We offer both masters and doctoral degrees in chemical engineering. Research can be in a variety of areas, including advanced energy systems, biochemical and biomedical engineering, catalysis, process optimization, nanotechnology, novel separation methods, polymers, reaction kinetics, surface science, thermodynamics, and thin films.

Any student with an undergraduate degree in chemical engineering or its equivalent from an accredited school and a grade point average (GPA) of at least 3.0 (on a 4.0 scale) during the last 60 hours of undergraduate course work may be admitted as a student in full standing.

MASTER OF SCIENCE

The Master of Science degree program can be readily completed in two years. A thesis is required.

Course work requirements for the M.S. degree in Chemical Engineering are:

- **3 Required Graduate-level Chemical Engineering Courses:** Thermodynamics, Transport, and Kinetics 9 hours
- **2 Graduate-level Chemical Engineering Electives** 6 hours
- **2 Graduate-level Science, Math, or Engineering Electives** 6 hours
- **Seminar in Chemical Engineering Research (1 hour/semester)** 3-4 hours
- **Masters Thesis Course Hours** 6 hours

**TOTAL 30-31 HOURS**

A special curriculum for students with undergraduate degrees in a field such as chemistry, physics, or mechanical engineering is available.

DOCTOR OF PHILOSOPHY

Nine hours of course work beyond the Master of Science are required for the Ph.D. degree in chemical engineering to make a total of 90 post-baccalaureate hours. Research credit hours make up the balance of the 90 hours. The additional course work hours must include CH E 5523, Advanced Mathematical Methods in Science and Engineering, plus two courses selected from advanced math, science, and engineering courses in consultation with the student's research supervisor. It is possible for a good student with a M.S. degree to complete the requirements for the Ph.D. in a period of four years.

A student working towards a Ph.D. degree must pass a qualifying exam and a general exam before being admitted as a candidate for this degree. The qualifying exam consists of written exams in 1) thermodynamics, 2) transport phenomena, and 3) kinetics and reaction engineering. The general examination involves writing a paper on the student's research project. The general examination also includes an oral presentation on the written report.

The following is a list of courses in Chemical Engineering and related disciplines (on back) that are available for graduate credit.

### CHEMICAL ENGINEERING (CH E)

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<th>Course Code</th>
<th>Course Title</th>
<th>Additional Title/Notes</th>
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<td>Process Dynamics and Control</td>
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<td>CH E G4262</td>
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<td>CH E G4273</td>
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<td>CH E G4473</td>
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<td>CH E G5243</td>
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<td>CH E G5293</td>
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<td>CH E G5435</td>
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<td>CH E G5463</td>
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<td>CH E G5516</td>
<td>Surface Characterization</td>
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<td>CH E G5523</td>
<td>Advanced Mathematical Methods in Science and Engineering</td>
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<td>CH E G5563</td>
<td>Properties and Applications of Porous Materials</td>
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<td>CH E G5643</td>
<td>Natural Gas Utilization</td>
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<td>CH E G5673</td>
<td>Colloid and Surface Science</td>
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<td>CH E G5693</td>
<td>Cellular Aspects in Tissue Engineering</td>
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<td>CH E G5703</td>
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<td>CH E G5723</td>
<td>Biosensors</td>
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<td>CH E G5843</td>
<td>Advanced Chemical Engineering Thermodynamics</td>
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<td>CH E G5960</td>
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<td>CH E G6990</td>
<td>Special Chemical Engineering Problems</td>
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RELATED COURSES AVAILABLE FOR GRADUATE CREDIT

AEROSPACE AND MECHANICAL ENGINEERING (AME)
AME G5213 Biomechanics I
AME G5223 Biomechanics II
AME G5233 Biomaterials
AME G5253 Implantable Devices
AME G5293 Transport in Biological Systems
AME G5333 Thermodynamics and Combustion
AME G5710 Topics in Solid Mechanics
AME G5803 Principles of Heat Transfer
AME G5973 Computational Heat and Fluid Flow

BIOENGINEERING (BIOE)
BIOE G5203 Bioengineering Principles
BIOE G5213 Biomechanics I
BIOE G5223 Biomechanics II
BIOE G5233 Biomaterials
BIOE G5243 Biochemical Engineering
BIOE G5253 Implantable Devices
BIOE G5293 Transport in Biological Systems
BIOE G5373 Tissue Engineering
BIOE G5393 Introduction to Computer-Aided Tissue Engineering
BIOE G5693 Cellular Aspects in Tissue Regeneration
BIOE G5703 Biology for Engineers
BIOE G5723 Biosensors
BIOE G5960 Directed Readings
BIOE G5970 Special Topics/Seminar (Various topics)
BIOE G6970- Advanced Topics in Bioengineering

CHEMISTRY AND BIOCHEMISTRY (CHEM)
CHEM G3653 Introduction to Biochemistry
CHEM G4023 Instrumental Methods of Chemical Analysis
CHEM G4033 Instrumental Methods of Chemical Analysis Laboratory
CHEM G5103 Physical and Chemical Separations
CHEM G5113 Equilibrium and Kinetic Methods of Analysis
CHEM G5123 Intermediate Physical Chemistry
CHEM G5233 Advanced Inorganic Chemistry -- Reactions and Mechanisms
CHEM G5323 Advanced Organic Chemistry
CHEM G5333 Advanced Inorganic Chemistry -- Bonding and Structure
CHEM G5433 Reaction Chemistry of the Main-Group Elements.
CHEM G5453 Polymer Science
CHEM G5673 Colloid and Surface Science
CHEM G5753 Principles of Biochemistry I
CHEM G5853 Principles of Biochemistry II
CHEM G6103 Electroanalytical Chemistry
CHEM G5323 Advanced Organic Chemistry
CHEM G5333 Advanced Inorganic Chemistry -- Bonding and Structure

CIVIL ENGINEERING AND ENVIRONMENTAL SCIENCE (CEES)
CEES G5114 Aquatic Chemistry
CEES G5244 Physiochemical Water Treatment Process
CEES G5283 Environmental Organic Chemistry
CEES G5324 Environmental Biology and Ecology
CEES G5624 Biological Waste Treatment
CEES G5673 Colloid and Surface Science
CEES G5833 Ground Water Quality Protection
CEES G5853 Groundwater and Seepage
CEES G5943 Air Quality Management

ELECTRICAL AND COMPUTER ENGINEERING (ECE)
ECE G5033 Neural Networks
ECE G5043 Fuzzy Logic
ECE G5063 Pattern Recognition and Computer Vision
ECE G5213 Digital Signal Processing

INDUSTRIAL ENGINEERING (IE)
IE G5323 Advanced Production Systems and Operation
IE G5343 Reliability in Engineering Design
IE G5623 Linear Programming
IE G5643 Engineering Optimization

MATHEMATICS (MATH)
MATH G333 Linear Algebra I
MATH G3413 Physical Mathematics I
MATH G3423 Physical Mathematics II
MATH G4163 Introduction to Partial Differential Equations
MATH G5163 Partial Differential Equations

MICROBIOLOGY (MBIO)
MBIO G4833 Basic Immunology
MBIO G4853 Physiology of Microorganisms
MBIO G5843 Introduction to Molecular Biology
MBIO G6873 Microbial Ecology

PETROLEUM ENGINEERING (PE)
P E G4033 Oil, Gas and Environmental Law
P E G4521 Reservoir Fluid Mechanics Laboratory
P E G5143 Fluid Flow in Porous Media
P E G5243 Introduction to Rock Mechanics
P E G5423 Advanced Stimulation
P E G5533 Petroleum Reservoir Development
P E G5603 Introduction to Natural Gas Engineering and Management
P E G5613 Natural Gas Engineering
P E G5623 Natural Gas Processing
P E G6153 Transport Phenomena in Porous Media

PHYSICS (PHYS)
PHYS G3223 Modern Physics for Engineers
PHYS G3803 Introduction to Quantum Mechanics I
PHYS G5013 Mathematical Methods in Physics
PHYS G5163 Statistical Mechanics
PHYS G5243 Solid State Physics
PHYS G5393 Quantum Mechanics I
PHYS G5403 Quantum Mechanics II
PHYS G5573 Electrodynamics I
PHYS G5583 Electrodynamics II

ZOOLOGY
ZOO G3103 Principles of Physiology
ZOO G5153 Endocrinology
ZOO G5364 Transmission Electron Microscopy
ZOO G5374 Scanning Electron Microscopy
ZOO G5843 Introduction to Molecular Biology

12/18/2012