

MECHANICAL ENGINEERING AND AEROSPACE ENGINEERING

Undergraduate Program Information

The mission of the Mechanical and Aerospace Engineering Department at New Mexico State University is threefold:

- to educate those who will advance knowledge and become the future leaders of industry and academia;
- to conduct both basic and applied research in mechanical and aerospace engineering and related interdisciplinary areas; and
- to provide service to the profession, to the State of New Mexico, to the country, and to the future development of engineering worldwide.

A critical focus within the department is to afford undergraduates of varying backgrounds and abilities every opportunity for achieving success in the mechanical and aerospace engineering professions. To address this focus, the faculty of the Mechanical and Aerospace Engineering Department, with input from other constituents, have established the following program educational objectives that inform the overall undergraduate programs:

- Our graduates will gain relevant employment and/or pursue a graduate degree.
- Our graduates will advance in their level of workplace responsibility.

Graduate Program Information

Graduate programs of study are available leading to the degrees of:

- Doctor of Philosophy in Aerospace Engineering
- Doctor of Philosophy in Engineering with a concentration in Mechanical Engineering
- Master of Science in Aerospace Engineering
- Master of Science in Mechanical Engineering
- Master of Engineering in Aerospace Engineering
- Master of Engineering in Mechanical Engineering.

Areas of active research in mechanical engineering include the following:

- Computational fluid dynamics
- Hypersonics
- Vortex dynamics
- Energy systems and components
- Thermal management
- Surface engineering
- Computational mechanics with application to material properties
- Composite materials and nanomaterials
- Structural damage diagnosis and prognosis
- Nonlinear dynamics and vibrations
- Reduced order modeling in multibody dynamics
- Fluid-structure interactions
- Renewable energy / energy harvesting
- Bio-inspired and bio-mimetic robotics
- Robotics and autonomous systems

- Multi-robot systems
- Advanced manufacturing and medical device
- Structure property relations and degradation / corrosion of materials.

Areas of active research in aerospace engineering include the following:

- Computational, theoretical, and experimental fluid dynamics
- Hypersonics
- Flow control
- Aero-optics
- Multi-phase, multi-scale, and reacting flows
- Rarefied gas dynamics
- Propulsion
- Aeroelasticity
- Structural health monitoring / damage detection
- Guidance, navigation, and control of space systems
- Small satellite missions
- Unmanned aerial systems.

Laboratory facilities supporting graduate research include a large low-speed wind tunnel facility; a shock tunnel facility for hypersonics; computational fluid dynamics lab; robotics, unmanned vehicles, and intelligent systems control lab; autonomous systems lab; mechanical design and advanced materials & structures lab; nonlinear dynamics & energy harvesting lab; computational mechanics of materials and structures lab; non-destructive evaluation lab; medical device & microfabrication research lab; surface-environment interaction research lab; and renewable energy and thermal systems lab. A mechanical testing lab is also available in the College of Engineering.

In addition to fulfilling the basic requirements for admission to the Graduate School, applicants are expected to have an undergraduate degree equivalent to a BS in mechanical or aerospace engineering from a university accredited by ABET. Graduate students whose BS degree is in a discipline other than A E or M E will normally be required to take undergraduate courses in M E or A E in order to prepare for graduate course work; such undergraduate preparatory work will be determined by the graduate coordinator on a case by case basis. A candidate for *Master of Science* degree is required to complete a Thesis, whereas that for *Master of Engineering* is to complete the required coursework only. Both degrees require a minimum of 30 credits of graduate study.

A doctoral candidate must complete a program of study determined by the student and his / her advisory committee. The student must successfully pass a written qualifying examination (administered during the student's first year of full-time study) and an oral comprehensive examination which is administered after the student completes at least 80 percent of the course work and demonstrates sufficient progress in their research. The student must submit and defend an acceptable dissertation based on independent investigation in a field of study approved by the advisory committee.