MS IN CHEMICAL, ENVIRONMENTAL AND MATERIALS ENGINEERING

Overview

The Department of Chemical, Environmental, and Materials Engineering (CEM) offers a Master of Science (MS) degree in Chemical, Environmental, and Materials Engineering with the following areas of emphasis:

- Chemical Engineering
- Environmental Engineering
- Materials Science and Engineering

Admission Requirements

Students will apply directly to the College of Engineering for the Graduate Program. Students must have a related bachelor's degree in Engineering, Physics, Chemistry, Biology, Mathematics, or other technical fields, with a minimum GPA of 3.0 on a 4.0 scale. There is flexibility based on a holistic review of the application. For non-native English speakers, the minimum TOEFL score is 80 and the minimum IELTS score is 6.5.

Curriculum Requirements

Thesis Option

Code	Title	Credit Hours
Graduate Coursework		**21**
From approved courses including at least 12 credits from CET 6XX/7XX courses and at least one course from each of the core areas below. Equivalent courses may be taken at other schools/college with the approval of the program director.		
Environmental Engineering		
CET 630	Water Resources Engineering II	
CET 633	Water-Quality Control in Natural Systems	
CET 640	Environmental Chemistry	
CET 641	Environmental Engineering Microbiology	
CET 642	Solid and Hazardous Waste Engineering	
CET 643	Air Pollution Control Engineering	
CET 730	Advanced Fluid Mechanics	
CET 735	Water and Wastewater Engineering: Treatment and Reuse	
CET 743	Risk Analysis	
Chemical Engineering		
CET 651	(Aerosol Instrumentation)	
CET 652	(Aerosol Science & Technology)	
CET 653	(Aerosol Mechanics)	
CET 670	Soft Matter Colloids (Soft Matter and Colloids)	
CET 671	Chemical Product Design (Chemical Product Design)	
Materials Engineering		
MAE 607	Advanced Mechanics of Solids	
MAE 616	Introduction to Composite Materials	
MAE 631	Scientific and Engineering Foundations of Additive Manufacturing	
MAE 632	Additive Manufacturing of Engineering Materials	
MAE 733	Additive Manufacturing Lab	
CAE 720	Concrete Materials Science	
CAE 729	Molecular Simulation of Materials	
BME 622	Scanning Electron Microscopy for Engineers	
BME 635	Advanced Biomaterials	
ECE 643	BioNanotechnology	
Master's Thesis		
CET 810	Master's Thesis (Master's Thesis)	6

CET 703	Graduate Research Seminar (Taken three times for 1 credit each)	3
Total Credit Hours		**30**

Curriculum Requirements

Non-Thesis Option

Code	Title	Credit Hours
Graduate Coursework		**24**
From approved courses including at least 12 credits from CET 6XX/7XX courses and at least one course from each of the core areas below. Equivalent courses may be taken at other schools/college with the approval of the program director.		
Environmental Engineering		
CET 630	Water Resources Engineering II	
CET 633	Water-Quality Control in Natural Systems	
CET 640	Environmental Chemistry	
CET 641	Environmental Engineering Microbiology	
CET 642	Solid and Hazardous Waste Engineering	
CET 643	Air Pollution Control Engineering	
CET 690	Special Topics	
CET 730	Advanced Fluid Mechanics	
CET 735	Water and Wastewater Engineering: Treatment and Reuse	
CET 743	Risk Analysis	
Chemical Engineering		
CET 795	Special Problems (Formulation Design)	
CET 790	Advanced Topics (Softmatter & Colloids)	
CET 790	Advanced Topics (Aerosol Instrumentation)	
CET 790	Advanced Topics (Aerosol Science & Technology)	
CET 790	Advanced Topics (Aerosol Mechanics)	
Materials Engineering		
MAE 607	Advanced Mechanics of Solids	
MAE 616	Introduction to Composite Materials	
MAE 631	Scientific and Engineering Foundations of Additive Manufacturing	
MAE 632	Additive Manufacturing of Engineering Materials	
MAE 733	Additive Manufacturing Lab	
CAE 720	Concrete Materials Science	
CAE 729	Molecular Simulation of Materials	
BME 622	Scanning Electron Microscopy for Engineers	
BME 635	Advanced Biomaterials	
ECE 643	BioNanotechnology	
CET 703	Graduate Research Seminar (Taken three times for 1 credit each)	3
Capstone		**3**
Students choose to complete a Master's Project or Industry Project.		
CET 605	Master's Project (Master's Project)	
CET 695	Special Problems (A three-month summer industry project, culminating with an internship report detailing the work done and knowledge gained. Project will be supervised by a faculty member in an appropriate academic unit culminating in a report that's approved by the supervisor.)	
Total Credit Hours		**30**

Graduation Requirements

The average grade in curricular coursework should be B or better, and no grade below C will be counted. 50% of the non-thesis credits should be from CET courses. Other requirements are identical to the College of Engineering requirements.

Supervisory Committee Requirements

Students who decide to pursue the thesis option must select a supervisory committee. The supervisory committee must have at least two members, with at least one member being a Graduate Faculty member in CEME. The chair must be a full-time faculty and a member of the Graduate Faculty, and may or may not be from CEME. If the chair is from CEME and a member of the Graduate Faculty, then only one other member of the committee must be from CEME and a member of the Graduate Faculty

Sample Plan of Study

Thesis Option

Year One		
Fall		**Credit Hours**
Graduate Course		3
Graduate Course		3
Graduate Course		3
CET 703	Graduate Research Seminar	1
	Credit Hours	**10**
Spring		
Graduate Course		3
Graduate Course		3
CET 703	Graduate Research Seminar	1
CET ### MS Thesis		3
	Credit Hours	**10**
Year Two		
Fall		
Graduate Course		3
Graduate Course		3
CET ### MS Thesis		3
CET 703	Graduate Research Seminar	1
	Credit Hours	**10**
	Total Credit Hours	**30**

Sample Plan of Study

Non-Thesis Option

Year One		
Fall		**Credit Hours**
Graduate Course		3
Graduate Course		3
Graduate Course		3
CET 703	Graduate Research Seminar	1
	Credit Hours	**10**
Spring		
Graduate Course		3
Graduate Course		3
Graduate Course		3
CET 703	Graduate Research Seminar	1
	Credit Hours	**10**
Summer		
CET 605 or 695	Master's Project or Special Problems	3
	Credit Hours	**3**
Year Two		
Fall		
Graduate Course		3

Graduate Course		3
CET 703	Graduate Research Seminar	1
	Credit Hours	**7**
	Total Credit Hours	**30**

Mission

The mission of the Department of Chemical, Environmental, and Materials Engineering is to:

- Provide high-quality undergraduate and graduate education in chemical, environmental, and materials engineering that will prepare graduates for professional careers and a lifetime of learning.
- Conduct high-quality research that will advance the current body of knowledge and engage in new discoveries to improve the quality of human life; and
- Serve the engineering profession and society through active involvement in professional organizations and contribution of professional expertise.

The departmental mission will be accomplished by providing an integrated and multidisciplinary scientific education. Graduates will be involved in the transfer of scientific discoveries to modern technologies and novel products that benefit society and minimize the impact on the environment. They will be trained to address multi-scale aspects of generating clean energy, producing novel and superior materials, and utilizing the biological revolution to manufacture new products. They will be involved in the development and manufacture of consumer products, as well as in design, operation, and control of processes in a variety of industries (e.g., petroleum, petrochemical, chemical, consumer products, semiconductor, environmental technologies, advanced materials, food, feed and pharmaceuticals).

Educational Objectives

The educational objectives of the MS program are to produce graduates whom:

- Have advanced technical knowledge in at least one specialty area of chemical, environmental, or materials engineering;
- Have advanced capability to apply advanced knowledge to engineering problems; and
- Have made significant contributions in at least one specialty area of chemical, environmental, or materials engineering.

Student Learning Outcomes

- Students will demonstrate an advanced knowledge of the discipline (mathematics, science, and engineering), including methodology relevant to a specialty area.
- Students will demonstrate an advanced ability to identify, formulate, and solve engineering problems to carry out supervised research.
- Students will demonstrate an advanced ability to generate technical contributions and effectively communicate them to the scientific community.