New Mexico State University
College of Engineering
An Introduction
Lakshmi N. Reddi, Ph.D., P.E.

- Bachelor of Technology, civil engineering
  Jawaharlal Nehru Technological University
- Master of Science, civil engineering
  The Ohio State University
- Doctor of Philosophy, civil engineering
  The Ohio State University
I would recommend this school for anyone who wants to work hard and achieve their goals in life because NMSU will provide the environment and support for them to succeed.”

— GAURAV PANWAR, GRADUATE STUDENT
Where is Las Cruces?
A Glimpse of New Mexico

NMSU Campus Locations
NMSU Las Cruces
Community Colleges
NMSU Alamogordo
NMSU Carlsbad
NMSU Grants
Doña Ana Community College

Albuquerque Center

- Hiking
- Camping
- Skiing
- Golf Course
- Arts

- Fishing
- Boating
- Biking
- Airport
- Historical Site

Engineering Is Discovery!
Discover Your New Home

- Second largest city in New Mexico
- Low cost of living
- Distinct international flavor
- Friendly community
- Sunny skies almost every day
Life in the High Desert

Why NMSU?

15,490 students at the Las Cruces campus, representing nearly 90 countries

Forbes lists NMSU 13th nationally for helping minorities to succeed in the fields of science, technology, engineering and math.

More than 175 degree programs

Carnegie Foundation Ranked R2 Doctoral University-Higher

Placed in the top tier of U.S. News & World Report's national universities rankings and considered one of the best colleges by Washington Monthly

17 NCAA Division I SPORTS

200+ Student organizations, clubs and groups
New Mexico is a high-tech state, hosting research and development organizations that include:

- Los Alamos National Laboratory
- Sandia National Laboratories
- Air Force Research Laboratory
- White Sands Missile Range
- University of New Mexico
- New Mexico Tech
- Spaceport America
- New Mexico State University

Spaceport America
New Mexico State University Profile

- Land-grant institution established in 1888
- Engineering established in 1890
- Research expenditures for FY 2015: $3,374,299
- Enrollment: 11,713 undergraduate, 2,719 graduate
- Designated a NASA Space Grant College
- Ranked by the Carnegie Foundation as Research University with high research activity institution
- Listed among America’s Best Colleges by Forbes Magazine
NMSU’s Pathways to Discovery

- No. 1 in the nation in science and engineering funding for minority-serving institutions by the National Science Foundation.
- Ranked No. 2 in the country for research and social mobility that improves lives by the Brookings Institution.
- Listed in the top 2.3 percent of institutions of higher education worldwide by the Center for World University rankings.
Library: offers individualized reference assistance and access to worldwide research materials to complement its own research collections.

Center for English Language Programs (CELP): offers intensive English instruction and culture courses, helping students with lower TOEFL scores prepare for life at NMSU.

Distance education: opportunities meet diverse educational and professional needs anytime, anywhere.

Computer labs: multiple labs feature state-of-the-art equipment and are accessible to all students.

Housing: residence halls, apartments and family housing offer convenient, secure and high-value options for students.

Campus Health Center: provides outpatient primary health care. Pharmacy, laboratory and X-ray services are also available. The center participates in the international student orientation every semester.
New Mexico State University Profile

- Top 20% nationally in federal engineering R&D expenditures (NSF 2012) among all colleges and universities
- Hispanic-serving institution with main campus minority enrollment more than 49 percent
- 86 undergraduate majors, 53 master’s programs, 21 doctoral programs
- Colleges:
  - Agriculture, Consumer and Environmental Sciences
  - Arts and Sciences
  - Business
  - Education
  - **Engineering**
  - Health and Social Services
Academic Departments

- Chemical Engineering
- Civil Engineering
- Electrical and Computer Engineering
- Engineering Physics (Arts and Sciences)
- Engineering Technology and Surveying Engineering
- Industrial Engineering
- Mechanical and Aerospace Engineering

Degree Areas

- BS: 14 disciplines
- MS: 7 disciplines
- Ph.D.: 6 disciplines
College of Engineering Degrees Offered

- Aerospace Engineering (BS, MS, Ph.D.)
- Chemical Engineering (BS, MS, Ph.D.)
- Civil Engineering (BS, MS, Ph.D.)
- Electrical and Computer Engineering (BS, MS, Ph.D.)
- Engineering Physics (BS)
- Engineering Technology (BS: civil, electronics and computer, information, mechanical)
- Environmental Engineering (MS)
- Industrial Engineering (BS, MS, Ph.D.)
- Information and Communication Technology (BICT)
- Mechanical Engineering (BS, MS, Ph.D.)
- Surveying Engineering (BS)
Student-Centered Programs

- Learning Communities: student support, professional development, tutoring
- Interdisciplinary, industry sponsored capstone design projects
- Undergraduate research
- National student chapter competitions
- Aggie Innovation Space
- Arrowhead Park: assistance for entrepreneurs
- Internships, co-ops, employment fairs
Centers of Research
“The National Science Foundation’s Engineering Research Centers are interdisciplinary, multi-institutional centers that join academia, industry, and government in partnership to produce transformational engineered systems along with engineering graduates who are adept at innovation and primed for leadership in the global economy.”

“ERCs operate at the interface between the discovery-driven culture of science and the innovation-driven culture of engineering.”
ReNUWIt: Re-inventing the Nation’s Urban Water Infrastructure

Funding: National Science Foundation (2011)
University Partners: Stanford University, Univ. of California Berkeley
Lead: Prof. Nirmala Khandan, Dept. Civil Engineering

Center Goal
R&D for improving sustainability and resilience of aging urban water infrastructure. Validating research at testbed level.

Center-wide thrust areas
• Efficient Engineering
• Natural Water Infrastructure Systems
• Urban Water Systems and Institutions
iCREDITS: Interdisciplinary Center of Research Excellence in Design of Intelligent Technologies for Smart Grids

Funding: National Science Foundation (2014)
Leads: Prof. Enrico Pontelli, Dept. Computer Science
Prof. Satish Ranade, Dept. Elect. & Comp. Eng

Center-wide thrust areas:

- **Energy delivery**
- **Scalable communication** that enables smart grid entities to effectively communicate
- **Coordinate** actions of smart grid entities to ensure reliable and efficient energy delivery
- **Monitor** disturbances occurring in transmission and distribution and respond to maintain system integrity
Center Goal: Develop and implement into practice nature-inspired sustainable solutions to geotechnical engineering and infrastructure problems in four research thrust areas.

Center-wide thrust areas:
- Hazard Mitigation
- Infrastructure Construction
- Resource Recovery
- Environmental Protection and Restoration
Tran-SET: Transportation Consortium of South-Central States

Funding: U.S. Department of Transportation (2016)
University Partners: LSU, OSU, TAMU, UTSA
Lead: Prof. Craig Newton, Dept. Civil Engineering

Center Goal: Extending the life of transportation infrastructure, preserving the environment and preserving the existing transportation system.

Center-wide thrust:
Improving durability of transportation infrastructure, pavement, bridges
Research Strengths
Research Strengths: Energy, Environment, Food, and Water

Abdelkefi (MAE)  
Brahma (ECE)  
Jena (ChE)  
Kota (MAE)  
Kuravi (MAE)  
Manz (ChE)  
Ranade (ECE)  
Rockstraw (ChE)  

Bawazir (CAGE)  
Brewer (ChE)  
Foudazi (ChE)  
Khandan (CAGE)  
King (CAGE)  
Samani (CAGE)  
Xu (CAGE)  

Engineering faculty: 22
Power Systems

- Involved in all aspects of electric power systems, including economics, management societal aspects of power engineering
- Control and management of networks through distributed intelligence
- Development of prototype renewable-energy-based micro grid electric distribution system in partnership with electric utility
- Development and demonstration of innovative energy-related technologies with potential to reduce dependence on fossil fuel energy

**Electric Utility Management Program**

- 1 of 10 university-based power engineering programs in the U.S.
- Graduates 15 BS,10 MS/PhD annually
- State-of-the-art electric transmission simulation laboratory
Research Strengths: Infrastructure/Structures

**Construction Materials**
Newtson (CAGE)
Weldon (CAGE)

**Non-Destructive Testing**
Newtson (CAGE)
Dehghan-Niri (CAGE)

**Structural Health Monitoring**
Dehghan-Niri (CAGE)
Jauregui (CAGE)
Weldon (CAGE)
Bridges, Structures and Infrastructure

- Bridge Research
  - Inspection: US, Korea, China
  - Safe Load Testing
  - Health Monitoring
  - Monitoring Defective Components
  - Smart Bridges
  - Concrete Shrinkage and Control
  - Nonlinear Ultrasonic Testing
  - Close-range Photogrammetry

- Evaluation of structures

- Safety/security of infrastructure
Aerospace Research

- SNL: Reduced-Order Modeling of Shear Layers
- NASA: Simulation Study of A 6-DOF Cable-Robot based EVA Training System
- DOD: Flapping Wing Aerodynamics and Control
- NASA: Simulating reduced Gravity in space flight training using an exoskeleton
- NASA: Structural Health Monitoring and Self-Healing of Aerospace Structures
Research Strengths: Data/Information Science

Engineering faculty: 18

Machine Learning

Communications & Signal Processing
- Borah (ECE)
- Boucheron (ECE)
- Creusere (ECE)
- DeLeon (ECE)
- Houston (ChE)
- Mitchel (ECE)
- Sandoval (ECE)

Sensors & Sensing Applications
- Bawazir (CAGE)
- Cho (ECE)
- Martin (CAGE)
- Samani (CAGE)
- Tang (ECE)
- Voelz (ECE)
Planning and support for launching unmanned, high-altitude research balloons up to 60 million cubic feet and weighing as much as 8,000 lbs. from sites all over the world

Received the Robert H. Goddard Award for Exceptional Achievement in Engineering

CRDA between NMSU and FAA for Unmanned Aircraft System Flight Test Center, allowing safe operation in national airspace

Research and development for diverse UAS applications
Bioengineering and Biomedical Research

- Development of an Adaptive Reduced-Gravity Simulator for Aerospace and Biomechanics Research (funded by NSF) for neural rehabilitation and physiotherapy of people with walking impairment and human motion capture for sports analysis
- Human-body dynamics modeling and characterization
- Human dynamics database and computer animation
- 3D human motion analysis and performance optimization
Advanced materials for sustainable energy and clean water, including:

- Synthesis of nanostructured adsorbents for hydrogen storage
- Synthesis of carbon nanotube membranes for water treatment and smart sensors

Synthesis, processing and microstructural characterization of nanostructured materials:

- Thin-film characterization, especially spectrometric ellipsometry and x-ray techniques

Modification of magnetic properties:

- Correlated-electron systems, permanent magnets, superconductors, and nanostructured magnets
International Graduate Admission
International graduate students must start with the Admissions Office (http://international.nmsu.edu/admissions.html).

The following must be sent directly to the Graduate School:

- Official transcripts
- Official copy of the GRE (Graduate Record Examination) General Test scores
- TOEFL (Test of English as a Foreign Language) scores
Language Requirements

The required **TOEFL** scores for regular NMSU admission:
- 68 on the iBT or 520 on the paper-based test for applicants to undergraduate degree programs.
- 79 on the iBT or 550 on the paper-based test for applicants to graduate degree programs.

The required **IELTS** scores for regular NMSU admission:
- 6.0 overall for undergraduate applicants.
- 6.5 overall for graduate applicants.

Academic departments reserve the right to require higher TOEFL/IELTS standards.

International students admitted with TOEFL 68 to 78 IBT, 520 to 549 PBT or 6.0 IELTS are required to sit for the English Placement Exam prior to beginning academic coursework.
Optional Practical Training is defined by US Citizenship & Immigration Services as “temporary employment for practical training directly related to the F-1 student’s major area of study.” For more information, visit [https://www.uscis.gov/opt](https://www.uscis.gov/opt)

OPT can be authorized at the following times:

- During the student’s annual vacation and at other times when school is not in session;
- As long as the student is currently enrolled and eligible, and intends to register for the next semester;
- While school is in session, provided that OPT does not exceed 20 hours per week;
- After completion of all course requirements for the degree, excluding thesis or equivalent, if the student is in a bachelor’s, master’s, or doctoral degree program; or
- After completion of the course of study
Full-time graduate status = 9 credit hours/semester = $8,369.10 full-time graduate tuition and fees.

<table>
<thead>
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<th>Graduate tuition is assessed to students classified as Graduate</th>
<th>Tuition</th>
<th>Required Fees</th>
<th>Total</th>
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<tr>
<td>Rate per Credit (1 - 6 Credits)</td>
<td>315.88</td>
<td>48.80</td>
<td>364.68</td>
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<tr>
<td>Rate per Credit (1 - 14 Credits) when enrolled in &gt;6 credits</td>
<td>881.10</td>
<td>48.80</td>
<td>929.90</td>
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<tr>
<td>Flat Rate (15 and above)</td>
<td>11,314.50</td>
<td>732.00</td>
<td>12,046.50</td>
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A few engineering program specifics
Program Specialties

- Computer Engineering
- Communications and Signal Processing
- Power and Control
- Photonics and Electromagnetics
Program Options

Three options exist for the Master of Science in Electrical Engineering degree.

1. Thesis – 24 credits of course work plus 6 credits of E E 599 plus oral exam.


3. Course Work Only – 30 credits of course work plus pass three graduate core courses (or two graduate core courses and one graduate breadth course) with a B or better. No oral exam is required.
Option 1 – Ph.D. with completed MS degree

Complete undergraduate deficiency coursework, if the student admitted has both master’s and bachelor’s degrees in fields other than electrical engineering. Complete the Klipsch graduate Core classes if the student does not have a MSEE degree from NMSU.

Complete a minimum of 18 credits beyond the master’s of graduate course work with the following restrictions:

- EE courses must be numbered 500 or higher. Non-EE courses must be 450 or higher.
- At least half of the 18 credits must be taken in the Klipsch School (EE).
- At most 6 credits may be research, for example, EE600, Doctoral Research, and EE590 courses that are not listed as regular courses in the schedule.
- Exclude credits of EE 700 Doctoral Dissertation.
- If the MS degree is not EE, exclude credits from graduate deficiency coursework.
- Exclude credits from BCIS 450 to 499, CS 450/452/457/ 470 to 476/479/481 to 486/491, COMM 485, EE 490/598/ 599, SPCD 470/ 490.
Option 2 – Direct Ph.D. with BSEE or equivalent, but no MS degree (this option is only available for students with no undergraduate deficiencies)

Complete three graduate core courses, listed in the Klipsch graduate Core of classes for PhD students. Complete a minimum of 42 credits of graduate coursework, including the three graduate core courses with the following restrictions:

- At least half of the 42 credits must be numbered 500 or higher.
- At least half of the 42 credits must be taken in the Klipsch School (EE).
- At most 9 credits may be research, for example, EE600, Doctoral Research, and EE590 courses that are not listed as regular courses in the schedule.
- Exclude credits of EE 700 Doctoral Dissertation.
- Exclude credits from BCIS 450 to 499, CS 450/452/457/470 to 476/479/481 to 486/491, COMM 485, EE 490/598/599, SPCD 470/490.
- At least half of the credits must be taken with other than a single professor.
Mechanical and Aerospace Engineering Program Specialties

**Program Specialties**

- Aeroelasticity and Fluid Structure Interaction
- Dynamics and Vibrations
- Fluid Mechanics
- Robotics and Controls
- Solid Mechanics & Materials
- Thermal Science and Energy
**Mechanical and Aerospace Master’s Program**

**Course Only Option**
Total number of credits – 30
ME 570 and one core course from 4 of 5 specified topic areas.
4 additional ME courses

**MS Thesis Option**
Total number of credits – 30
ME 570 and at least 21 credits (including ME 570) taken in ME courses.
ME 509: A course for individualized studies. Only 3 credits of ME 509 can be counted toward the degree program.
ME 510: For courses offered formally on a one-time only or limited basis. ME 510 should be subtitled based on focus. Students may repeat the course one time under a different subtitle.
Publication Requirement: refereed conference proceeding accepted or a refereed journal article in review by graduation. The MS thesis can be a reformatted version of this paper. Exceptions may be made on a case by case basis by the department head.
A minimum of 36 credit hours of coursework beyond the Bachelor of Science degree, at least 18 of which must support the student’s research area.

A minimum of 24 credit hours of research, ME 700 – Doctoral Dissertation, which may include a maximum of 6 credit hours of ME 600 Doctoral Research. ME 600 is intended for those students who have not completed the qualification examination, a prerequisite for ME 700.

A student is required to have one refereed journal paper accepted and a second one accepted or in review by graduation. The PhD dissertation can be a compilation and reformatted version of these published or accepted journal papers. Exceptions may be made on case by case basis by the Department Head.
Questions?