

B.S. IN CIVIL ENGINEERING

Civil Engineering Overview

The Civil Engineering curriculum provides an integrated educational experience in mathematics, basic sciences, humanities, social sciences, engineering sciences, and civil engineering design. The first two years of the Civil Engineering curriculum provide a strong foundation in mathematics, basic sciences, and engineering sciences. During the next two years of the four-year program, the Civil Engineering curriculum integrates engineering sciences with design applications in the areas of structural, environmental, geotechnical, and water resources engineering. The curriculum culminates with a major senior-level design project that includes design applications from the major specialty areas of civil engineering.

Graduate study is offered leading to the degrees of Master of Science and Doctor of Philosophy in Civil Engineering (<http://bulletin.miami.edu/graduate-academic-programs/engineering/civil-architectural-environmental-engineering/>). For detailed information on graduate studies, see the Graduate Studies Bulletin.

A tabular listing of the course requirements for the degree of Bachelor of Science in Civil Engineering is shown below.

Curriculum Requirements

Code	Title	Credit Hours
MAJOR REQUIREMENTS		
Engineering Courses		
CAE 115	Introduction to Engineering II: Geospatial Data (Surveying and GIS)	2
CAE 210	Mechanics of Solids I	3
CAE 211	Mechanics of Solids II	3
CAE 212	Structural Laboratory	1
CAE 310	Structural Analysis	3
CAE 320	Concrete Structures	3
CAE 321	Steel Structures	3
CAE 330	Fluid Mechanics	3
CAE 350	Transportation Engineering I	3
CAE 361	Building Information Modeling I	3
CAE 370	Geotechnical Engineering I	3
CAE 371	Geotechnical Laboratory	1
CAE 401	(Civil and Architectural Engineering Seminars (NEW COURSE))	1
CAE 402	Professional Engineering Practice	3
CAE 403	Senior Design Project I - Engineering Design	3
CAE 404	Senior Design Project II - Integrated Engineering Documents	3
CAE 430	Water-Resources Engineering I	3
CAE 470	Foundations and Earth Retaining Systems	3
CET 340	Introduction to Environmental Engineering	3
CET 440	Water Quality Control Systems	3
ECE 205	Principles of Electrical Engineering-I	3
EGN 110	Innovation and Entrepreneurship in Engineering	3
or EGN 114	Global Challenges Addressed by Engineering and Technology	
or EGN 123	Computing and Digital Solutions for the future	
ISE 311	Applied Probability and Statistics	3
MAE 303	Thermodynamics	3
CEN Technical Elective		3
CEN Design Electives		6
Math and Science Courses		
MTH 151	Calculus I for Engineers	5
MTH 162	Calculus II	4
MTH 211	Calculus III	3
MTH 311	Introduction to Ordinary Differential Equations	3
CHM 151	Chemistry for Engineers	3

CHM 153	Chemistry Laboratory for Engineers	1
PHY 221	University Physics I	3
PHY 222	University Physics II	3
PHY 224	University Physics II Lab	1
GENERAL EDUCATION REQUIREMENTS		
Written Communication Skills:		
WRS 105	First-Year Writing I	3
WRS 107	First-Year Writing II: STEM	3
Quantitative Skills (3 credits) (fulfilled thru MTH 151)		
Areas of Knowledge:		
Arts and Humanities Cognate		9
People and Society Cognate		9
STEM Cognate (9 credits) (fulfilled through the major)		
ADDITIONAL REQUIRED COURSES		
Basic Science Elective		3
Total Credit Hours		127

* Internships, Practical Training, or other types of practicum are neither required nor optional credit-earning components in the established undergraduate curriculum. Credit earned through these experiences via UMI 305 will not count towards any CAE degree requirements.

Plan of Study

Freshman Year		Credit Hours
Fall		
EGN 110, 114, or 123	Innovation and Entrepreneurship in Engineering or Global Challenges Addressed by Engineering and Technology or Computing and Digital Solutions for the future	3
MTH 151	Calculus I for Engineers	5
PHY 221	University Physics I	3
WRS 105	First-Year Writing I	3
Credit Hours		14
Spring		
CAE 115	Introduction to Engineering II: Geospatial Data (Surveying and GIS)	2
CAE 210	Mechanics of Solids I	3
CHM 151	Chemistry for Engineers	3
CHM 153	Chemistry Laboratory for Engineers	1
MTH 162	Calculus II	4
WRS 107	First-Year Writing II: STEM	3
Credit Hours		16
Sophomore Year		
Fall		
CAE 211	Mechanics of Solids II	3
CAE 212	Structural Laboratory	1
ISE 311	Applied Probability and Statistics	3
MTH 211	Calculus III	3
PHY 224	University Physics II Lab	1
PHY 222	University Physics II	3
AH Cognate ²		3
Credit Hours		17
Spring		
CAE 310	Structural Analysis ¹	3
CET 340	Introduction to Environmental Engineering	3
ECE 205	Principles of Electrical Engineering-I	3
MTH 311	Introduction to Ordinary Differential Equations	3

AH Cognate ²		3
Credit Hours		15
Junior Year		
Fall		
CAE 320	Concrete Structures ¹	3
CAE 330	Fluid Mechanics	3
CAE 350	Transportation Engineering I ¹	3
MAE 303	Thermodynamics	3
PS Cognate ²		3
Basic Science Elective		3
Credit Hours		18
Spring		
CAE 321	Steel Structures ¹	3
CAE 361	Building Information Modeling I	3
CAE 370	Geotechnical Engineering I ¹	3
CAE 371	Geotechnical Laboratory ¹	1
CAE 430	Water-Resources Engineering I ¹	3
CET 440	Water Quality Control Systems	3
Credit Hours		16
Senior Year		
Fall		
CAE 401		1
CAE 403	Senior Design Project I - Engineering Design ¹	3
CAE 470	Foundations and Earth Retaining Systems ¹	3
CEN Design Elective I ³		3
AH Cognate ²		3
PS Cognate ²		3
Credit Hours		16
Spring		
CAE 402	Professional Engineering Practice	3
CAE 404	Senior Design Project II - Integrated Engineering Documents ¹	3
CEN Tech Elective		3
CEN Design Elective II ⁴		3
PS Cognate ²		3
Credit Hours		15
Total Credit Hours		127

¹ Only offered once a year

² To be selected from lists of approved People and Society (PS)/Humanities and Arts (HA) cognates, Technical, CEN Technical, and Basic Science electives. Students take a minimum of 3 courses (9 credit hours) in HA cognate and 3 courses in PS Cognate (9 credit hours)

³ CAE 530 (<https://bulletin.miami.edu/search/?search=cae+530>) or CAE 570 (<https://bulletin.miami.edu/search/?search=cae+570>)

⁴ CAE 520 or CAE 521

Mission

The mission of the Department of Civil, Architectural & Environmental Engineering is to:

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

Goals

The educational objectives of the Civil Engineering Program are to have graduates who within the first several years following graduation are either

1. Working as a professional in an area closely related to civil engineering, or
2. Pursuing a graduate or professional degree.

Student Learning Outcomes

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. An ability to communicate effectively with a range of audiences.
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.