

Graduate Tracks

CONSTRUCTION ENGINEERING & MANAGEMENT

Nearly all civil engineering projects require the management skills of a construction engineer. The scheduling and erection of constructed facilities is the responsibility of construction engineers. Construction engineers analyze constructed facilities based on function, economics, and safety; they determine the construction schedule, safe erection methods and equipment used, and they estimate the total labor and material costs of the constructed facility. Proper procedures used by engineers during construction will increase performance and productivity and reduce the risk of construction failure and deficiencies.

Students pursuing a graduate degree in construction are encouraged to get a broad background in both engineering and management. Depending on the students' interests, additional courses may be found in other departments: cognitive-related courses from the Integrated Systems Engineering Department, history of technology courses from the Architecture and History Departments, and artificial-intelligence and other intelligent systems from the Computer Science and Engineering Department. In addition, courses are available in several other departments, such as Statistics and Mathematics.

Research

The areas of research activities of faculty and graduate students include safety of construction operations; safety of structures and infrastructures; system safety and reliability; development of improved methods for predicting time, cost, and cash flow; risk and decision analysis of construction processes; worker's training and safety; computer-based planning and scheduling of construction projects; and construction estimating and bidding. Recent studies include learning from the past, such as historical constructions, ancient construction operations and construction materials. Understanding historical construction is the key to future green and sustainable constructions. Several tools like the fault tree analysis, fuzzy logic, intelligent systems, multi-media and visualization, and virtual reality, have been used to conduct research in the above areas. Research activities of the program include: use of 3D models and virtual reality techniques to simulate ancient and future construction activities; and development of intelligent systems to diagnose construction accidents and safety.

Facilities

The University computer facility is the Ohio Supercomputer Center located on campus. This facility principally supports research computing. The University also provides a variety of computer resources on campus. In addition, the department has specialized computational facilities. The facilities are under the auspices of the College of Engineering Region 1, which is supported, in part, by a University computer fee. The physical facility consists of three rooms with over 135 PCs and multiple printers. Students have 24-hour, 7-days-a-week keycard access. Some are available on a walk-in basis; others provide studio settings for advanced users. At least 50 software packages are available, including the Microsoft Office suite, AutoCAD, and various GIS and image processing packages. The University also provides an environment that gives students access to a variety of computer resources on campus, in Ohio, and on the Internet.

Faculty

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Academic Program

Master of Science (MS) Program. Two types of MS options are offered: thesis and non-thesis. The thesis option requires 30 graduate credit hours, including 6 credit hours for research and thesis. The non-thesis option requires 33 graduate credit hours. A minimum of 6 credit hours of coursework to develop in-depth knowledge in Construction Engineering & Management is to be selected from the current Graduate Committee-approved Table A listing. A minimum of 6 credit hours of coursework to develop breadth in Construction Engineering & Management is to be selected from Table B. At least 3 credit hours of mathematics are also required.

Doctoral Degree (PhD) Program. The PhD degree requires 80 graduate credit hours, including 30 credit hours for research and dissertation. A minimum of 12 credit hours of Construction Engineering & Management coursework (Table A) is required. An additional 8 credit hours of courses from Table B are also required.

Please see the Civil Engineering Graduate Studies Program Handbook for more information.

Interdisciplinary Programs

The construction management program strongly supports and encourages interdisciplinary collaboration. The faculty and members of other departments cooperate to develop sets of courses that prepare graduate students to deal with interdisciplinary problems. Architecture, Agriculture, Integrated Systems, Humanities and Computer Science and Engineering are some examples of potential partners. Generally, the need for an interdisciplinary problem arises when a student chooses to work on a thesis that involves other areas.

Course Offerings

| TABLE A | Title | Credits |
|----------------|--|---------|
| CIVILEN 8810* | Construction Intelligent System and Simulation I | 3 |
| CIVILEN 8820* | Construction Intelligent System and Simulation II | 3 |
| ISE 5700 | Introduction to Cognitive Systems Engineering | 3 |
| ISE 5760 | Cognitive Engineering Systems: Visualization and Human-Computer Interfaces | 3 |
| ISE 5870 | Resilience Engineering | 2 |
| ISE 5820 | Systems Thinking in Engineering and Design | 3 |
| TABLE B | | |
| ARCH 5110 | History of Architecture I | 4 |
| ARCH 5120 | History of Architecture II | 4 |
| CIVILEN 5001 | Introduction to Geographic Information Systems | 4 |
| CIVILEN 5130 | Applied Hydrology | 3 |
| CIVILEN 5168 | Introduction to the Finite Element Method | 3 |
| CIVILEN 5310 | Matrix Structural Analysis | 3 |
| CIVILEN 5370 | Prestressed Concrete Design | 3 |
| CIVILEN 5410 | Engineering Survey | 3 |
| CIVILEN 5441 | Introduction to GPS: Theory and Applications | 3 |
| CIVILEN 5561 | Principles of Soil and Rock Mechanics | 3 |
| CIVILEN 5571 | Principles of Foundation Analysis and Design | 3 |
| CIVILEN 5810 | Construction Safety and Forensics | 3 |

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| CIVILEN 5820 | Construction Estimating | 3 |
| CIVILEN 5830 | Construction Scheduling | 3 |
| CIVILEN 5840 | Construction Contracts and Claims | 3 |
| CIVILEN 6880 | Civil Engineering Seminar (Construction) | 1 |
| CSE 5521 | Survey of Artificial Intelligence I: Basic Techniques | 2 |
| CSE 5522 | Survey of Artificial Intelligence II: Advanced Techniques | 3 |
| CSE 5526 | Introduction to Neural Networks | 3 |
| CSE 5531 | Introduction to Cognitive Science | 3 |
| CSE 5539 | Intermediate Studies in Artificial Intelligence | 2 |
| CSE 5545 | Advanced Computer Graphics | 3 |
| CSE 5559 | Intermediate Studies in Computer Graphics | 2 |
| CSE 5913 | Capstone Design: Computer Animation | 4 |
| HISTORY 5700 | Special Topics in the History of Environment, Technology & Science | 3 |
| HISTORY 7705 | Graduate Readings in the History of Technology | 1 - 6 |
| HISTORY 7710 | Graduate Readings in the History of Science | 1 - 6 |
| MATH (MS only) | | |
| MATH 5051 | Introduction to Mathematical Logic | 3 |
| MATH 5168 | Introduction to the Finite Element Method | 3 |
| MATH 5603 | Numerical Linear Algebra | 3 |
| STAT 5510 | Statistical Foundations of Survey Research | 3 |
| STAT 5740 | Introduction to SAS Software | 2 |
| STAT 6201 | Mathematical Statistics | 4 |
| STAT 6301 | Probability for Statistical Inference | 3 |
| STAT 6302 | Theory of Statistical Analysis | 3 |
| STAT 6410 | Design and Analysis of Experiments | 4 |
| STAT 6450 | Applied Regression Analysis | 4 |
| STAT 6520 | Applied Statistical Analysis with Missing Data | 3 |

*Must be taken for MS and PhD in construction, unless approved otherwise by the advisor.



Prospective students interested in learning more about admission and funding should visit ceg.osu.edu/degrees/prospective-graduate-students.