PHD IN CHEMICAL, ENVIRONMENTAL, AND MATERIALS ENGINEERING

Overview

The Department of Chemical, Environmental, and Materials Engineering (CEM) offers a Doctor of Philosophy (Ph.D.) degree in Chemical, Environmental, and Materials Engineering with the following areas of emphasis:

- Chemical Engineering
- Environmental Engineering
- Materials Science and Engineering

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

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

The specialty areas of study for the Ph.D. include:

- Aerosols
- Water Systems
- Synthetic Biology
- Materials Synthesis

Admission Requirements

The minimum GRE requirement is 310 (verbal plus quantitative) for students without a master's degree, and 305 for students with a master's degree. Applicants can be admitted without meeting the minimum GRE requirement; however, GRE scores must be submitted with the application for admission, and will be considered in the admission decision Other requirements are the same as the College of Engineering requirements. The transfer policy complies with the rules of the Graduate School.

Curriculum Requirements

Ph.D. in Chemical, Environmental, and Materials Engineering

FOR students without a prior master's degree

Code	Title	Credit Hours
Graduate Coursework		**27**
At least 9 course credits must be at the 700-level in the CEmaT department		
Seminar Series		**6**
CET 703	Graduate Research Seminar (New Course: CET Seminar Series)	
Teaching Requirement		**3**
CET 704	Graduate Teaching (New Course: Mentored Teaching Experience)	
Dissertation		**36**
CAE 830	Pre-Candidacy Doctoral Dissertation	
CAE 840	Post-Candidacy Doctoral Dissertation	
CAE 850	Research in Residence	
Total Credit Hours		**72**

For students with a prior master's degree*

*Assuming 12 graduate credit hours are approved to count toward the doctoral program

Code	Title	Credit Hours
Graduate Coursework		**15**
At least 9 course credits must be at the 700-level in the CEmaT department		
Seminar Series		**6**
CET 703	Graduate Research Seminar (New Course: CET Seminar Series)	

Teaching Requirement		**3**
CET 704	Graduate Teaching (New Course: Mentored Teaching Experience)	
Dissertation		**36**
CAE 830	Pre-Candidacy Doctoral Dissertation	
CAE 840	Post-Candidacy Doctoral Dissertation	
CAE 850	Research in Residence	
Total Credit Hours		**60**

Graduation Requirements

The average grade in curricular coursework should be B or better, and no grade below C will be counted. Other requirements are identical to the College of Engineering requirements.

Supervisory Committee Requirements

The supervisory committee must have at least four members, with at least two members being Graduate Faculty members in CEmaT. The chair must be regular faculty and a member of the Graduate Faculty, and may or may not be from CEmaT. If the chair is from CEmaT and a member of the Graduate Faculty, then only one other member of the committee must be from CEmaT and a member of the Graduate Faculty. There must be at least one outside (non-CEmaT) member.

Qualifying Examination and Proposal Defense

Qualifying Exam

The first part of qualifying exam is taken at the end of the first year of study. The qualifying exam consists of a set of written tests that cover material from the student's baccalaureate studies, as well as material from the student's first year of study. The qualifying exam will be coordinated and administered by the supervisory committee, with the following guidelines:

- Each member of the supervisory committee will prepare a test consisting of a set of questions/problems which will be administered to the student by the committee member.
- The scope of each test will be coordinated by the chair of the supervisory committee so as to minimize overlap in content.
- The student will be informed in advance of the material to be covered on each test. Normally, the material will be relevant to the student's research area.
- The format of the each test will be determined by the responsible committee member.
- Each committee member will grade their test within one week of when it is taken.
- The student is required to pass each test, with the passing score determined by the committee member administering the test.
- If the student does not pass one or more of the tests, then follow-up tests to those not passed will be administered by the corresponding committee members in the January following the first tests. If the student does not pass all the second tests, he/she will be dismissed from the program.
- All qualifying exams will be offered in a two-week window in the August following the student's admission into the program, assumed to be in the previous August.

After passing the qualifying exam, the next milestone is the dissertation proposal defense. Upon successful defense of the dissertation, the student is admitted to candidacy.

Proposal Defense

The second part of the qualifying exam is the proposal defense. This is typically taken at the end of the second year. A student is admitted to candidacy after passing the proposal defense.

Suggested Plan of Study

Ph.D. in Chemical, Environmental, and Materials Engineering

Direct B.S. to Ph.D. Pathway - Fall Admission

Year One		
Fall		**Credit Hours**
Graduate Course		3
Graduate Course		3
Graduate Course		3
CET 703	Graduate Research Seminar	1
CET 830	Pre-Candidacy Doctoral Dissertation	1
	Credit Hours	**11**

Spring		
Graduate Course		3
Graduate Course		3
Graduate Course		3
CET 703	Graduate Research Seminar	1
CET 830	Pre-Candidacy Doctoral Dissertation	1
	Credit Hours	**11**
Year Two		
Fall		
Graduate Course		3
Graduate Course		3
Graduate Course		3
CET 703	Graduate Research Seminar	1
CET 704	Graduate Teaching	2
CAE 830	Pre-Candidacy Doctoral Dissertation	1
	Credit Hours	**13**
Spring		
CET 703	Graduate Research Seminar	1
CET 704	Graduate Teaching	1
CET 840	Post-Candicacy Doctoral Dissertation	1
	Credit Hours	**3**
Year Three		
Fall		
CET 703	Graduate Research Seminar	1
CAE 830	Pre-Candidacy Doctoral Dissertation	8
Dissertation Proposal (Admission to Candidacy)		
	Credit Hours	**9**
Spring		
CET 703	Graduate Research Seminar	1
CAE 840	Post-Candidacy Doctoral Dissertation	8
	Credit Hours	**9**
Year Four		
Fall		
CAE 840	Post-Candidacy Doctoral Dissertation	8
	Credit Hours	**8**
Spring		
CAE 840	Post-Candidacy Doctoral Dissertation	8
	Credit Hours	**8**
	Total Credit Hours	**72**

M.S. to Ph.D. Pathway - Fall Admission

Year One		
Fall		**Credit Hours**
Graduate Course		3
Graduate Course		3
Graduate Course		3
CET 703	Graduate Research Seminar	1
CAE 830	Pre-Candidacy Doctoral Dissertation	1
	Credit Hours	**11**
Spring		
Graduate Course		3
Graduate Course		3

CET 703	Graduate Research Seminar	1
CAE 830	Pre-Candidacy Doctoral Dissertation	1
	Credit Hours	**8**
Year Two		
Fall		
CET 703	Graduate Research Seminar	1
CET 704	Graduate Teaching	2
CAE 830	Pre-Candidacy Doctoral Dissertation	1
	Credit Hours	**4**
Spring		
CET 703	Graduate Research Seminar	1
CET 704	Graduate Teaching	1
CET 840	Post-Candicacy Doctoral Dissertation	1
	Credit Hours	**3**
Year Three		
Fall		
CET 703	Graduate Research Seminar	1
CAE 840	Post-Candidacy Doctoral Dissertation	8
	Credit Hours	**9**
Spring		
CET 703	Graduate Research Seminar	1
CAE 840	Post-Candidacy Doctoral Dissertation	8
	Credit Hours	**9**
Year Four		
Fall		
CET 840	Post-Candicacy Doctoral Dissertation	8
	Credit Hours	**8**
Spring		
CET 840	Post-Candicacy Doctoral Dissertation	8
	Credit Hours	**8**
	Total Credit Hours	**60**

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 Ph.D. 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.

Specialty areas include aerosols, water, synthetic biology, and materials synthesis.

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.