Chemical Engineering (MSE)

Biochemical and biomedical engineering. Protein and nucleic acid engineering, metabolic engineering, synthetic biology, systems biology, bioinformatics, fermentations, genetic engineering technology, mammalian tissue culture, biomaterials, biosensors, biomolecular interactions, cell and tissue engineering, virus removal from blood, hemodialysis.

Chemical engineering fundamentals. Kinetics and catalysts, thermodynamics, transport phenomena.

Energy resources. Secondary and tertiary oil recovery, flow processes in porous media, acid gas treating, energy control and efficiency, photovoltaics, battery technology.

Environmental engineering and sustainability. Air pollution measurements, modeling and control, air pollutant and chemical exposures, atmospheric chemistry.

Materials and processes for microelectronics. Plasma processing, etching, chemical vapor deposition, selective laser sintering, supermolecular self-assembly and organization, colloidal systems, mesoscopic materials.

Meso- and molecular-scale modeling and simulation. Statistical and micromechanical modeling and Monte Carlo, Brownian, and molecular dynamics simulations of reactions, complex fluids, polymers, and biological molecules.

Polymer engineering. Synthesis; processing; reaction injection molding; properties, with specific emphasis on blends, transport, and thermodynamic behavior; membranes; microelectronics; thin film; composition.

Process engineering. Chemical reaction engineering and catalyst development; optimization; process simulation, dynamics, and control; fault detection, rheology and simulation of suspensions.

Separations. Membrane separations, distillation, absorption, supercritical extraction.

Other areas. Aerosol science, surface phenomena, crystal chemistry and physical properties, electrochemistry, electronic and optical materials, electrical impedance tomography.

Graduate Handbook

Graduate handbook information is updated and maintained by each program. Graduate handbooks are available within each program's office and online. Please contact the program with concerns or questions.

Admission

Students with a Bachelor of Science degree in chemical engineering usually fulfill requirements for consideration for admission.

Students with a bachelor's degree in another discipline, such as chemistry, physics, other engineering sciences, and natural sciences, must have a background the department considers satisfactory for the study of advanced chemical engineering. A strong background will have included courses in math (including calculus and differential equations), vector physics, and ideally some courses that cover the topics of thermodynamics, heat and mass transfer, and chemical kinetics.

Apart from the requirements of the Office of Graduate and Postdoctoral Studies, the department has no set criteria for admission. Applications are viewed holistically based GPA, research experience, letters of recommendation, and personal statements. We view each of these categories as important and the admission committee ranks applications according to these metrics.

Total Hours Required: 30

Requirements

The student's program of coursework is selected with the advice of the graduate advisor and must be approved by the Graduate Studies Committee.

Thesis Requirements

Code	Title	Hours
Hours chosen from graduate CHE courses		15
CHE graduate research courses		9
CHE 698	Thesis	6
All students must also follow the requirements and policies below:		
Graduate Engineering Requirements		
Graduate University Requirements		
Total Hours		**30**

Additional Requirements

At least 15 hours must be completed in graduate-level chemical engineering courses. Up to nine hours of graduate research in chemical engineering may be counted towards the 30 hours requirement. A grade point average of at least 3.00 must be attained on graduate coursework in the major.

A thesis problem is selected after the student has consulted members of the Graduate Studies Committee. The thesis research problem should be selected during the first semester and initial research begun at that time. At least one full year is required to complete the master's degree program.

Report Requirements

Code	Title	Hours
Hours chosen from graduate CHE courses		15
CHE graduate research courses		9
Free electives: Additional coursework to reach total hours required.		3
CHE 398R	Master's Report	3
All students must also follow the requirements and policies below:		
Graduate Engineering Requirements		
Graduate University Requirements		
Total Hours		**30**

Additional Requirements

At least 18 hours must be completed in graduate-level coursework, of which at least 15 hours must be in chemical engineering. Up to nine hours of graduate research in chemical engineering may be counted towards the 30 hour requirement. A grade point average of at least 3.00 must be attained on graduate coursework in the major.

Requirements without Thesis or Report

Code	Title	Hours
Graduate CHE hours		18
Hours chosen from:		6
Outside CHE		
Free electives: Additional coursework to reach total hours required.		6
All students must also follow the requirements and policies below:		
Graduate Engineering Requirements		
Graduate University Requirements		
Total Hours		**30**

Additional Requirements

At least 18 semester hours must be completed in graduate coursework in chemical engineering, and at least six hours must be outside chemical engineering. Three hours of upper-division coursework may be included, and three hours of graduate research in chemical engineering may be included. No research is required, but a grade point average of at least 3.00 must be attained on graduate coursework in the major. Enrollment in this option must be approved by the Chair of the Graduate Studies Committee in chemical engineering.

The graduate program in chemical engineering is designed to provide students with the opportunity to develop advanced competence in transport phenomena, thermodynamics, and reaction engineering for the application of chemistry to the advancement of society. Through formal coursework and mentoring, each student is expected to acquire the tools to develop and transmit new knowledge and processes in a focused area of chemical engineering. The focused research areas include advanced materials, polymers and nanotechnology, biotechnology, energy, environmental engineering and sustainability, modeling and simulation, and process engineering.

Program Educational Objectives

Upon graduation, those who earn advanced chemical engineering degrees are expected to

1. Become leading professionals who advance chemical engineering practice and knowledge in multiple fields, such as energy, materials, environmental and systems engineering, electronics, biotechnology, human health, and education;
2. Continue to educate themselves as their needs, interests, and circumstances dictate;
3. Become ethical and productive engineers, who recognize and acknowledge the local and global impacts of engineering technology on humans and the environment.