CHEMICAL & MATERIALS ENGINEERING

Mission

The New Mexico State University Chemical & Materials Engineering (CHME) Department strives to prepare Chemical Engineering Bachelor of Science graduates to successfully and safely practice the chemical engineering profession, to engage in life-long personal and professional development, and to contribute to the betterment of their community and society. The undergraduate chemical engineering program of the CHME Department is accredited by the Engineering Accreditation Commission of ABET, Inc. Completion of an ABET accredited degree is required for licensure in New Mexico.

Undergraduate Program Information

Chemical engineers solve problems by combining the fundamentals of physical sciences (chemistry and physics) and life sciences (biology, microbiology, biochemistry) with the principles of engineering analysis, mathematics, and economics. The curriculum of study leading to the BSCHE continuously builds on prerequisite knowledge. The capstone course requires completion of a series of seven prerequisite courses, each having its own prerequisites. In this manner, the BSCHE produces graduates with highly developed problem-solving capabilities, strong communication and interpersonal skills, and an ability to seek out and assimilate knowledge beyond the classroom. Graduates apply these competencies to solve problems across a wide range of industries in the private and public sectors.

The work of a chemical engineer typically leads to the development of processes that convert raw materials (chemicals) into more useful or valuable products. Chemical engineers are pioneers of modern materials and associated processes that are essential to the fields of:

- nanotechnology;
- fuel cells;
- computer chip manufacture;
- environmental restoration and pollution prevention;
- biomedical, biotechnology and bioengineering;
- pharmaceutical manufacturing;
- food production;
- transportation (automotive and aerospace);
- advanced materials;
- petrochemical and refining;
- chemical synthesis and production; and
- power & energy (including the nuclear industry).

Graduates are also well-prepared to continue the study of law, medicine or advanced engineering topics at the graduate level.

Undergraduate Program Educational Objectives

The Chemical & Materials Engineering Department at New Mexico State University strives to produce undergraduates who will:

1. apply their problem-solving and communication skills to chemical engineering industries, government research labs, academia, and related fields;
2. implement safety practices in their work;
3. be on the path to leadership; and
4. build new skills sets through continuing education and professional development.

These Program Educational Objectives (PEOs), which are modified based on input from our constituencies, are consistent with the missions of NMSU, the College of Engineering and the Department of Chemical & Materials Engineering.

Graduate Program Information

The Department of Chemical and Materials Engineering offers graduate study leading to the M.E., M.S. and Ph.D. degrees with an emphasis in chemical engineering. Admission to the program is in accord with the general regulations of the Graduate School. The Graduate Record Examination (GRE) General Test is required for applicants for the M.S. and Ph.D. programs. All graduate students are required to pass all graduate engineering courses with a minimum grade of B-.

All M.S. and Ph.D. graduate students must select a thesis or dissertation advisor by the end of their first semester in the chemical engineering graduate program. In addition, doctoral students must complete their Program of Study and Committee form by the end of their first semester. Masters students must complete their Program of Study form by the end of their first semester. Thesis/dissertation may be pursued in absentia at various industrial sites by special arrangement.

Graduate teaching and research assistantships, fellowships and traineeships are available. For consideration for financial assistance, completed applicants must be received by March 1. All support is contingent upon availability, eligibility and satisfactory progress toward the degree.

Each student admitted to the CHME grad program who has an undergraduate degree in a discipline other than chemical engineering must schedule a meeting with the CHME Department Head to identify undergraduate course deficiencies that the student must take to obtain a graduate degree in chemical engineering.

Graduate Program Outcomes

To achieve the graduate program educational objectives, CHME graduate students must demonstrate the following abilities based on degree program. Objectives are intended to allow for broad interpretation.

Doctor of Philosophy

- Conduct a critical literature review on a disciplinary topic that incorporates application of concepts from coursework
- Articulate the state-of-the-knowledge in a disciplinary research area and how their research advances the field
- Carry out original research using the scientific method at a level that demonstrates independent thinking:
  - Form hypotheses
  - Design experiments or simulations to test hypotheses
  - Collect experimental or simulation data
  - Develop and/or apply appropriate models to evaluate collected data

    - Use models and collected data to inform that state of the knowledge
    - Ensure research is conducted in a safe and responsible manner
- Communicate (both in written and oral form) clearly and effectively through preparing and defending a dissertation
- Present original research to a variety of audiences in appropriate formats
- Give and receive constructive feedback in a professional manner
- Demonstrate professional leadership through experiences, such as:
    - Supervise and mentor earlier-career (high school, undergraduate, graduate) student researchers
    - Design and conduct disciplinary teaching and/or training
    - Lead an outreach event or activity

As part of the above, students are also expected to complete the following:

- Publish a dissertation
- Complete two peer reviewed journal articles
- Deliver a conference presentation (regional, national, or international)
- Deliver two seminars at the:
    - Group meeting level
    - Department wide level.

Masters of Science

- Conduct a critical review of the literature: Incorporates application of concepts from coursework
- Articulate the state-of-the-art-knowledge in the field: Shows how their research advances the field
- Carry out Original Research: Show use of the Scientific Method
    - Design experiments/simulations to test hypotheses or model a system
    - Collect experimental or simulation data and evaluate using appropriate models
    - Use models and collected data to inform the state of the knowledge
    - Ensure research is conducted in a safe and responsible manner
- Academic Discourse: Accept and provide constructive feedback in a professional manner.
- Leadership: Demonstrate professional leadership.

As part of the above, students are also expected to complete the following:

- Deliver a department wide presentation.

Masters of Engineering

- As part of graduation, the student will write 250 to 500 words, describing how the ME program contributed to growth in their desired area of education related to chemical engineering.