Effective Reading for Diverse Learners
- EDUC4003 - Methods & Practices
- EDUC4005 - Assessments & Measurements
- EDUC4013 - Student Teaching (Secondary)
- EDUC4014 - Student Teaching Seminar

Note : A grade of C– or higher is required to get ALP or UMSE credit for education courses.

Additional Comments:

Institute General Requirements

See the **NMT Institute General Education Core Requirements.**

No Requirement Level

GC-ATLE - G.C. in Elementary Alternative Licensure

[Program Overview]

Program Title
Graduate Certificate in Elementary Alternative Licensure

Department(s)
Science Teaching (program)

Degree & Program Code
GC-ATLE

Program Description
The Elementary Alternative Licensure Graduate Certificate will allow students with at least a Bachelor's degree to become certified teachers for grades K-8 in New Mexico schools. Teacher candidates can start teaching on the alternative licensure as soon as they are admitted into the program. The program includes 6 credit hours of upper-level coursework and 12 credit hours of graduate classes.

Note: A grade of C– or higher is requires to get ALP or UMSE credit for education courses.

Simple Requisites

Program Requirements
Note: A grade of C– or higher is requires to get ALP or UMSE credit for education courses.

Elementary Alternative Licensure Requirements
Type
Completion Requirement

Required Education Courses

Complete ALL of the following Courses:

- EDUC3040 - Concepts in Education
- EDUC3042 - Matching Teaching Strategies to Student Learning
- EDUC5002 - Effective Reading for Diverse Learners
- EDUC5004 - Methods & Practices of Teaching (Elementary)
- EDUC5006 - Teaching and Assessing Reading
- EDUC5012 - Supervised Field Experience (Elementary)

Additional Comments:

Institute General Requirements

No Requirement Level

GC-ATLS - G.C. in Secondary Alternative Licensure

[Program Overview]

Program Title
Graduate Certificate in Secondary Alternative Licensure

Department(s)
Science Teaching (program)

Degree & Program Code
GC-ATLS

Program Description
The Secondary Alternative Licensure Graduate Certificate will allow students with at least a Bachelor's degree to become certified teachers for grades 7-12 in New Mexico schools. Teacher candidates can start teaching on the alternative licensure as soon as they are admitted into the program. The program includes 6 credit hours of upper-level coursework and 12 credit hours of graduate classes.

Note: A grade of C– or higher is requires to get ALP or UMSE credit for education courses.

Simple Requisites

Program Requirements

Secondary Alternative Licensure
Type
Completion Requirement

Required Education Courses

Complete ALL of the following Courses:

- EDUC3040 - Concepts in Education
- EDUC3041 - Matching Teacher Strategy to Student Learning
- EDUC5001 - Effective Reading for Diverse Learners
- EDUC5003 - Methods & Practices of Teaching (Secondary)
- EDUC5005 - Assessments and Measurement
- EDUC5011 - Supervised Field Experience (Secondary)

Note: A grade of C– or higher is requires to get ALP or UMSE credit for education courses.

Additional Comments:

Institute General Requirements

No Requirement Level

MST - M.S. for Teachers

[Program Overview]

Program Title
Master of Science for Teachers

Department(s)
Science Teaching (program)

Degree & Program Code
MST

Program Description
The MST program provides graduate-level classroom and laboratory instruction for teachers or going into science, mathematics, engineering, and/or technology. The emphasis of the courses is on content, rather than pedagogy. MST students are encouraged to adapt activities, demonstrations, laboratory exercises and methods of teaching and apply these as projects in their own classrooms during the academic year. Courses for the participants are offered in a variety of disciplines and are led by New Mexico Tech faculty. Classes build on fundamental principles and offer new concepts and novel teaching methods. Courses are offered throughout the year via distance education with in-person course options in summer on the New Mexico Tech campus and around the state.

Degree Pathways
1. M.S. for Teachers Coursework-only
2. M.S. for Teachers with Independent Study
3. M.S. for Teachers with Thesis

Simple Requisites

Program Requirements

1.Program prerequisite: All incoming MST students must demonstrate competence in mathematics by either completing ST5001 (Credits are awarded for this course but DO NOT count towards the 30 credits needed for a MST Degree), passing the equivalent Math Competence exam, or receiving a waiver based upon previous course work. No credits are awarded for passing a Math Competence exam.

This course or the appropriate Math Competence exam/waivers is a prerequisites for admission into the MST program as a regular graduate student

2. Master of Science for Teacher students must take comprehensive and specialty courses across the disciplines of Biology, Chemistry, Physics, Geology, Mathematics, Engineering, and Computer Science for a total of 30 credit hours. All incoming students must choose (A) **STEM Breadth** or (B) **STEM Depth** option for their degree. By the end of the second semester in the program, students must choose between independent study, thesis, or coursework-only option for program completion.

3. Degree completion requirements; students will submit a portfolio to the MST office prior to their final semester. Contents of portfolio will depend on degree pathway and should be discussed with the MST program director. Examples of artifacts that may be included in a portfolio are (a) Lesson plans with STEM K-12 classroom activities (topics chosen from at least two MST courses), (b) Feedback from the respective course instructors on the accuracy of the STEM content, and (c) Feedback from at least three fellow MST students, as well as (d) Writing a self-reflection on how to further improve their STEM content teaching from their experience in the MST program.

Note: A grade of C or higher is required to get credit toward an MST degree. (this is an institutional requirement for graduate students)

Program Requirements
Type
Completion Requirement

All students must take

Complete ALL of the following Courses:

- STCH5035 - Technical Communication for Teachers

STEM Breadth option will choose at least 5 STCH courses (15 credits) from among the list below

Earn at least 15 credits from the following:

- STCH5002 - Biology for Educators
- STCH5005 - Chemistry for Educators
- STCH5010 - Computer Science for Educators
- STCH5015 - Engineering for Educators: Looking Underground
- STCH5020 - Geology for Educators
- STCH5025 - Math for STEM Educators
- STCH5030 - Physics for Educators

STEM Depth option will choose at least 2 courses (6 credits) from among the list below:

Earn at least 6 credits from the following:

- STCH5002 - Biology for Educators
- STCH5005 - Chemistry for Educators
- STCH5010 - Computer Science for Educators
- STCH5015 - Engineering for Educators: Looking Underground
- STCH5020 - Geology for Educators
- STCH5025 - Math for STEM Educators
- STCH5030 - Physics for Educators

STEM Breadth option will choose 4 courses (12 credits)

Earn at least 12 credits from the following:

- STCH5026 - Understanding Statistics
- STCH5031 - Physics of the Solar System
- STCH5006 - Chemistry of Biomolecules
- STCH5021 - Earth History
- STCH5009 - Current Concepts & Technology in Biology
- STCH5016 - Engineering for Educators: Drones & Biomimicry
- STCH5011 - Cybersecurity Fundamentals
- STCH5081 - Directed Study

STCH 5081 Directed Study (if approved by the student's advisor)

STEM Depth option will take 5 courses (15 credits) in one discipline and 2 additional courses (6 credits) from two other disciplines from among the list below

Earn at least 15 credits from the following:

- STCH5026 - Understanding Statistics
- STCH5031 - Physics of the Solar System
- STCH5006 - Chemistry of Biomolecules
- STCH5021 - Earth History
- STCH5009 - Current Concepts & Technology in Biology
- STCH5016 - Engineering for Educators: Drones & Biomimicry
- STCH5011 - Cybersecurity Fundamentals
- STCH5081 - Directed Study

STCH 5081 Directed Study (if approved by the student's advisor)

Independent Study Option

Complete ALL of the following Courses:

- STCH5090 - Independent Study

Thesis Option

Complete ALL of the following Courses:

- STCH5091 - Thesis

Additional Comments:
Depending on the scope of independent study or thesis projects, students may also need to enroll in Research and Documentation as a Directed Study course. Please contact your academic advisor/MST Director for details.

Additional courses to complete 30 credit hours may be chosen from other Tech courses numbered 3000 or above. These courses can be substituted for specialty credit requirements upon approval of the advisor.

*STEM Depth eligibility and approvals: Students with a prior bachelor's degree in one of the disciplines (or closely related fields) offered by the MST program may, with the consent of the student's advisor, and the department chair associated with the discipline, use up to 15 credit hours of non-MST courses from the selected discipline to satisfy the "specialty courses" requirement. The consent of the advisor and the associated department chair or instructor is required in order to apply non-MST courses offered by other NMT departments.

Institute General Requirements
See the **New Mexico Tech General Graduate Program Requirements** for further information.

No Requirement Level

[Learning Outcomes]

Outcome
MST students will demonstrate understanding of STEM content.

Outcome
MST students will develop effective technical communication skills.

Outcome
MST students will demonstrate transfer of STEM content to the K-12 classroom setting

Courses

STCH5001 - Math for Teachers

General

Credit Hrs
Credit Hrs:
2

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course is a basic survey of the principles of contemporary mathematics. The course will emphasize the algebra of sets and numbers, exponentials and logarithms, complex numbers, vectors and matrices, and applications for each. This course or the waiver in it is a prerequisite for all other MST courses. The credits for this course is being awarded however they do not count towards the MST degree.

No Requirements

STCH5002 - Biology for Educators

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Current Biological topics and related laboratory techniques will be explored in a lecture/demo/laboratory setting. Topics may include molecular biology tools, ecological applications, bioinformatics, microbiology, genetics and genetic engineering.

Simple Requisites

Course Requisite Requirements

No Requirement Level

Prerequisite: Graduate standing in the MST program or permission of the Program Director.

STCH5005 - Chemistry for Educators

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Chemistry for Educators is intended to serve as an introduction to the fundamentals of chemistry and its applications. It will cover the core Chemistry topics that are required by the Next Generation Science Standards. In this course, students will be introduced to measurements in chemistry, atoms and elements, molecules and compounds, structure and properties of matter, energy, waves and electromagnetic radiation, chemical composition and reactions, chemical forces and interaction, solutions, and basic concepts in nuclear chemistry.

Simple Requisites

Course Requisite Requirements

No Requirement Level

Prerequisite: Graduate standing in the MST program or permission of the Program Director.

STCH5006 - Chemistry of Biomolecules

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course will focus on the structure-function of biological macromolecules, basic enzymology, vertebrate biochemistry, and the study of vitamins, hormones, biochemical genetics, and nutrition. It will provide an overview of basic biochemistry and will emphasize on structure, nomenclature, and reactions of biologically active compounds such as carbohydrates, lipids, proteins, nucleic acids, and enzymes, a detailed examination of major pathways of cellular metabolism, regulation, underlying mechanisms, and driving forces. The material is valuable for promoting informed and creative approaches to biomedical challenges.

Simple Requisites

Course Requisite Requirements

No Requirement Level

Prerequisite: Graduate standing in the MST program or permission of the Program Director.

STCH5009 - Current Concepts & Technology in Biology

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course provides a survey of the discipline of computer science presenting a layered view of computing systems and a pervasive notion of abstraction. Students will get an introduction to hardware components; information representation; algorithms; programming languages; operating systems; applications such as information systems and artificial intelligence; computer networks and the Internet; computer security; and ethical issues in computing.

Simple Requisites

Course Requisite Requirements

No Requirement Level

Prerequisite: Graduate standing in the MST program or permission of the Program Director.

STCH5010 - Computer Science for Educators

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Standard Letter

Course Description
This course provides a survey of the discipline of computer science presenting a layered view of computing systems and a pervasive notion of abstraction. Students will get an introduction to hardware components; information representation; algorithms; programming languages; operating systems; applications such as information systems and artificial intelligence; computer networks and the Internet; computer security; and ethical issues in computing.

Simple Requisites

Course Requisite Requirements

No Requirement Level

Prerequistes: Graduate standing in the MST program or permission of the Program Director.

STCH5011 - Cybersecurity Fundamentals

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Cybersecurity Fundamentals is developed to prepare teachers to deliver a course that uses Kali Linux OS to teach the basics of protecting Internet-connected systems from passive vulnerabilities as well as cyber-attacks. Topics include cyber ethics and cyber laws, Linux basics, networking technologies, definitions of fundamental cybersecurity terminologies, what to hack and how to hack, principles and applications of cryptography, different forms of social engineering attack, how to perform penetration tests as an ethical hacker, and the tools of vulnerability assessments.

Simple Requisites

Course Requisite Requirements

No Requirement Level

Prerequisite: Graduate standing in the MST program or permission of the Program Director.

STCH5015 - Engineering for Educators: Looking Underground

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Similar to the way medical imaging techniques like MRIs and x-rays look into the human body, geophysical methods like radar and ultrasound can look underneath the surface of the ground or inside rocks. This class provides an overview of fundamental wave propagation behaviors for mechanical and electromagnetic

waves and how those behaviors can be used to investigate and describe the investigated area. Applications of these techniques, from geology to archaeology, will also be explored to understand the capabilities and limitations of the methods.

Simple Requisites

Course Requisite Requirements

No Requirement Level

Prerequisite: Graduate standing in the MST program or permission of the Program Director.

STCH5016 - Engineering for Educators: Drones & Biomimicry

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Standard Letter

Course Description
During the millions of years of evolution, nature has developed processes, objects, materials, and functions to increase efficiency. Through biomimicry and inspiration from this treasure trove, engineers and biologists have become interested in learning from biological insights. Sometimes looking at nature provides us the best answers for the development and optimization of different types of engineering systems including drones. Nature always has effective solutions for many complex tasks in different aerospace systems, such as energy, locomotion, navigation, control, sensing, and design. The growing science of biomimicry focuses on what engineers can learn quite a lot about efficient solutions for aerospace systems that nature has spent millions of years refining. As an example, one of the interesting aspects of avian flight dynamics is how natural flyers, such as birds and insects, can deform their shape to optimize their flight in different flight modes. Therefore, the concept of morphing structures for aerial vehicles can be originated from the observation of birds as they fly. This course discusses the knowledge learned and inspired by nature and biological systems to solve concrete drone engineering problems. Open-source software called XFLR5, FlapSim and WakeSimm, and OpenSim will be introduced and used for modeling, analysis, and simulation of bioinspired drone concepts.

Simple Requisites

Course Requisite Requirements

No Requirement Level

Prerequisite: Graduate standing in the MST program or permission of the Program Director.

STCH5020 - Geology for Educators

General

Credit Hrs

Credit Hrs:
3

Credit Hours Max:
3

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This is a field-based course that involves camping, limited hiking, and visits to national parks and mine sites in the western U.S. Students will camp in areas of spectacular geologic settings. In-the-field assignments will comprise the basis for grading. Regional and local geologic settings of national parks and mineral deposits are reviewed, and the clash between mineral utilization and natural resources occurrence are discussed. Introduction to geologic mapping and use of geologic compass. Evening “take-away” sessions allow for discussion of our field observations and assessment of our daily activities.

Simple Requisites

Course Requisite Requirements

No Requirement Level

Prerequisite: Graduate standing in the MST program or permission of the Program Director.

STCH5021 - Earth History

General

Credit Hrs

Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
History of the Earth and its life. Formation and chemical evolution of Earth and its atmosphere and ocean. Tectonic evolution of continents. Early evolution and patterns/processes of life. Fundamentals of evolution. Long-term interactions between geosphere, atmosphere, and biosphere. Projects will adapt course concepts for K-12 classroom activities that meet Next Generation Science Standards.

Simple Requisites

Course Requisite Requirements

No Requirement Level

Prerequisite: Graduate standing in the MST program or permission of the Program Director.

STCH5025 - Math for STEM Educators

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course is a survey of mathematical topics covered in K-12 education that are particularly applicable to STEM fields. The course will develop the necessary background mathematics and indicate how it can be applied in scientific fields, presented in a way that the student will be able to bring these applications directly to their classroom. Selected topics, and their applications, include rates of change (kinematics), vectors and their operations (forces and work), ellipses (planetary orbits), hyperbolas (lenses and telescopes), laws of sines and cosines (civil engineering), polar coordinates (navigation), exponential decay (radioactivity), and modular arithmetic. (cryptography and security of financial transactions)

Simple Requisites

Course Requisite Requirements

No Requirement Level

Prerequisite: Graduate standing in the MST program or permission of the Program Director.

STCH5026 - Understanding Statistics

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
This course help students understand summarized data (ungrouped and grouped) in both descriptive and inferential statistical applications through the use of frequency distributions, measures of central tendency and measures of dispersion; outcome probabilities and the various concepts related to discrete and continuous probability distributions; the concepts surrounding random sampling and interval estimating for populations and large & small samples; classical hypothesis testing and with one-tailed & two-tailed testing; comparisons involving means; goodness of fit test; regression analysis ; one-way analysis of variance (ANOVA) and the application to math & science teachers' data analysis.

Simple Requisites

Course Requisite Requirements

No Requirement Level

Prerequisite: Graduate standing in the MST program or permission of the Program Director.

STCH5030 - Physics for Educators

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Standard Letter

Course Description
Physics for Educators is a class on fundamental physics topics: Mechanics, Electricity and Magnetism, Waves and Oscillations and their application to applied physics: Geophysical Fluid Dynamics, Atmospheric Physics and Oceanography. An added value to the class is that working through the modules that consist of practical work as well as the lectures, the students will be able to connect the basics, conventionally taught from physics books, with current research. There are 30 modules assigned to the class plus 8 interactive discussions. Each module guides the student through a specific topic through preparation for the lecture to practical work.

Simple Requisites

Course Requisite Requirements

No Requirement Level

Prerequisite: Graduate standing in the MST program or permission of the Program Director.

STCH5031 - Physics of the Solar System

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
The course will provide an overview of the Solar System. Fundamental astrophysics and physics concepts will be reviewed while presenting and in depth review of the main components of our Solar System.

Simple Requisites

Course Requisite Requirements

No Requirement Level

Prerequisite: Graduate standing in the MST program or permission of the Program Director.

STCH5035 - Technical Communication for Teachers

General

Credit Hrs
Credit Hrs:
3

Grade Modes
Standard Letter

Course Description
This course is designed to help you learn the skills you will need to develop, research, write and present professional documents in multiple contexts. All technical and professional documents are action-oriented, and we will consider the ways that content, style, organization, format, visuals, and medium help

readers to take efficient and effective action. In addition, this course provides you with an overview of research and citation practices in various fields, with particular attention given to the sciences and science education, and an overview of ethical practices when conducting a study with human subjects. Through the instruction and assignments in this course, you will learn to improve your communication skills and improve the communication skills of your students

Simple Requisites

Course Requisite Requirements

No Requirement Level

Prerequisite: Graduate standing in the MST program or permission of the Program Director.

STCH5050 - Mathematics for Teachers I

General

Credit Hrs

Credit Hrs:
2

Grade Modes
Audit, Pass/Fail, Standard Letter

Equivalent Courses: Previous & Current Courses
ST550

No Requirements

STCH5081 - Directed Study

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
9

Credit Hours Operator:
TO

Grade Modes
Audit, Pass/Fail, Standard Letter

Course Description
Study under the guidance of a member of the graduate faculty. In general, subject matter will supplement that available in other graduate course offerings. Comprehensive/ concentration area: Chemistry

No Requirements

STCH5090 - Independent Study

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
9

Credit Hours Operator:
TO

Grade Modes
Pass/Fail, No Report, Standard Letter

Course Description
An IS provides the student with an opportunity to engage in a plan of study under the supervision of NMT Faculty to (a) explore in more depth or detail an area to which the student has been introduced in previous courses or in the field of science-based education and (b) contribute to the knowledge content and/or the application of the knowledge content of the selected area. An IS is intended to be a project initiated by the student and designed in conjunction with his/her advisory committee.

Equivalent Courses: Previous & Current Courses
ST590

No Requirements

STCH5091 - Thesis

General

Credit Hrs

Credit Hrs:
1

Credit Hours Max:
6

Credit Hours Operator:
TO

Grade Modes
Pass/Fail, No Report

Course Description
A Thesis is similar to an IS except that it normally involves research over an extended period of time and follows the guidelines of the Academic Advisor's or Research Advisor's Department. In general, the requirements for a Master of Science for Teachers student completing a thesis are no different from the requirements for any other graduate student completing a thesis within the same department.

Equivalent Courses: Previous & Current Courses
ST591

No Requirements