CHEMICAL, ENVIRONMENTAL AND MATERIALS ENGINEERING

Overview
The Department of Chemical, Environmental, and Materials Engineering (CEMaT) 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 Doctor of Philosophy program in Chemical, Environmental, and Materials Engineering are to produce graduates that:

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
- Environmental and Water-Resources Engineering
- Synthetic Biology
- Materials Synthesis

Students in the PhD program are required to complete at least 72 credits beyond a Bachelors degree. At least 36 credits will be coursework credits, and at least 36 credits will be research credits. For students who enter the PhD program with an earned Masters degree in a related field, the Masters degree coursework can count up to a maximum of 12 credits towards the required coursework, with approval of the Graduate Program Director and the Supervisory Committee. All PhD students are required to engage in supervised research and defend a dissertation.

The following are the major requirements for the degree:

1. Develop a Plan of Study that is approved by a Supervisory Committee.
2. Take coursework credits in Year 1, and pass a Comprehensive Exam (first part of the Qualifying Exam) at the end of Year 1.
3. Engage in research and defend a dissertation proposal by end of Year 2 (second part of Qualifying Exam), and be admitted to Candidacy.
4. Students who receive College of Engineering Fellowships must substantively participate in teaching beginning in Year 2.
5. Complete and defend a dissertation at the end of the program.
6. Students are encouraged to publish their research findings in refereed journals.

Master’s Program

- MS in Materials Engineering (http://bulletin.miami.edu/graduate-academic-programs/engineering/chemical-environmental-materials-engineering/materials-engineering-ms/)
- MS in Product Design (http://bulletin.miami.edu/graduate-academic-programs/engineering/chemical-environmental-materials-engineering/product-design-ms/)

Doctoral Program:
PhD in Chemical, Environmental, and Materials Engineering

CET 605. Master’s Project. 3 Credit Hours.
Project in Chemical, Environmental or Materials Engineering. Course is an option for the non-thesis master’s student.

Components: IND.
Grading: GRD.
Typically Offered: Fall, Spring, & Summer.
CET 630. Water Resources Engineering II. 3 Credit Hours.
Runoff models, routing models, water-quality models, and evapotranspiration models. Design of storm water management systems. Principles of groundwater flow. Design of wells and wellfields for public water supply. Legal regulatory, and economic components of water-resources management systems. Comprehensive design project.
Prerequisite: CET 430.
Components: LEC.
Grading: GRD.
Typically Offered: Fall.

CET 633. Water-Quality Control in Natural Systems. 3 Credit Hours.
Water quality regulations, fate and transport processes, water-quality control in rivers, lakes, wetlands, oceans, and ground water.
Pre or Corequisite: CET 430 and CET 440.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

CET 640. Environmental Chemistry. 3 Credit Hours.
Kinetics, equilibrium, acid-base, oxidation-reduction, and reaction chemistry applied to water and wastewater engineering.
Prerequisite: CHM 121.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

CET 641. Environmental Engineering Microbiology. 3 Credit Hours.
Classification of microorganisms. Microbial agents of infectious diseases and modes of disease transmission. Control of pathogens through water and waste treatment, food protection, and insect control. Microbial ecology and bioremediation systems. Laboratory exercises in microbiology.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

CET 642. Solid and Hazardous Waste Engineering. 3 Credit Hours.
Solid-waste characteristics, recycling, incineration, hazardous waste characteristics, prevention, and physical and chemical treatment are covered. Design projects are also included.
Prerequisite: CET 340.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

CET 643. Air Pollution Control Engineering. 3 Credit Hours.
Fundamentals of air pollution and air quality; properties and control of particulates, volatile organic compounds, carbon monoxide, sulfur oxides, and nitrogen oxides; motor vehicle emissions; health and aesthetic effects (acid rain, visibility), laws and regulations, meteorology and pollutant transport in the atmosphere; indoor air pollution.
Prerequisite: MAE 303 and (CET 330 or CAE 330 or MAE 309).
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

CET 690. Special Topics. 1-3 Credit Hours.
Sub-titles describing the topics to be offered will be shown in parentheses in the printed class schedule, following the title Special Topics.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

CET 695. Special Problems. 1-3 Credit Hours.
Project course introducing methods of research through an individual investigation of current problems. Offered by special arrangement only.
Components: RSC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

CET 703. Graduate Research Seminar. 1 Credit Hour.
Attendance and active participation in a designated semester seminar series.
Components: LEC.
Grading: SUS.
Typically Offered: Fall & Spring.
CET 704. Graduate Teaching. 1-3 Credit Hours.
Teaching or assisting in a course with a substantial level of instructional responsibility. Only open to doctoral students.
Components: LEC.
Grading: SUS.
Typically Offered: Fall & Spring.

CET 730. Environmental Hydrology. 3 Credit Hours.
Principles of ecohydrology, agricultural hydrology, impacts of climate change, fundamentals of remote sensing and geographic information systems for hydrological applications, statistical applications in hydrology.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

CET 735. Water and Wastewater Engineering: Treatment and Reuse. 3 Credit Hours.
Physical treatment processes; Chemical unit processes; Advanced biological treatment processes; Sludge treatment and disposal; Industrial water supply and wastewater treatment; Membrane systems for wastewater treatment and case studies; Advanced wastewater treatment and reuse; Environmental nanotechnology.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

CET 743. Risk Analysis. 3 Credit Hours.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

CET 780. Indoor Environmental Modeling. 3 Credit Hours.
Prediction of indoor environment using computational fluid dynamics techniques. Advanced topics in thermal comfort and indoor air quality. Basic concepts of turbulence modeling and numerical methods for natural, forced, and mixed convection and jet flows indoors. Simulation of air velocity, temperature, and contaminant concentrations in buildings. Comparison of the simulated results with measured data.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

CET 790. Advanced Topics. 1-3 Credit Hours.
Subject matter offerings based upon student demand and availability of faculty. Subtitles describing the topics to be offered will be shown in parentheses in the printed class schedule, following the title Advanced Topics.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

CET 795. Special Problems. 1-3 Credit Hours.
Research and/or design projects. Individual investigation of current problems. Offered by special arrangement only.
Components: RSC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

CET 830. Pre-Candidacy Doctoral Dissertation. 1-12 Credit Hours.
Doctoral dissertation credits taken prior to the Ph.D. student’s candidacy. The student will enroll for credit as determined by his/her advisor. Not more than 12 credit hours of CET 830 may be taken in a regular semester, nor more than 6 credit hours in a summer session.
Components: THE.
Grading: SUS.
Typically Offered: Fall, Spring, & Summer.

CET 840. Post-Candidacy Doctoral Dissertation. 1-12 Credit Hours.
Doctoral dissertation credits taken after the Ph.D. student has been admitted to candidacy. The student will enroll for credit as determined by his/her advisor. Not more than 12 credit hours in CET 840 may be taken in a regular semester, nor more than 6 credits in a summer session.
Components: THE.
Grading: SUS.
Typically Offered: Fall, Spring, & Summer.
CET 850. Research in Residence. 1 Credit Hour.
Used to establish research in residence for the Ph.D. after the student has been enrolled for the permissible cumulative total in appropriate doctoral research. Credit not granted. May be regarded as full-time residence as determined by the Dean of the Graduate School.

Components: THE.
Grading: SUS.
Typically Offered: Fall, Spring, & Summer.