Civil Engineering

The George R. Brown School of Engineering

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Degrees Offered: B.A., B.S.C.E., M.C.E., M.S., Ph.D.

The profession of civil engineering involves the development, planning, design, construction, and operation of large facilities and systems. These include buildings, bridges, and other structures, as well as systems for transportation, water supply, drainage and flood control, and waste disposal and pollution control. Also part of this field is the planning of new and the redevelopment of existing civil infrastructure. Students in the professional degree program (B.S.C.E.) may opt for either the basic program or a specialized environmental engineering option.

The research interests of the civil engineering faculty lie in the areas of structural engineering and mechanics, earthquake engineering, geotechnical engineering, and computer-aided design. These include structural dynamics, offshore technology, reinforced concrete and prestressed concrete, reliability of systems, random vibrations, soil dynamics, soil-structure interaction, and structural control. Other interests include experimental dynamics, studies of reinforced concrete structural assemblies, the mechanical properties of soil, and the mechanics of solids. A joint M.B.A./Master of Civil Engineering degree is also available in conjunction with the Jessie H. Jones Graduate School of Management.

Degree Requirements for B.A. and B.S.C.E. in Civil Engineering

For general university requirements, see Graduation Requirements (pages 17–19). For the B.A. degree, students majoring in civil engineering must have a total of at least 120 semester hours at graduation. The B.A. is not accredited as a professional degree; detailed requirements are available from the department office.

The B.S.C.E. degree is a professional degree accredited by the Accreditation Board for Engineering and Technology (ABET). Students may choose between a basic program and the more specialized environmental engineering option offered in conjunction with the Department of Environmental Science and Engineering (see below). For the B.S.C.E. degree, students must have a total of at least 134 semester hours at graduation, including the following required courses:
Basic Program

Mathematics
MATH 101 and 102 Single Variable Calculus I and II
MATH 211 Ordinary Differential Equations and Linear Algebra
MATH 212 Multivariable Calculus

Physics
PHYS 101 Mechanics (with lab)
PHYS 102 Electricity and Magnetism (with lab)

Chemistry
CHEM 121–122 General Chemistry with Laboratory

Computational and Applied Mathematics
CAAM 210 or CAAM 211 Introduction to Engineering Computation
CAAM 335 Foundations of Applied Mathematics
(or CAAM 353 Computational Numerical Analysis)
CAAM 381 Introduction to Applied Probability
(or STAT 310 Probability and Statistics)

Additional Fields
MECH 200 Classical Thermodynamics
(or ELEC 243 Introduction to Electronics)
MSCI 301 Materials Science

I course from the following:
CHEM 211 Organic Chemistry
GEOL 101 The EarthGEOL 102 Evolution of the Earth
ENVI 201 Introduction to Environmental Systems
SPAC 203 Atmosphere, Weather, and Climate
PHYS 201 Waves and Optics
BIOS 201 Introductory Biology
(or BIOS 202 Introductory Biology)

Civil Engineering
CIVI 211 Engineering Mechanics
CIVI 251 Plane Surveying
CIVI 300 Mechanics of Solids
CIVI 302 Strength of Materials Lab
CIVI 304 and 305 Structural Analysis I and II
CIVI 306 Steel Design
CIVI 363 Applied Fluid Mechanics
CIVI 400 Mechanics of Solids II
CIVI 403 Reinforced Concrete Design
CIVI 404 Concrete Lab
CIVI 451 Introduction to Transportation
CIVI 464 Hydrology and Watershed Analysis
CIVI 470 Basic Soil Mechanics
CIVI 530 Concrete Building Design
(or CIVI 540 Steel Building Design)
ENVI 403 Principles of Environmental Engineering

Electives
1 approved elective at the 400 or 500 level in civil engineering or a closely related area (CIVI 480 Senior Design Project is recommended)

Environmental Engineering Option

Mathematics
MATH 101 and 102 Single Variable Calculus I and II
MATH 211 Ordinary Differential Equations and Linear Algebra
MATH 212 Multivariable Calculus

Computational and Applied Mathematics
CAAM 210 or CAAM 211 Introduction to Engineering Computation
CAAM 335 Foundations of Applied Mathematics
(or CAAM 353 Computational Numerical Analysis)
CAAM 381 Introduction to Applied Probability
(or STAT 310 Probability and Statistics)

Physics
PHYS 101 Mechanics (with lab)
PHYS 102 Electricity and Magnetism (with lab)

Biological Sciences
BIOS 201 Introductory Biology
(or BIOS 202 Introductory Biology)

Chemistry
CHEM 121–122 General Chemistry with Laboratory
Degree Requirements for M.C.E., M.S., and Ph.D. in Civil Engineering

Although the B.S.C.E. is a suitable terminal degree for students interested in a professional career, a master’s degree (M.C.E.) is becoming increasingly desirable. Students seeking a career in teaching or in research and development should complete the Ph.D. degree. The M.S. and Ph.D. programs give special attention to developing student interest in, and ability for, independent study and research. Students may pursue graduate studies in structural engineering, structural mechanics, and geotechnical engineering. A joint M.B.A./M.C.E. degree is also available in conjunction with the Jesse H. Jones Graduate School of Management. Involvement in undergraduate teaching is expected of both M.S. and Ph.D. students.

Admission. Applicants should have a B.S.C.E. with a significant emphasis on structural engineering, but students with other undergraduate degrees may apply if they have adequate preparation in mathematics, mechanics, and structural analysis and design. Courses such as engineering technology or construction technology, however, do not represent adequate preparation.

M.C.E. Program. For general university requirements, see Graduate Degrees (pages 72–73). To earn a M.C.E. degree, students must:

- Complete 30 semester hours of approved courses

M.B.A./M.C.E. Program. For general university requirements, see Graduate Degrees (pages 72–73). See also Accounting and Management. To earn a M.B.A./M.C.E. degree, students must:

- Complete 24 semester hours of civil engineering courses
- Complete 52 semester hours of business administration courses

M.S. Program. For general university requirements, see Graduate Degrees (pages 72–73). To earn a M.S. degree, students must:

- Complete at least 24 semester hours of approved courses
- Produce an acceptable thesis
- Pass a final oral examination on the thesis

Students intending to extend their studies into the Ph.D. degree program should note that the department does not grant an automatic M.S. degree to candidates who have not written a satisfactory master’s thesis.
Ph.D. Program. For general university requirements, see Graduate Degrees (pages 72–73). To earn a Ph.D. degree, students must:

- Complete at least 48 semester hours of approved courses with high standing
- Pass a comprehensive preliminary examination testing the candidate’s knowledge of the field and ability to think in a creative manner
- Pass an oral qualifying examination on the proposed thesis research and related topics
- Complete a thesis that constitutes an original contribution to knowledge
- Pass a final public oral examination on the thesis and related topics

Should the department faculty conclude, at any stage of the doctoral program, that a student is unqualified to continue, the student is dismissed.

See CIVI (pages 289–293) in the Courses of Instruction section.