

# GRADUATE PROGRAM IN CHEMICAL ENGINEERING

## MASTER OF SCIENCE IN CHEMICAL ENGINEERING DOCTOR OF PHILOSOPHY IN CHEMICAL ENGINEERING

### SCHOOL OF CHEMICAL, BIOLOGICAL AND MATERIALS ENGINEERING THE UNIVERSITY OF OKLAHOMA

100 East Boyd, Room T-335, Sarkeys Energy Center, Norman, OK 74019 USA

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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	<u>6 hours</u>
<b>TOTAL</b>	<b>30-31 HOURS</b>

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 will be 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)

CH E G3123 Momentum, Heat and Mass Transfer II  
CH E G3333 Separation Processes  
CH E G3432 Unit Operations Laboratory  
CH E G3473 Chemical Engineering Thermodynamics  
CH E G4153 Process Dynamics and Control  
CH E G4253 Chemical Engineering Design I  
CH E G4262 Chemical Engineering Design Laboratory  
CH E G4273 Advanced Process Design  
CH E G4473 Kinetics  
CH E G5163 Catalysis  
CH E G5183 Graduate Transport Phenomena  
CH E G5193 Characterization of Solid Surfaces  
CH E G5203 Bioengineering Principles  
CH E G5243 Biochemical Engineering  
CH E G5273 Biomedical Engineering  
CH E G5293 Transport in Biological Systems

CH E G5373 Tissue Engineering  
CH E G5443 Complex Fluids Rheology Laboratory  
CH E G5453 Polymer Science  
CH E G5463 Polymer Processing  
CH E G5480 Seminar in Selected Topics in Chemical Engineering  
CH E G5523 Advanced Mathematical Methods in Science and Engineering  
CH E G5643 Natural Gas Utilization  
CH E G5673 Colloid and Surface Science  
CH E G5843 Advanced Chemical Engineering Thermodynamics  
CH E G5871 Seminar in Chemical Engineering Research  
CH E G6483 Seminar on Selected Topics in Engineering Sciences  
CH E G6613 Modern Thermodynamics Seminar  
CH E G6723 Seminar in Theoretical and Applied Kinetics

## 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 G5333 Thermodynamics and Combustion  
AME G5413 Processes in Fluid Mechanics  
AME G5553 Mechanical Behavior of Materials  
AME G5710 Topics in Solid Mechanics  
AME G5720 Topics in Fluid Mechanics  
AME G5803 Principles of Heat Transfer  
AME G5973 Computational Heat and Fluid Flow

### 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 G6453 Chemical Kinetics

### CIVIL ENGINEERING (C E)

C E G5114 Aquatic Chemistry  
C E G5244 Water and Waste Treatment  
C E G5624 Biological Waste Treatment  
C E G5833 Ground Water Quality Protection  
C E G5853 Groundwater and Seepage  
C E G5923 Air Pollution Control Engineering

### ELECTRICAL ENGINEERING (E E)

E E G5033 Neural Networks  
E E G5043 Fuzzy Logic  
E E G5063 Computer Vision  
E E G5213 Digital Signal Processing

### ENVIRONMENTAL SCIENCE (E S)

E S G5283 Environmental Organic Chemistry  
E S G5324 Biological Aspects of Environmental Science  
E S G5673 Colloid and Surface Science

### INDUSTRIAL ENGINEERING (I E)

I E G5323 Advanced Production Systems and Operation  
I E G5343 Reliability in Engineering Design  
I E G5623 Linear Programming  
I E G5643 Engineering Optimization

### MATHEMATICS (MATH)

MATH G3333 Linear Algebra I  
MATH G3343 Linear Algebra II  
MATH G3413 Physical Mathematics I  
MATH G3423 Physical Mathematics II  
MATH G4163 Introduction to Partial Differential Equations  
MATH G4413 Intermediate Ordinary 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 G5893 Genetics and Plasmids and Bacterial Viruses  
MBIO G6873 Microbial Ecology

### PETROLEUM ENGINEERING (P E)

P E G4033 Oil, Gas and Environmental Law  
P E G4453 Oil Reservoir Engineering  
P E G4462 Reservoir Mechanics Laboratory  
P E G4602 Natural Gas Engineering 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 G4123 Vertebrate Physiology  
ZOO G5153 Endocrine Physiology  
ZOO G5364 Transmission Electron Microscopy  
ZOO G5374 Scanning Electron Microscopy  
ZOO G5843 Introduction to Molecular Biology