

# PH.D. IN CIVIL ENGINEERING

## Overview

The Department of Civil and Architectural Engineering (CAE) offers a Doctor of Philosophy (Ph.D.) degree in Civil Engineering with the following areas of emphasis:

- Civil Engineering
- Architectural Engineering

The educational objectives of the Doctor of Philosophy program in Civil Engineering are to produce graduates whom:

1. Have advanced technical knowledge in at least one specialty area of civil engineering
2. Have advanced capability to apply advanced knowledge to engineering problems
3. Have made significant contributions in at least one specialty area of civil engineering

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

- Structural Engineering
- Structural Materials
- Integrated Building Systems
- Mechanical, Electrical, and Plumbing (MEP) Systems

A prior degree in civil or architectural engineering is preferred, but not required to apply to the Ph.D. program. Applicants with degrees in science or other engineering fields will be considered, especially if their background and research interests align with those of faculty. Students who do not have a prior engineering degree may be expected to complete several core undergraduate civil engineering courses prior to applying for admission to Ph.D. candidacy.

The minimum credit requirement for the Ph.D. is 72 credits beyond the baccalaureate degree. These credits include both non-dissertation and dissertation credits. Non-dissertation credits include course, seminar, and teaching credits. All Ph.D. students are required to complete coursework, engage in supervised research, and defend a dissertation.

The Program of Study is the student's specific set of coursework that defines the course requirements for graduation and must be approved by an advisory committee (known as the Supervisory Committee). Depending on whether the student already has an earned M.S. degree, the Ph.D. degree can typically be completed within two to five years.

## Curriculum Requirements

### For a PhD following an M.S.

- For students who already have an earned M.S. (in either civil or architectural engineering, or a closely-related field), a minimum of 72 graduate-level credits (with an average of "B" or better and no grade below a "C") are required beyond the M.S. degree.
- The requirement list is provided below. The classification of courses into their respective Groups can be found in the CAE Courses (<http://bulletin.miami.edu/graduate-academic-programs/engineering/civil-architectural-environmental-engineering/#coursestext>) section.

Code	Title	Credit Hours
<b>Requirement</b>		
6 credits from Group A		6
Group A: 700-level lecture-based CAE Courses in civil and architectural engineering		
3 credits from any of the following Groups: A, B, and/or E		3
Group A: 700-level lecture-based CAE Courses in civil and architectural engineering		
Group B: 600-level lecture-based CAE Courses in civil and architectural engineering		
Group E: CAE Independent Study (Special Problems)		
CAE 695	Special Problems	
or CAE 795	Special Problems	
9 credits from any of the following Groups: A, B, C, D and/or E		9
Group A: 700-level lecture-based CAE Courses in civil and architectural engineering		
Group B: 600-level lecture-based CAE Courses in civil and architectural engineering		
Group C: 600- or 700-level CAE courses in Construction Management (CM)		
Group D: Any pre-approved course in any UM Department at the 600- or 700-level (i.e. XXX 600-799) except CAE and UMI		
Group E: CAE Independent Study (Special Problems)		

CAE 795 or CAE 695	Special Problems Special Problems	
45 credits from Group H		45
Group H: CAE PhD Dissertation		
CAE 830	Pre-Candidacy Doctoral Dissertation	
CAE 840	Post-Candidacy Doctoral Dissertation	
9 credits from Group I		9
Group I: CAE PhD Professional Development		
CAE 703 CAE Graduate Seminar		
CAE 704 CAE Graduate Teaching		
<b>Total Credit Hours</b>		<b>72</b>

Note: 1. All courses, except Dissertation, are 3 credit hours unless otherwise indicated.

2. Courses may not count towards multiple requirements.

3. At least 1 credit of CAE 830 (<http://bulletin.miami.edu/search/?search=cae+830>) must be completed prior to admission to Candidacy.

4. At least 1 credit of CAE 840 (<http://bulletin.miami.edu/search/?search=cae+840>) must be completed prior to graduation.

Refer to the Additional Details section (below) for additional options and restrictions.

- A total of 6 credits of transfer and/or exchange coursework (not counted towards the B.S. or M.S. degrees) may be taken at another institution and used to satisfy the requirements for the PhD degree.

## For a PhD without prior M.S.

- For students who do not have an earned M.S. (in either civil or architectural engineering, or a closely-related field), a minimum of 72 graduate-level credits (with an average of "B" or better and no grade below "C") are required beyond the B.S. degree.
- The requirement list is provided below. The classification of courses into their respective Groups can be found in the CAE Courses (<http://bulletin.miami.edu/graduate-academic-programs/engineering/civil-architectural-environmental-engineering/#coursestext>) section.

Code	Title	Credit Hours
9 credits from Group A		9
Group A: 700-level lecture-based CAE Courses in civil and architectural engineering		
9 credits from any of the following Groups: A, B, and/or E		9
Group A: 700-level lecture-based CAE Courses in civil and architectural engineering		
Group B: 600-level lecture-based CAE Courses in civil and architectural engineering		
Group E: CAE Independent Study (Special Problems)		
CAE 695 or CAE 795	Special Problems Special Problems	
9 credits from any of the following Groups: A, B, C, D, and/or E		9
Group A: 700-level lecture-based CAE Courses in civil and architectural engineering		
Group B: 600-level lecture-based CAE Courses in civil and architectural engineering		
Group C: 600- or 700-level CAE courses in Construction Management (CM)		
Group D: Any pre-approved course in any UM Department at the 600- or 700-level (i.e. XXX 600-799) except CAE and UMI		
Group E: CAE Independent Study (Special Problems)		
CAE 795 or CAE 695	Special Problems Special Problems	
36 credits from Group H		36
Group H: CAE PhD Dissertation		
CAE 830	Pre-Candidacy Doctoral Dissertation	
CAE 840	Post-Candidacy Doctoral Dissertation	
9 credits from Group I		9
Group I: CAE PhD Professional Development		
CAE 703 CAE Graduate Seminar		

CAE 704 CAE Graduate Teaching	
<b>Total Credit Hours</b>	<b>72</b>

Note: 1. All courses, except Dissertation, are 3 credit hours unless otherwise indicated.

2. Courses may not count towards multiple requirements.

3. At least 1 credit of CAE 830 (<http://bulletin.miami.edu/search/?search=cae+830>) must be completed prior to admission to Candidacy.

4. At least 1 credit of CAE 840 (<http://bulletin.miami.edu/search/?search=cae+840>) must be completed prior to graduation.

Refer to the Additional Details section (below) for additional options and restrictions.

- A total of 12 credits of transfer and/or exchange coursework (not counted towards the B.S. or M.S. degrees) may be taken at another institution and used to satisfy the requirements for the PhD degree.

## Qualifying Examination

A graduate student must successfully pass a three-part PhD qualifying examination prior to being admitted to PhD Candidacy. Each part is administered sequentially and typically includes:

1. Written assessment of the student's knowledge of the principles and techniques in engineering.
2. Oral assessment of the student's knowledge of the principles and techniques in engineering
3. Oral presentation of the PhD research proposal (Dissertation Proposal Defense)

A PhD student must pass the written and oral assessments, generally taken at the end of the first year of study, before being allowed to defend a dissertation proposal. The assessments, administered by the student's Supervisory Committee, must consist of a written component, and may also include an oral component if deemed appropriate by the Supervisory Committee.

Subsequent to passage of the assessments, the student can defend his/her Dissertation Proposal to their Dissertation Committee, which is typically the same as the student's Supervisory Committee or, if not, has a makeup equivalent to the Supervisory Committee. All Committee members must approve the Proposal.

Three outcomes of each part are possible: Pass, Fail, and Fail with option to re-take once. For students retaking the exam, the Committee will determine a suitable time frame, but not to exceed 6 months. Students who do not pass the exam will be dismissed from the Ph.D. program.

## Admission to Candidacy

Admission of the student to Candidacy is subject to passage of the Qualifying Examination.

## Dissertation Defense

The PhD thesis must be defended to, approved by, and signed by the student's Dissertation Committee, which is typically the same as the student's Supervisory Committee or, if not, has a composition that is equivalent to the Supervisory Committee.

## Additional Details

- The classification of courses into their respective Groups can be found in the CAE Courses (<http://bulletin.miami.edu/graduate-academic-programs/engineering/civil-architectural-environmental-engineering/#coursestext>) section.
- Master's Design Project (CAE 604) *will not* count towards the PhD degree requirements.
- Internships, Practical Training, workshops, or other types of practicum are neither required nor optional credit-earning components in the established graduate curriculum (Program of Study). Credit earned through these experiences (such as UMI 605) *will not* count towards any CAE degree requirements.
- At a minimum, a qualifying exam and a final public oral examination in defense of the thesis are required.
- The Supervisory Committee (and Dissertation Committee) must have a minimum of 4 members, including:
  1. Committee Chair (Advisor) shall be full-time CAE faculty and a member of the Graduate Faculty.
  2. CAE faculty and a member of the Graduate Faculty
  3. CAE faculty and a member of the Graduate Faculty
  4. Non-CAE member with an earned PhD

## For a PhD following an M.S.

A typical plan of study for a Ph.D. student (MS to PhD) is shown below.

<b>First Year</b>		
<b>Fall</b>		<b>Credit Hours</b>
CAE Elective		3
CAE Seminar		1
CAE 830	Pre-Candidacy Doctoral Dissertation	8
	<b>Credit Hours</b>	<b>12</b>
<b>Spring</b>		
CAE Elective		3
CAE Seminar		1
CAE 830 Pre-Candidacy Dissertation		8
	<b>Credit Hours</b>	<b>12</b>
<b>Second Year</b>		
<b>Fall</b>		
CAE Elective		3
CAE Seminar		1
CAE 830 Pre-Candidacy Dissertation		8
	<b>Credit Hours</b>	<b>12</b>
<b>Spring</b>		
CAE Elective		3
CAE Seminar		1
CAE 830 Pre-Candidacy Dissertation		8
	<b>Credit Hours</b>	<b>12</b>
<b>Third Year</b>		
<b>Fall</b>		
CAE or other approved Elective		3
CAE 704 CAE Graduate Teaching		1
CAE 840	Post-Candidacy Doctoral Dissertation	8
	<b>Credit Hours</b>	<b>12</b>
<b>Spring</b>		
CAE or other approved Elective		3
CAE 704 CAE Graduate Teaching		1
CAE 840 Post-Candidacy Dissertation		8
	<b>Credit Hours</b>	<b>12</b>
	<b>Total Credit Hours</b>	<b>72</b>

### For a PhD without prior M.S.

A typical plan of study for a Ph.D. student (BS to PhD) is shown below.

<b>First Year</b>		
<b>Fall</b>		<b>Credit Hours</b>
CAE Elective		3
CAE Seminar		1
CAE 830	Pre-Candidacy Doctoral Dissertation	6
	<b>Credit Hours</b>	<b>10</b>
<b>Spring</b>		
CAE Elective		3
CAE Seminar		1
CAE 830 Pre-Candidacy Dissertation		5
	<b>Credit Hours</b>	<b>9</b>
<b>Second Year</b>		
<b>Fall</b>		
CAE Elective		3

CAE Seminar	1
CAE 830 Pre-Candidacy Dissertation	6
<b>Credit Hours</b>	<b>10</b>
<b>Spring</b>	
CAE Elective	3
CAE Seminar	1
CAE 830 Pre-Candidacy Dissertation	5
<b>Credit Hours</b>	<b>9</b>
<b>Third Year</b>	
<b>Fall</b>	
CAE or other approved Elective	3
CAE or other approved Elective	3
CAE 840	3
<b>Credit Hours</b>	<b>9</b>
<b>Spring</b>	
CAE Elective	3
CAE 704 CAE Graduate Teaching	2
CAE 840 Post-Candidacy Dissertation	6
<b>Credit Hours</b>	<b>11</b>
<b>Fourth Year</b>	
<b>Fall</b>	
CAE Elective	3
CAE 704 CAE Graduate Teaching	3
CAE 840 Post-Candidacy Dissertation	3
<b>Credit Hours</b>	<b>9</b>
<b>Spring</b>	
CAE Elective	3
CAE 840 Post-Candidacy Dissertation	2
<b>Credit Hours</b>	<b>5</b>
<b>Total Credit Hours</b>	<b>72</b>

## Mission

The mission of the Ph.D. program in the Department of Civil and Architectural Engineering is to:

- Mentor Ph.D. students in conducting high-quality research that will advance the body of knowledge and prepare graduates for a lifetime of scholarly contributions that positively impact society;
- Provide high-quality graduate education in civil and architectural engineering that will prepare graduates for professional careers and a lifetime of learning;
- Serve the engineering profession and society through active involvement in professional organizations and contribution of professional expertise.

Students in the program will be engaged in research, including interdisciplinary research, while progressing through rigorous coursework to prepare them for professional careers in industry, academia, and government. A small-department atmosphere enables faculty to provide individualized instruction and a personal commitment to mentoring doctoral students. Faculty in the department have a long-standing record of forming strong research partnerships with government agencies, industry, health sciences, and faculty in other colleges within the university, and external faculty. These collaborative endeavors enable the Department to provide Ph.D. graduates with a world-class education to strengthen their technical, professional, problem-solving, and communication skills necessary for them to generate significant contributions to society.

## Goals

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

- Are capable of advancing knowledge through in-depth study of a specific problem using engineering principles.
- Have advanced technical knowledge in at least one specialty area of civil engineering
- Have advanced capability to apply advanced knowledge to engineering problems
- Have made significant contributions in at least one specialty area of civil engineering

Specialty areas include structural, water-resources, and architectural 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.