New Mexico Tech (NMT or Tech) is a public, Hispanic Serving Institution of higher learning that serves a diverse population by integrating education, research, public service, and economic development through emphasis on science, technology, engineering, mathematics, natural resources, communication, and cultural awareness. NMT offers Bachelor’s, Master’s, and Doctoral degrees in science and engineering disciplines. The campus is located in sunny Socorro, NM, boasting over 300 days of sunshine per year, and situated one hour south of Albuquerque in the Rio Grande valley at an elevation of 4,600 feet. Graduate students make up nearly 25% of the total student population of approximately 2,100. Tech’s overall student to faculty ratio of 13 to 1 allows for intensive one-on-one interaction between students and faculty.

Why should you do your graduate work at New Mexico Tech?

Graduate education provides students the opportunity to specialize beyond the general undergraduate education. NMT provides a high quality, low cost graduate education with extensive opportunities to engage in research to advance science and engineering. Students in Master’s programs will deepen their understanding of a specialty area and engage in a research project that may lead to publication. Doctoral students go beyond the Master’s level in a number of ways. They are required to advance understanding in their field with original contributions in addition to receiving education and mentoring. Generally, doctoral students will publish and present their research, often publishing numerous papers with their research advisor(s). In many cases, doctoral students mentor small research groups of less advanced students to practice for leading major research programs in their future careers. These experiences at NMT prepare our graduate students to excel in their careers and result in an excellent return on students’ investments of time and tuition.

We invite you to join our outstanding students in these graduate opportunities.

Lorie M. Liebrock, Ph. D.
Dean of Graduate Studies, Professor of Computer Science and Engineering
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CIVIL AND ENVIRONMENTAL ENGINEERING

The Department of Civil and Environmental Engineering at New Mexico Tech offers a Bachelor’s degree in Civil Engineering (with areas of specialization in structural, geotechnical, or water resources) and Bachelor’s and Master’s degrees in Environmental Engineering.

Both undergraduate programs are designed to give students a strong foundation in engineering and science, and strive to produce well-balanced graduates ready to enter the civil engineering and environmental engineering industries or continue their education with graduate studies.

The Environmental Engineering graduate program at New Mexico Tech provides a unique educational and research experience in the engineering and science of the natural environment and environmental protection. The research and plan of study are fine-tuned for each individual, drawing upon the strengths of the student, taking advantage of program capabilities, and complementing research activities within and outside New Mexico.

Areas of Research

Air Quality Monitoring, Air Pollution Control
—Dr. Christian Carrico

Structural Engineering
—Dr. Wesley Cook, P.E.

Hazardous Waste Management, Biological and Chemical Waste Treatment, Risk Assessment
—Dr. Frank Y.C. Huang, P.E.

Water and Wastewater Treatment, Groundwater Contamination, Site Remediation, Solid and Hazardous Waste Management, Risk Assessment
—Dr. Clinton Richardson, P.E., B.C.E.E.

Structural Engineering, Earthquake Engineering, Structural Dynamics, Transport Engineering
—Dr. Claudia M.D. Wilson

About Our Department

Faculty: 6
Adjunct faculty: 6
Undergraduates: 95
Graduate students: 7

Degrees Offered:
B.S.
M.S. in Environmental Engineering

Graduate Student Profile

Amy Reed was born in McKinney, Texas. Oluwatobi Oke comes to New Mexico Tech from Ilesha, Nigeria. Both started their graduate studies in Environmental Engineering in Fall 2013. Amy is currently working with Gordon Environmental, Inc. of Albuquerque, New Mexico developing a cost benchmark for New Mexico’s Solid Waste Industry of landfills, transfer stations, collection centers, and rural collection haulers. Oluwatobi is evaluating physical and optical properties of soot aerosols from open biomass burning from regional wildfires and cook-stove emissions via test burns of carbonaceous materials.

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Jones Hall Annex, home of Civil and Environmental Engineering
The Computer Science and Engineering Department offers graduate degrees in the exciting, rapidly growing, and constantly changing field of Computer Science. The department has been designated a Center of Academic Excellence in Information Assurance Education and Research by the National Security Agency and the Department of Homeland Security.

The department’s graduate programs provide students the opportunity to take courses, select advisory committee members, and pursue research in an area of interest to the student and their research advisor. The Master of Science program is designed for students who wish to further broaden or deepen their knowledge of computer science; both thesis and non-thesis options are offered. 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.

Graduate students have several possible funding opportunities including teaching and research assistantships, the Scholarship for Service program, and on-campus funding opportunities from ICASA, PRRC, and EMRTC. After graduation, our students have found employment in large, medium, and startup companies; in national labs; in government agencies and as faculty members.

Areas of Research

Cyber Security, Parallel Processing, Visualization — Dr. Lorie Liebrock

Data Management, Information Systems, Mobile Security and Privacy — Dr. Subhasish Mazumdar

Cloud Computing, Big Data, GPU Computing — Dr. Abdelnouraam Rezgui

Computer Security, Cloud and Distributed Computing, Software Engineering — Dr. Dongwan Shin

Securing Data and Communications, Sensor Networks, Neural Network Applications — Dr. Hamdy Soliman

Mobile Computing, Computer and Network Security, Machine Learning and Applications — Dr. Jun Zheng

About Our Department

Faculty: 8
Undergraduates: 190
Graduate students: 20

Degrees Offered:
B.S.
M.S. in Computer Science
M.S. in Computer Science with Information Technology Option
Ph.D. in Computer Science

Graduate Student Profile

Yang Wang is a Ph.D. student from China working on mobile device security while working as a Teaching Assistant in the department. He has developed a method of evaluating the security risk of Android applications based on their requested permissions and a platform to automatically test and analyze the applications in both static and dynamic ways. He has also created visual tools to notify users of the potential risks from applications being installed.
The Department of Electrical Engineering blends a strong undergraduate program with an active, research-based graduate program. Both programs strive to provide a balance of theory and practice to prepare graduates for success in their profession or advanced education.

Members of the faculty have a variety of research interests that provide a range of opportunities for graduate students. Research interests center around sensing and instrumentation with applications in spacecraft, optics, thunderstorms, imaging, inertial navigation, and robotics. Students are also provided unique research opportunities thanks to the department’s close association with research facilities on campus. These facilities provide opportunities for students to participate in leading scientific and engineering projects and acquire valuable educational and research experiences.

Areas of Research

Digital Signal Processing Applied to Thunderstorms and Speech Recognition  — Dr. Rene Arechiga


Remote Sensing Applications, which include Embedded Multispectral/Hyperspectral Imaging Systems, Unmanned Aircraft Systems-Based Inspection Applications  — Dr. Hector Erives

Spacecraft Instrumentation, Astronomical Instrumentation, Data Assimilation, Space Plasma Physics, Optical Interferometry, Sensor Networks  — Dr. Anders Jorgensen

Signal and Image Processing with emphases on Nonuniform Sampling, Modeling and Estimation of Wireless Communication Channels  — Dr. Seda Senay

Optics and Wavefront Science, Adaptive Optics, Photonics, Optical Coatings, Electrical Properties of Energetic Materials, Internal and External Ballistics  — Dr. Scott Teare

Analysis and Control of Electromechanical Systems, Power Systems, Robotics  — Dr. Kevin Wedeward

About Our Department

Faculty: 7
Undergraduates: 115
Graduate students: 13

Degrees Offered:
B.S.
M.S. in Electrical Engineering
Graduate Certificate in Electrical Engineering

Graduate Student Profile

Ryan Jackson is developing and verifying a mathematical model for a small-scale, remote-controlled helicopter by collecting data from an inertial measurement unit (gyroscope, accelerometer and compass) mounted on the helicopter.

Data he collects from the sensors includes pitch, roll and yaw, along with lateral, longitudinal and vertical velocities, which is used to verify an analytical mathematical model developed for the helicopter.

Ultimately, the mathematical model and sensors will facilitate autonomous control of the helicopter for imaging and inspection applications.
The New Mexico Tech Master of Engineering Management Graduate Program is positioned at the intersection of engineering and business, with an emphasis on achieving depth of understanding of issues specific to innovation in a technology environment.

- 30-hour STEM degree program available via live webcasts
- Calculus-based BS required
- 2+ years work experience preferred
- Emphasis on projects using modeling and simulation
- Workplace application encouraged for thesis project

Areas of Research

Modeling and Simulation of Complex Social Systems, Evolution of Innovation, Technology Commercialization

—Dr. Peter Anselmo

Managing Complex Technical Projects

—Dr. Warren Ostergren

Leadership Development, Technology Commercialization, Decision Analysis and Heuristics

—Dr. Frank Reinow

Management Science, Data Envelopment Analysis, Policy Analysis

—Dr. Toshi Sueyoski

Applied Economics, Econometrics

—Dr. Yan Yuan

About Our Department

Faculty: 5
Adjunct faculty/lecturers: 3
Graduate students: 19

Degree Offered:
Master of Engineering Management (MEM)

Graduate Student Profile

Sarah Quintana is an R&D Engineer at the Los Alamos National Laboratory and is currently pursuing a Master’s degree in Engineering Management as a distance education student. She is working on her final project, “Development of an Improved Process for Installation Projects of High Technology Manufacturing Equipment”, with Dr. Warren Ostergren. High technology manufacturing equipment is utilized at LANL to support Nuclear Missions; the process required to complete projects involving this equipment is unique and involves numerous steps. Based on her recent work with the Direct Current Arc Glovebox Design, Fabrication and Installation Project, Sarah is working to improve these processes and implement lessons learned for continued project improvement and success.

Speare Building, home of Engineering Management
Materials and their many uses dominate our world. Developing new materials, new processes to make them, new theories and computational models to understand them, and new means to measure their properties are the emphases of Materials and Metallurgical Engineering at New Mexico Tech.

Our research spans many areas and applications—from environmentally benign polymers for electronics packaging to foundational theory meant to greatly extend the life of bonding agents; from photonic band gap analyses of protective coatings to combating microbial induced corrosion; from smart adaptive shape-memory metals to biologically inspired metal-ceramic interfaces for orthopedics, super ion-conducting ceramics to terahertz photodetectors; from ultralight nanostructured aluminum composite armor cladding to single crystal superalloys for high performance aircraft engines.

The department is distinguished by the broad range of hands-on experimental techniques in materials science, the strong integration between its undergraduate and graduate programs, and the ability to approach new frontiers in materials technology through close interaction across the primary materials sub-disciplines of polymers, ceramics, metals, composites, and nano/bio materials. The atmosphere for graduate research in materials is distinguished by having world-leading faculty working closely with graduates and post-graduates to create personalized research and learning experiences. Students are funded through teaching and research assistantships.

Areas of Research

Deformation and Fracture of Metals, Composites, Thin Films, Microstructure/Property Relationships, Super Alloys, Composites, Smart Materials

— Dr. Bhaskar Majumdar

Thermal and Mechanical Properties of Epoxies, Thermodynamics of Phase Transitions and of Inhomogeneous Polymeric Materials, Chemical Kinetics, Molecular Dynamics Simulations, Density Functional Theory, Glass Transition

— Dr. John McCoy

Lipid Particle Characterization, Biomedical Imaging, Liposomes, Microbubbles, Ultrasound, Fluorescence Microscopy

— Dr. Michaelann Tartis

Biofuel Conversion and Production, Catalyst Characterization, Hydrogen Production

— Dr. Corey Leclerc

Nanoparticle Reactor Design, Nanomaterial Transport Modeling, Applied Nanotechnology, Optical Waveguides

— Dr. Dale Henneke

Optoelectronics, Nanostructures, Nanotechnology, Terahertz Lasers and Photodetectors, Solid State Physics of Nanostructures, Semiconductor Materials

— Dr. Nikolai Kalugin

Areas of Research

Tarnish-Resistance, Electrochemical “Blackening” of Steel, Photo-Corrosion of Zinc and Copper, Anodizing Galvanized Steel

— Dr. David Burleigh

Computational Modeling of Materials for the Energy and Environment, Surfacing Engineering, Catalysys, Gas Sensors, Proton Transport

— Dr. Pabitra Choudhury

Fabrication and Characterization of Ceramics, Novel Ceramic Processing, Thin Film Processing, Hot Forging of Oxide Ceramic Composites

— Dr. Paul Fuierer

Graduate Student Profile

Michael McLeod is pursuing a doctoral degree in the subject area of magnetocaloric materials, which have applications in solid-state magnetic refrigeration. Such a technology offers high payoffs in terms of energy savings and elimination of ozone depleting gases. Michael’s work involves alloy design and novel processing techniques to boost magnetocaloric efficiency in Heusler class of intermetallic systems. Michael hails from Colorado but likes the small campus research setting at NMT. He enjoys pick-up soccer games on the playing field.
MECHANICAL ENGINEERING

The mission of the Department of Mechanical Engineering at New Mexico Tech is to provide a quality education, to conduct strong research programs, to foster a close partnership with industry and government, and to provide related service to the campus community and the community at large.

A major focus of the department’s activities is to provide quality engineering education with sufficient scope to include the basic and specialized engineering training necessary for current and emerging needs of society. The department has related responsibility to contribute to the advancement of knowledge by conducting research at the cutting edge of science and technology.

Areas of Research

Explosives Engineering: Energetic Materials, Linear and Conical Shaped Charges, Oblique Shock Reflection — Dr. Bin Lim

Mechatronic Systems Engineering: Intelligent Systems, Complex Nonlinear Systems, Structural Monitoring — Dr. Andrei Zagrai

Solid Mechanics: Shock Dynamics and Thermal Properties of Fluid-Filled Opencell Foams — Dr. Ashok Ghosh

Solid Mechanics: Impact Studies, Dynamic Behaviors of Materials — Dr. Jamie Kimberley

Robotics: Haptic Technologies, Dynamic Modeling — Dr. David Grow

Shock and Gas Dynamics: Experimental Thermal-Fluid Dynamics, High-Speed Gas Dynamics, Thermal Convection Problems — Dr. Michael Hargather

Computational Fluid Dynamics: Internal Combustion Engines, Renewable Energy — Dr. Nadir Yilmaz

Thermal Fluid Science: Wall-Bounded Flow, Flow Instabilities, Enhancing or Reducing Heat Transfer Coefficients, Turbulent Mixing, Fluid Drag — Dr. Tie Wei

About Our Department

Faculty: 12
Adjunct faculty: 12
Undergraduates: 343
Graduate students: 63

Degrees Offered:

B.S.
M.S. in Mechanical Engineering with Specialization in Explosives Engineering, Fluid and Thermal Sciences, Mechatronics Systems Engineering, or Solid Mechanics
Ph.D. in Mechanical Engineering (currently in proposal stage)

Ben Cooper’s Master's research is a collaboration with the Air Force Research Lab to develop next generation space systems. He is involved in the design of science payloads for high altitude balloon and suborbital rocket launches, as well as a student-designed nanosatellite for low earth orbit. His primary research is in Structural Health Monitoring, which uses ultrasonic wave pulses to interrogate a structure and detect damage.

Weir Hall, home of Mechanical Engineering
**MINERAL ENGINEERING**

Mineral Engineering is a non-traditional mining program that builds upon the more traditional degrees of geological engineering and mining engineering. The program is designed to meet the needs of the changing industries of mining and construction. Students seeking a Master of Science in Mineral Engineering may specialize in Mineral Exploration, Geotechnical Engineering, or Explosive Engineering.

The department has modern, well-equipped labs for instruction and research in soil and rock mechanics, ventilation, blast vibrations, mineral evaluation, and computer applications. The department also maintains its own experimental underground mine for instruction and research use by the students and faculty. Students often work with faculty members on research and consulting projects both in the labs and in the field at the mine site. Such opportunities allow students valuable hands-on experience in solving mining/mineral-related and geotechnical problems.

**Areas of Research**

- Applied Mineral Exploration, Ore Deposits, Natural Resource Utilization
  — *Dr. William X. Chávez, Jr.*
- Geomechanics, Numerical Modeling, Code Development
  — *Dr. Ali Fakhimi*
- Site Investigation, Blasting and Rock Fragmentation, Mine Design, Geomechanics
  — *Dr. Navid Mojtabai*
- Soil Mechanics, Image Processing, X-Ray Computer Tomography
  — *Dr. Mehrdad Razavi*

**About Our Department**

- Faculty: 4
- Adjunct faculty: 6
- Undergraduates: 30
- Graduate students: 22

**Degrees Offered:**

- B.S.
- M.S. in Mineral Engineering
- M.S. in Mineral Engineering with Specialization in Mineral Exploration, Geotechnical Engineering, or Explosive Engineering

**Graduate Student Profile**

*Ali Tarokh* joined the mineral engineering graduate program coming from a mining engineering background and based on the recommendation of a friend studying at Tech. “Most of the research going on in the department was focused on interdisciplinary studies with applications in mining, civil and petroleum engineering that seems to be a trend for the future. During my stay at New Mexico Tech I was fortunate to work with Dr. Fakhimi on a unique but controversial research topic of ‘size effects on fracture process zone.’ This research involved conducting numerical simulations of rock fracture and investigating the issue of scale effect. We managed to publish several journal and conference papers. I won two prestigious awards of ‘Best Student Paper Award’ and ‘Best M.S. Thesis in Rock Mechanics Award’ from the American Rock Mechanics Association (ARMA) in 2012 and 2013 respectively.”
PETROLEUM ENGINEERING

New Mexico Tech has more than 80 years experience educating petroleum engineers, dating from the 1930’s when we were known as the New Mexico School of Mines.

Today, with the world’s demand for oil still growing, we are at the forefront in petroleum education and technology. Opportunities exist to conduct either applied or basic research at the Petroleum Recovery Research Center (PRRC), a research division of New Mexico Tech, or within the Petroleum and Chemical Engineering program. Graduates are well-positioned to acquire high paying, technical jobs in the oil and gas industry.

Areas of Research

Well Testing, Reservoir, Analytical Solutions  —Dr. Her-Yuan Chen
Formation Evaluation/Petrophysics, Naturally Fractured Reservoirs, Unconventional Gas Recovery  —Dr. Thomas Engler
Production and Pressure Transient, Tight Gas Reservoirs, Well Testing  —Dr. Mike Kelly
Catalysis for Biorefineries, Hydrogen Generation, Biofuels, Petrochemicals, Ethanol Conversion  —Dr. Corey Leclerc
Carbon Sequestration, Membrane Technology  —Dr. Robert L. Lee
Drilling Fluids, Multiphase Flow and Artificial Lift  —Dr. Tan C. Nguyen
Gas Flooding Processes, Flow Heterogeneities  —Dr. Hamid Rahnema

About Our Department

Faculty: 7
Adjunct faculty: 9
Undergraduates: 192
Graduate students: 37

Degrees Offered:

B.S.
M.S. in Petroleum Engineering
Ph.D. in Petroleum Engineering

Graduate Student Profile

Sebastian Pivnicka is a Master’s student in Petroleum Engineering working on pressure prediction models to improve drilling efficiency, reduce the risk of blowouts, and allow for the ability to drill into more challenging formations.

Drilling fluids exhibit a change in viscosity as a function of time (thixotropy). This is due to the build-up of “structure,” which results from the clay particles arranging themselves into something resembling a house of cards. This “structure” is what gives drilling fluids the ability to suspend and remove rock cuttings from the wellbore.

Sebastian measures various empirical parameters that affect fluid thixotropy in the lab, and uses these in a simulator to predict pressure loss in pipe as a function of time. Model validation will be performed in the Hydraulics Testing Facility at New Mexico Tech.

Sebastian has received a co-op internship with ConocoPhillips for one semester.
SCIENCE

Biology 12
Chemistry 13
CLASS 14
Earth & Environmental Science 15
Master of Science for Teachers 16
Mathematics 17
Physics 18
The Biology Masters program prepares students for further graduate study and for private and public sector jobs in research, education, medicine, and environmental management.

Graduate seminars promote the development of essential written communication skills while addressing cross-cutting topical issues such as astrobiology, aging, genomics, and nanotechnology.

Faculty in the Biology Department at New Mexico Tech have secured research funding in recent years from multiple sources including the National Science Foundation, the National Institutes of Health (NIH), the Office of Naval Research, the New Mexico Waste Management Education and Research Consortium, and the New Mexico Water Resources Research Institute. This extracurricular funding provides stipends for graduate research assistants. Students conduct research on topics that span a wide range of medically and environmentally related areas, frequently in collaboration with other departments, such as Chemistry, Mathematics, Chemical Engineering, and E&ES. Their graduate coursework supports these efforts.

Areas of Research

Planetary Extremophiles  
—Dr. Tom Kieft

Biology of Aging, Evolutionary Constraint  
—Dr. Kevin Kirk

Bioinformatics, Ancient DNA  
—Dr. Rebecca Reiss

Anti-cancer and Anti-bacterial Drug Discovery, Anti-microbial Materials, Biosensors  
—Dr. Snezna Rogelj

Emerging Infectious Diseases  
—Dr. Jamie Voyles

About Our Department

Faculty: 5
Undergraduates: 110
Graduate students: 7

Degrees Offered:
B.S.
M.S. in Biology

Graduate Student Profile

Gina Nguyen came to New Mexico Tech in 2009 and graduated in 2013 with a Bachelor’s in Biology, a Bachelor’s in Psychology with a minor in Chemistry, and a Master’s in Biology. Her thesis is titled “Drug-induced Growth Inhibition of Human Glioblastoma.”
CHEMISTRY

The Chemistry Department offers a balance between pure and applied chemistry. The program emphasizes development of a strong foundation in the fundamental areas of chemistry, preparing students for the diverse opportunities available to chemists. Well-equipped teaching and research laboratories offer general instruction and research in specialized areas. Students have the freedom to select courses to meet individual interests and objectives.

Research in chemistry at New Mexico Tech is focused on chemical problems that affect human society. Recent and current research projects include the following:

- New solar energy technology using organic dyes, biosensor development, and bio-analytical chemistry
- Study of novel materials’ optoelectronic properties for solar energy harvesting, conversion, and storage
- Study of mineral dust and its environmental impact
- Modeling of chemical processes in the atmosphere and their effect on climate change
- Understanding proteins and other molecules using computational modeling
- Synthesis and study of natural products and medicinal organic compounds
- Development of portable detection systems for malaria and other infectious diseases

**Areas of Research**

- Computational Chemistry, Chemical Education — Dr. Jeff Altig
- Synthetic Organic and Medicinal Chemistry — Dr. Liliya Frolova
- Physical Organic Chemistry — Dr. Michael Heagy
- Computational Biochemistry — Dr. Sally Pias
- Bioanalytical Chemistry — Dr. Menake Piyasena
- Environmental and Analytical Chemistry — Dr. Gayan Rubasinghe
- Physical Chemistry, Ultra-fast Spectroscopy — Dr. Mahinda Ranasinghe
- Synthetic Organic and Medicinal Chemistry — Dr. Rodolfo Tello-Aburto
- Atmospheric and Global Biogeochemistry — Dr. Oliver Wingenter

**About Our Department**

- Faculty: 8
- Undergraduates: 40
- Graduate students: 19

**Degrees Offered:**

- B.S.
- M.S. in Chemistry
- M.S. in Chemistry with Biochemistry Option
- Ph.D. in Chemistry

**Graduate Student Profile**

Daniel Leonard is currently pursuing a Master’s in Chemistry with Dr. Michael Heagy in the area of physical organic chemistry. Dan’s project involves solar driven conversion of carbon dioxide to formic acid and ultimately methanol. Efforts toward photoreduction of CO₂ hold the promise of greenhouse gas mitigation by mimicking natural photosynthesis via energy storage in chemical bonds. Dan’s work is supported by grants from the National Science Foundation and NASA.
COMMUNICATION, LIBERAL ARTS, AND SOCIAL SCIENCES (CLASS)

The Department of Communication, Liberal Arts, and Social Sciences is a multi-disciplinary department with undergraduate degrees in Technical Communication and General Studies, and courses in most areas of the Humanities and Social Sciences.

Those seeking to further develop their professional skills in writing and communication can earn a Graduate Certificate in Professional and Scientific Communication to enhance job performance and increase professional marketability.

Professional communication is a necessity for all fields as information has become the most powerful currency in the local, domestic and global marketplace. The Graduate Certificate offers a range of courses such as international professional communication, data visualization, proposal writing, and communication in the sciences. It also includes a graduate writing seminar to hone research and publishing skills. Eighteen credits are needed to complete the certificate, with the potential for on-line and summer courses.

The CLASS department operates the Oral Presentation Center and the Writing Center, which are important resources for graduate students working on research presentations. They also host a semiannual “Thesis and Dissertation Boot Camp,” which caters to graduate students nearing the end of their degree work.

The department’s Humanizing Technology project investigates the intersection between the Humanities, Social Sciences, and STEM disciplines, providing a unique opportunity for students to participate in research with faculty and professionals at Tech and beyond.

Areas of Research

Creativity and Innovation, Improvisation—Dr. Doug Dunston
American Literature, Philosophy—Dr. Susan Dunston
Data Visualization, Science and Technology Studies (STS), International Professional Communication, Complexity—Dr. Rosário Durão
Technical Communication, Composition—Dr. Elisabeth Kramer-Simpson
Latin American Cultural History, Psychoanalysis—Dr. Rafael Lara-Martínez
American and Multiethnic American Literature, Writing Across the Curriculum, Composition/Rhetoric—Dr. Julianne Newmark
Russia, Eastern Europe, Nationalism, Genocide—Dr. Alexander Prusin
ESL Writing, Graduate Student Writing, Technical and Scientific Communication—Dr. Steve Simpson

About Our Department

Faculty: 8
Undergraduates: 22
Graduate students: 1

Degrees Offered:

B.S. in Technical Communications
Graduate Certificate in Scientific and Professional Communication (New in spring 2014)

Karen M. Balch received her Bachelor's in General Studies at New Mexico Tech in 2007. She is a published author, has taught a creative writing class, led poetry workshops, translated her own poetry into Spanish, and has done several readings at various venues, including Rocky Mountain Modern Language Association conferences. She serves on a distinguished committee for an international organization where professional communication is a key factor. The Graduate Certificate in Scientific and Professional Communication will enhance her skills in professional communication.

nmt.edu/~huma • lapache@nmt.edu • 575.835.5445
Earth Science research is key to energy, mineral, and water resources, to the environment, and to natural hazards and understanding how our planet works as a gigantic system. E&ES is a large, well-funded, and internationally-renowned department producing highly trained undergraduates and emphasizing graduate research and education (Master’s and Ph.D.) Most graduate students are supported through research or teaching assistantships.

Collaborations are common with Earth scientists at the New Mexico Bureau of Geology and Mineral Resources, IRIS-PASSCAL Seismic Instrument Center – EarthScope Array Operations Center, and the Petroleum Recovery Research Center, all on campus. Los Alamos and Sandia National Labs and the National Cave and Karst Research Institute are nearby. The scientific resources (personnel, facilities, and funding) available to graduate students are dramatically increased by these collaborations. Additionally, faculty collaborate with many institutions around the nation and the world, as well as faculty in other departments at NMT such as Physics, Math, Biology, and Mineral Engineering.

Areas of Research

| Neotectonics: Rifting, Orogeny, Sedimentation |
| Geochronology and Thermochronology: \(^{40}\text{Ar}/^{39}\text{Ar}, \text{Fission Track}, \text{Cosmogenic Nuclides} |
| Carbonate Sedimentology and Petrology |
| Climate and Ice-sheet Evolution |

About Our Department

- Faculty: 20
- Adjunct faculty: 28
- Support staff: 3
- Undergraduates: 48
- Graduate students: 70

Degrees Offered:

- B.S. in Earth Science
- M.S. in Geochemistry, Geology, Geophysics, or Hydrology
- Ph.D. in Earth and Environmental Science with Dissertation in Geobiology, Geochemistry, Geology, Geophysics, or Hydrology

Graduate Certificate in Hydrology

Laboratories:

- High-speed Computing, \(^{40}\text{Ar}/^{39}\text{Ar} and Fission-track Dating, Stable Isotopes, Soil Chemistry, Electron Microprobe, Geomicrobiology, Speleology, XRD and XRF, Fluid and Gas Inclusion Labs

Hilary Kelly is a Choctaw and Cherokee Native and Marine Corps veteran with a Bachelor’s in Environmental Geology from Kansas University.

Her NASA-funded research will develop a robotically mounted instrument to detect and characterize mineral and biological materials on other planets with terrestrial testing in caves, mines, and extreme surface environments.
The Master of Science for Teachers program is designed to provide graduate-level classroom and laboratory instruction for K-12 teachers of science, mathematics, engineering, and/or technology. The emphasis of the courses is on content, rather than pedagogy. MST students are encouraged to develop laboratory exercises, demonstrations, and teaching methods from the course content 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 taught by New Mexico Tech faculty, with focus on fundamental principles, new concepts, and novel teaching methods. Courses are offered throughout the year via distance instruction and as live courses on the New Mexico Tech campus and around the state.

Areas of Research
Chemistry — Dr. Jeff Altig
Microscopy — Gary Chandler
Geology, Mining Engineering — Dr. William X. Chávez, Jr.
Optics — Ray Collins
Technical Communication — Dr. Julie Ford
Physics of Aviation — Dee Friesen
Soils, Climate Change, Earthquakes — Dr. Bruce Harrison
Computer Basics, Information Technology — Rob Hepler
Materials Camp, Advanced Materials — Dr. Diedre Hirschfeld
Math, Probability, Statistics — Dr. Anwar Hossain
Optical Astronomy — Dr. Dan Klinglesmith
Water as a Resource, Renewable Energy — Lynne Kurtlovitch
Cyber Security, Parallel Processing, Visualization, Supercomputing Challenge — Dr. Lorie Liebrock
Weather, Climate — Dr. Ken Minschwaner
Human Genetics, Molecular Biology — Dr. Rebecca Reiss
Environmental Studies, Science, Engineering — Dr. Clint Richardson

Space Science: Hazardous Asteroids, Telescopic Observations — Dr. Eileen Ryan
Educational Testing — Dr. Mark Samuels
Research and Documentation — Dr. Steve Simpson
Electricity, Electromagnetism and Light — Dr. Richard Sonnenfeld
Archaeology for Teachers — Elisabeth Stone
Concepts in Mathematics, Calculus, Modeling, Fractals, Chaos — Dr. W.D. Stone
Physics, Computers and Science Teaching, Radio Astronomy — Dr. Dave Westpfahl
Atmospheric Chemistry — Dr. Oliver Wingenter
Paleontology, Evolution, Zoology, Biology, Forensic Geology, Pecos River History — Dr. Don Wolberg

Graduate Student Profile
Olga Vazquez has been nominated for the Presidential Award of Excellence in Mathematics and Science Teaching. She teaches science at East Mountain High School (EMHS), a small charter school outside of Albuquerque, New Mexico with a school enrollment of only 400 students. Despite the small school size, Olga has developed a science extracurricular that one would only expect to find in affluent high schools with a large staff of science teachers. In addition to long hours with her students, Ms. Vazquez reaches out to the community, companies, and labs to bring in funds for science activities, to bring in mentors, and to identify summer internships. Of the 50-100 students Olga mentors in the various science clubs and teams, about half are girls. This is an impressive achievement for a technical field that loses a majority of the girls before 9th grade.

About Our Department
Part-time instructors: 46
Active graduate students: 200
Courses offered: 90

Degree Offered:
Master of Science for Teachers M.S.T.
The Mathematics Department offers Master’s degrees in analysis, industrial mathematics, and operations research and statistics, and a Ph.D. in industrial and applied mathematics. Industrial mathematicians solve complicated problems arising in industry and government, and many students work in these areas while pursuing a degree.

Graduate students can teach or work as research assistants in fall, spring, and summer semesters. Summer employment and industrial internships are available.

Research opportunities for graduate students include applications of probability, optimization, statistical theory, numerical methods, mathematical physics, biology, fluid dynamics, modeling and analysis applied to science and engineering, numerical solutions of ordinary and partial differential equations, and dynamical systems.

**Areas of Research**

- Numerical Methods for Solving Partial Differential Equations  
  —Dr. Rakhiim Aitbayev
- Geometric Analysis on Manifolds, Mathematical Physics, Quantum Field Theory, Quantum Gravity, Differential Geometry, Financial Mathematics  
  —Dr. Ivan Avramidi
- Optimization, Inverse Problems, Linear and Semi-Definite Programming, Integer Programming  
  —Dr. Brian Borchers
- Diagnostic Methods, Reliability Models, Cover Theory, Multivariate Analysis, Survival Estimation, Bayesian Estimation  
  —Dr. Anwar Hossain
- Analytic Solutions of Mixed Boundary Value Problems  
  —Dr. Bert Kerr
- Modeling Complex Multidimensional Data, Precipitation Modeling, Geostatistics, Bioinformatics  
  —Dr. Oleg Makhnin
- Topology of Strange Attractors, Interlocked Periodic Orbits, Coupled Chaotic Systems  
  —Dr. John Starrett
- Mathematical Biology, Modeling of Fluids and Glaciers, Size-Structured Populations, Age Distribution of Groundwater, Resonances in the Plasmosphere  
  —Dr. W.D. Stone
- Partial Differential Equations, Infinite-Dimensional Dynamical Systems, Random Attractors, Invariant Manifolds, Random Periodic Solutions  
  —Dr. Bixiang Wang

**Areas of Research**

- Analytic Solutions of Mixed Boundary Value Problems  
  —Dr. Bert Kerr
- Partial Differential Equations, Infinite-Dimensional Dynamical Systems, Random Attractors, Invariant Manifolds, Random Periodic Solutions  
  —Dr. Bixiang Wang

**About Our Department**

- Faculty: 12
- Undergraduates: 37
- Graduate students: 13

**Degrees Offered:**

- B.S.
- M.S. in Mathematics with Specialization in Analysis, Industrial Mathematics, or Operations Research and Statistics
- Ph.D. in Applied and Industrial Mathematics
- Graduate Minor in Applied and Industrial Mathematics, Operations Research and Statistics, Numerical Analysis, or Analysis

**Graduate Student Profile**

**Gunter Leguy** was born in Thonon les Bains, France in 1982, and came to NMT in January 2009. He is currently working on his Ph.D. in Applied Mathematics. His research area is in glaciology, modeling ice sheet dynamics and their contribution to sea level rise as part of a project funded through Los Alamos National Laboratories.

**Weir Hall, Mathematics Department**
The Physics Department offers Master’s degrees in Physics and in Physics with Specialty in Instrumentation, and Ph.D.s in Physics and Physics with Dissertations in Astrophysics, Atmospheric Physics, or Mathematical Physics.

Graduate students usually receive a teaching or research assistantship for the academic year. Summer assistantships are also available.

Primary research opportunities include: cloud physics, physics of lightning and thunderstorms, chemical processes in the atmosphere, planetary atmospheres, exoplanets, galactic evolution, plasma astrophysics, star formation, and stellar evolution. Other research areas are shock physics and theoretical physics.

Areas of Research

Atmospheric Physics and Chemistry

Astrophysics
—Drs. Michelle Creech-Eakman, Peter Hofner, David Meier, Dave Westpfahl, Lisa Young

Planetary Atmospheres
—Dr. Raul Morales Jubieras

Mathematical Physics
—Drs. Paul Arendt, Ivan Avramidi

About Our Department

Faculty: 12
Undergraduates: 85
Graduate students: 28

Degrees Offered:
B.S.
M.S. in Physics
M.S. in Physics with Specialty in Instrumentation
Ph.D. in Physics
Ph.D. in Physics with Dissertation in Astrophysics, Atmospheric Physics, or Mathematical Physics
Graduate Minor in Physics

Graduate Student Profile

Jake Trueblood came to New Mexico Tech as an undergraduate from Palmer Lake, CO. After his Bachelor’s degree, Jake stayed on to work with the Physics Department and Langmuir Lab on artificially triggered lightning for his Master’s thesis. The main goal of this work is to better understand how the triggering process affects the thunderstorm and whether or not it would be a viable means for protecting personnel, property, and other assets on the ground.
In addition to research opportunities in academic departments, there are many opportunities in NMT’s research divisions, as well as at our local national laboratories (Air Force Research Laboratory, Army Research Laboratory, Los Alamos National Laboratory, and Sandia National Laboratory Albuquerque).

Here we introduce some of NMT’s research divisions and some of their research areas.

**Energetic Materials Research and Testing Center**

EMRTC is internationally recognized with over 60 years experience in research, development, testing, and analysis of energetic materials for both corporate and government clients. EMRTC’s 40-square-mile field laboratory is located in the mountains west of campus, with more than 30 test sites, gun ranges, other research facilities and storage areas, allowing for a complete spectrum of research and testing activities.

EMRTC offers opportunities for students from nearly all graduate programs.

**Incorporated Research Institutions for Seismology Program for Array Seismic Studies of the Continental Lithosphere**

The IRIS-PASSCAL Instrument Center and EarthScope USAArray Array Operations Facility (AOF) at NMT support cutting-edge seismological research into Earth’s fundamental geological structure and processes. Scientists, technicians, and many students have helped develop many innovative instruments for deployment in the harshest of conditions through the PASSCAL Polar Programs.

PASSCAL Instrument Center and AOF currently support a total of 33 professional NMT staff plus a contingent of student workers.

**Institute for Complex Additive Systems Analysis**

ICASA contributes innovative and relevant solutions to national security and critical infrastructure protection in four main areas: understanding the behaviors and vulnerabilities of complex additive systems (CAS); creating inventive techniques for information assurance; training analysts, scientists, and engineers to both use and advance proposed solutions; and educating the next generation of engineers, mathematicians, and scientists in CAS security.

NMT/ICASA has been recognized by the National Security Agency and Department of Homeland Security as a “Center of Academic Excellence in Information Assurance Education” since 2001 and as a “Center of Academic Excellence in Information Assurance Research” since 2009. The state of New Mexico uses ICASA/NMT as first responders for forensic analysis of computer attacks and assistance with computer security.

**Langmuir Laboratory**

Langmuir Lab, in the Magdalena Mountains, is the nation’s first lab devoted to lightning research. Students work on cutting-edge research projects in a variety of atmospheric studies.

In 2015, Drs. William Rison and Ronald Thomas in Electrical Engineering and Dr. Paul Krehbiel in Physics received a Special Award from the American Meteorological Society for Lightning Mapping Array technology. NMT Vice President of Research Dr. Van Romero said “This is an excellent example of the work that happens at Tech and, in particular, in the Langmuir research group. They look at the fundamentals of physics and, combined with electrical engineering, have created a device that protects us from lightning events.”

**Magdalena Ridge Observatory**

The MRO consists of two major facilities: an operational 2.4-meter
fast-tracking telescope and a ten-element optical/infrared interferometer, under construction. The MRO mission is to support astronomy, space situational awareness, and education.

MRO works with the Office of Naval Research, the National Science Foundation, and NASA to track and characterize “near-Earth objects,” such as comets, asteroids, and satellites. Students use this phenomenal facility to conduct astronomical research.

National Center for Genome Resources

Based in Santa Fe, NCGR applies bioinformatics, software engineering, and next-generation sequencing to solve the preeminent challenges of 21st century biology through collaborative research and services. Their sequencing capabilities include genome, transcriptome, methylome, ChIP, small RNA, and exome sequencing, with corresponding analytical capabilities. NCGR provides researchers with experimental design assistance, custom data analysis, and data visualization. NCGR is dedicated to ensuring the health and food security of future generations.

National Cave and Karst Research Institute

NCKRI, headquartered in Carlsbad, New Mexico, goals are to conduct, support, facilitate, and promote programs in cave and karst research, education, environmental management, and data acquisition and sharing. NCKRI sponsors student research in geology and hydrology. The Institute serves as the national clearinghouse for scientific research on karst systems, which are vital conduits of much of the nation’s potable water.

NCKRI’s research includes: Cave and Karst Studies, Basic Research (on principles of how caves, karst, and their components are created, changed, organized, and distributed), and Applied Science (to solve, manage, or prevent problems with caves and karst, and to develop or improve methods for using cave and karst resources).

New Mexico Bureau of Geology and Mineral Resources

NMBGMR’s projects include studies of mineral resources, hydrology studies, aquifer mapping, publications, geochemistry, and geochronology. The Bureau has staff experts in petroleum geology, mineral geology, and other vital mining disciplines.

The Bureau’s experts serve as adjunct professors, sharing their knowledge and expertise with the next generation of scientific leaders. The NMBGMR’s state-of-the-art laboratory facilities serve the analytical needs of the public and support ongoing research efforts of the entire university community.

Petroleum Recovery Research Center

The PRRC is New Mexico’s focal point for improved oil and gas recovery research to transfer technology from their research labs to the oil and gas industry.

The PRRC’s research assistantship program offers excellent opportunities for students to develop their thesis and dissertation work, to publish their work under the guidance of their research advisors, and to receive hands-on training in a professional research environment. The PRRC has funding from numerous state and federal government agencies to support an average of 22 graduate students from disciplines including Chemical Engineering, Chemistry, Computer Science, Electrical Engineering, Civil & Environmental Engineering, Geochemistry/Geology, Geophysics, Hydrology, Mechanical Engineering, and Petroleum Engineering.
Live, Interactive Webcasts At The Heart Of Tech’s Distance Education Program

New Mexico Tech’s Distance Education program provides live, web-based courses that allow students to participate via video and audio with instructors and other students from anywhere in the world. Tech’s Distance program is unique in that remote students are part of a regular class being offered on campus in one of Tech’s multimedia-enabled classrooms. The Adobe Connect platform lets distance students see and hear everything that on-campus students can see and hear.

Using this approach, students can earn graduate degrees in Mechanical Engineering (with Specialization in Explosives Engineering, Fluid and Thermal Sciences, Mechatronics Systems Engineering, or Solid Mechanics), Materials Engineering, and Engineering Management, and a Graduate Certificate in Hydrology.

A Master of Science for Teachers degree can be earned while studying anytime and anyplace. Lectures in most courses are recorded; a summer session on Tech’s campus can complete the degree work.
A majority of full time 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 for Admission 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. Assistantships normally require half-time service in teaching or research (20 hours per week). Quarter-time appointments may be made in some cases. Students holding assistantship appointments qualify for resident tuition. Fellowships are grants in aid for full-time study and research leading to an advanced degree.

TEACHING ASSISTANTSHIPS
Teaching assistants are typically appointed for nine months at competitive stipend levels. Additional teaching duties or research opportunities during the summer are sometimes 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.

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 be applicable to thesis or dissertation requirements. Research assistants commonly receive summer appointments as well as nine-month academic year appointments.

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 through monthly stipends. Fellows must devote full time to studies and research.

For information about financial assistance, please contact your prospective department or the Center for Graduate Studies.

Current tuition information can be found at nmt.edu/tuition-and-fees