

Department of Civil Engineering

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Civil engineering consists of the application of scientific principles to the design, construction, and maintenance of public and private works that constitute the infrastructure for human populations. From a historical aspect, the pyramids of Egypt, the water resources systems that supported the agricultural society of ancient Babylonia and Assyria, the public buildings of Greece and Rome, the roads that linked the Roman Empire, and the railroads and barge canals of the early United States were all civil engineering projects that served the people of their times. Today's civil engineers are still involved in building and maintaining the infrastructure necessary for modern society to function. A civil engineer may be involved in the design and construction of highways, bridges, buildings, water conveyance systems, water and wastewater treatment plants, dams, airports, and other constructed projects. Civil engineers may also be involved in planning for traffic controls, flood plain management, and water and air quality management. The graduates of civil engineering programs may work with consulting engineering firms, governmental agencies, construction contractors, or manufacturing industries.

In the foreseeable future, population growth and relocation should create a steady demand for infrastructure growth. The concept of environmentally sensitive and resource sustainable development is emerging as the tenet for future growth. Civil engineers will have to apply evolving technologies and develop innovative solutions to ensure wise stewardship of our limited natural resources. Students who enter civil engineering can anticipate a challenging and rewarding career.

Lower-division courses in civil engineering consist of a common core of basic courses in science, mathematics, and engineering required of most students within the college. Required course work in the junior and senior years provides the student with a broad background in civil engineering subjects while 18 credits of technical electives permit some specialization at the undergraduate level. For civil engineering student interest in geology, there is an option to complete a minor in Geologic Engineering.

The Department of Civil Engineering occupies the first floor of the Buchanan Engineering Laboratory Building with some additional office and laboratory space in the basement and on the second floor of the building. Maintenance and replacement of existing equipment is provided by funds from research projects, from alumni donations, from lab fees, and from state educational funds. Instructional and research equipment include modern computing and data acquisition equipment.

The department offers three graduate degree programs in civil engineering: (1) Master of Science (30 credits, with thesis), (2) Master of Engineering (33 credits, non-thesis), and (3) Doctor of Philosophy (in limited specialty areas). It also offers the Master of Engineering in Engineering Management and a Master of Science in Geologic Engineering. Course work requirements in each of the degree programs are relatively flexible depending on student interest and course availability. Financial assistance is available on a competitive basis in the form of instructional and graduate research assistantships. Students interested in graduate studies should select a specialty area in which they wish to study. Foreign students must have a TOEFL score of at least 550 for admission to any departmental graduate degree program.

Graduate study is offered with specialization in structures and structural mechanics, highway and pavement materials, soil mechanics, transportation, hydraulics and water resources, geological engineering and sanitary engineering. Interdisciplinary programs of study are encouraged for interested students. As examples, students specializing in sanitary engineering may do considerable work in chemical engineering or biochemistry, and specialization in soil mechanics may involve study in geology or mining engineering.

The mission of the Department of Civil Engineering is to provide a high quality education at both the undergraduate and graduate level, emphasizing the needs of Idaho and the region. The goals and objectives of the program include graduating students that are: (1) Capable of planning, designing, and managing civil engineering systems and processes, (2) Capable of taking up leadership positions in the profession, (3) Responsible, ethical, and aware of the social and economic issues of engineered projects, and (4) Committed to life-long learning. Additionally, the department is committed to (1) maintaining experienced, professional instructors, modern facilities, and close interaction between the department and the professional engineering community in Idaho, (2) extending the knowledge base in civil engineering through research, continuing education, technology transfer, and professional practice, and (3) providing these services in the most cost effective manner for both the students and the taxpayers. Progress toward these goals and objectives is assessed by student performance on the nationally administered Fundamentals of Engineering Exam, exit interviews with graduating students, surveys of graduated students and their employers, and by an external advisory committee composed of practicing civil engineers from the state and the region.

The Bachelor of Science program in Civil Engineering is accredited by the Engineering Accreditation Commission of Accreditation Board for Engineering and Technology (ABET), 111 Market Place, Suite 1050, Baltimore, MD 21202-4012 – telephone: (410) 347-7700.

Courses

See Part 6 for courses in Civil Engineering (CE), Engineering Management (EM) and Geological Engineering (GeoE).

Undergraduate Curricular Requirements

CIVIL ENGINEERING (B.S.C.E.)

To graduate in this program, a minimum grade of C must be earned in all engineering, mathematics, and science courses used to satisfy the curriculum.

Any student majoring in civil engineering may accumulate no more than 14 credits of D or F in mathematics, science, technical elective, or engineering courses that are used to satisfy graduation requirements. Included in this number are multiple repeats of a single class or single repeats in multiple classes and courses transferred from other institutions. A warning will be issued in writing to students who have accumulated 7 credits of D or F in mathematics, science, technical elective, or engineering classes used to satisfy curricular requirements.

Required course work includes the university requirements (see regulation J-3) and:

- AmSt 301 Studies in American Culture or Phil 103 Ethics (3 cr)
 - CE 115 Introduction to Civil Engineering (2 cr)
 - CE 211 Engineering Surveying (3 cr)
 - CE 215 Civil Engineering Analysis and Design (2 cr)
 - CE 315 Introduction to Numerical Methods for Civil Engineering (2 cr)
 - CE 322 Hydraulics (3 cr)
 - CE 325 Fundamentals of Hydrologic Engineering (3 cr)
 - CE 330 Fundamentals of Environmental Engineering (4 cr)
 - CE 342 Theory of Structures (3 cr)
 - CE 357 Properties of Construction Materials (4 cr)
 - CE 360 Fundamentals of Geotechnical Engineering (4 cr)
 - CE 372 Fundamentals of Transportation Engineering (4 cr)
 - CE 491 Civil Engineering Professional Seminar (1 cr)
 - CE 493-494 Senior Design Project (4 cr)
 - Chem 111 Principles of Chemistry I (4 cr)
 - Econ 201 Principles of Economics or Econ 202 Principles of Economics, or Econ 272 Foundations of Economic Analysis (3-4 cr)
 - Engl 317 Technical Writing (3 cr)
 - Engr 105 Engineering Graphics (2 cr)
 - Engr 210 Engineering Statics (3 cr)
 - Engr 220 Engineering Dynamics (3 cr)
 - Engr 240 Introduction to Electrical Circuits or Engr 320 Engineering Thermodynamics and Heat Transfer (3 cr)
 - Engr 335 Engineering Fluid Mechanics (3 cr)
 - Engr 350 Engineering Mechanics of Materials (3 cr)
 - Engr 360 Engineering Economy (2 cr)
 - Math 170 Analytic Geometry and Calculus (4 cr)
 - Math 175 Analytic Geometry and Calculus II (4 cr)
 - Math 275 Analytic Geometry and Calculus III (3 cr)
 - Math 310 Ordinary Differential Equations (3 cr)
 - Phys 211 Engineering Physics I (3 cr)
 - Stat 301 Probability and Statistics (3 cr)
- Two of the following (8-9 cr):
- Biol 115 Cells and the Evolution of Life (4 cr)
 - Chem 112 Principles of Chemistry II and Lab or Phys 212 Engineering Physics II and Lab (4-5 cr)
 - Geol 111 Physical Geology for Science Majors (4 cr)
 - MMBB 154, 155 Introductory Microbiology and Lab (4 cr)
- Technical electives. To ensure sufficient breadth, technical electives must include at least 15 credits from at least three of the following five groups (18 cr):
- Environmental:
- CE 431 Design of Water and Wastewater Systems I (3 cr)
 - CE 432 Design of Water and Wastewater Systems II (3 cr)
 - CE 433 Water Quality Management (3 cr)
- Geotechnical:
- CE 460 Geotechnical Engineering Design (3 cr)
 - GeoE 436 Geological Engineering Analysis and Design (3 cr)
- Hyd/Water Resources:
- CE 421 Engineering Hydrology (3 cr)
 - CE 422 Hydraulic Design (3 cr)
 - CE 428 Open Channel Hydraulics (3 cr)
- Structures:
- CE 441 Reinforced Concrete Design (3 cr)
 - CE 444 Steel Design (3 cr)
 - CE 445 Matrix Structural Analysis (3 cr)
- Transportation:

CE 473 Highway Design (3 cr)
CE 474 Traffic Systems Design (3 cr)
CE 475 Pavement Design and Evaluation (3 cr)
Other CE 400 level classes (except CE 411), or approved alternatives, may be used to complete the required 18 cr of tech electives.

The minimum number of credits for the degree is 128, excluding math below 170, English below 102, and any classes needed to remove deficiencies.

Academic Minor Requirements

GEOLOGICAL ENGINEERING MINOR

CE 360 Fundamentals of Geotechnical Engineering (4 cr)
CE 460 Geotechnical Engineering Design (3 cr)
Geol 111 Physical Geology for Science Majors (4 cr)
Geol 345 Structural Geology (3-4 cr)
Geol 422 Principles of Geophysics (3 cr)
GeoE 407 Rock Mechanics (3 cr)
GeoE 436 Geological Engineering Analysis and Design (3 cr)
Hydr 409 Quantitative Hydrogeology (3 cr)
Approved technical elective in the geotechnics area (3 cr)

Graduate Academic Certificates Requirements

APPLIED GEOTECHNICS ACADEMIC CERTIFICATE

Note: A grade of 'B' or higher is required in all coursework for this academic certificate.

GeoE 407 Rock Mechanics (3 cr)
GeoE 436 Geological Engineering Analysis and Design (3 cr)
Electives (6 cr):
 GeoE 428 Geostatistics (3 cr)
 GeoE 465 Excavation and Materials Handling (3 cr)
 GeoE 517 Tunnel Design and Construction (3 cr)
 GeoE 528 Advanced Topics in Geological Engineering (3 cr)
 GeoE 535 Seepage and Earth Dams (3 cr)
Credits to total 12 for this Academic Certificate

STRUCTURAL ENGINEERING ACADEMIC CERTIFICATE

Note: A grade of 'B' or higher is required in all coursework for this academic certificate.

CE 546 Finite Element Analysis (3 cr)
One course from the following (3 cr):
 CE 542 Advanced Design of Steel Structures (3 cr)
 CE 547 Advanced Reinforced Concrete (3 cr)
Electives (6 cr):
 CE 504 Special Topics (3 cr)
 CE 510 Advanced Mechanics of Materials (3 cr)
 CE 541 Reliability of Engineering Systems (3 cr)
 CE 543 Dynamics of Structures (3 cr)
 CE 545 Matrix Structural Analysis (3 cr)
Electives may include one of the following:
 CE 521 Sedimentation Engineering (3 cr)
 CE 561 Engineering Properties of Soils (3 cr)
 CE 562 Advanced Foundation Engineering (3 cr)
 CE 566 Earthquake Engineering (3 cr)
 CE 575 Advanced Pavement Design and Analysis (3 cr)
Credits to total 12 for this Academic Certificate

WATER RESOURCES ENGINEERING ACADEMIC CERTIFICATE

Note: A grade of 'B' or higher is required in all coursework for this academic certificate.

CE 428 Open Channel Hydraulics (3 cr)

One course from the following (3 cr):

CE 519 Fluid Transients (3 cr)

CE 521 Sedimentation Engineering (3 cr)

Electives (6 cr):

CE 402 Applied Numerical Methods for Engineers (3 cr)

CE 421 Engineering Hydrology (3 cr)

CE 520 Fluid Dynamics (3 cr)

CE 528 Stochastic Hydrology (3 cr)

CE 529 Natural Channel Flow (3 cr)

CE 533 Water Quality Management (3 cr)

CE 546 Finite Element Analysis (3 cr)

Credits to total 12 for this Academic Certificate

Graduate Degree Programs

Graduate study is offered with specialization in the following subdisciplines of civil engineering: hydraulics and water resources engineering, environmental and sanitary engineering, structural engineering and structural mechanics, geotechnical engineering, and transportation engineering.

Master's Degrees. In addition to meeting the general requirements of the College of Graduate Studies stated in Part 4 of this catalog, master's degree students are required to complete at least 12 credits of 500s level courses having a CE prefix, not including CE 500, 502, 503, 589, 597, 598, and 599. Master's degree students are required to complete at least 12 credits in courses associated with one of the subdisciplines of civil engineering listed above. On their plan of study, candidates are restricted to a maximum of 6 credits of coursework with a grade of 'C'.

An approved thesis is required for Master of Science degrees. A maximum of 6 credits of CE 500, Master's Research and Thesis, can be used to fulfill M.S. degree requirements.

A minimum of 33 credits is required for the Master of Engineering degree. A thesis is not required and credit is not given for CE 500. A maximum of 3 credits of CE 502, Directed Study, can be used to satisfy M.Engr. degree requirements. M.Engr. students are required to demonstrate the ability to write a technical paper or report.

A final comprehensive examination conducted by the student's committee is required for master's degrees.

Applicants for admission to the master's degree programs generally will have a B.S. degree in civil engineering. Applicants with baccalaureate degrees in other majors are also eligible for admission; in these cases, after consultation with the student, deficiency courses will be specified by the student's advisory committee. Master's degree candidates not holding B.S. degrees in civil engineering are required to show evidence of completing a minimum of 16 credits of deficiency courses from the following list: CE 322, Hydraulics (3 cr), CE 325, Fundamentals of Hydrologic Engineering (3 cr), CE 330, Fundamentals of Environmental Engineering (4 cr), CE 342, Theory of Structures (3 cr), CE 357, Properties of Construction Materials (4 cr), CE 360, Fundamentals of Geotechnical Engineering (4 cr), CE 372, Fundamentals of Transportation Engineering (4 cr), and Engr 360, Engineering Economy (2 cr). Deficiency courses may be taken on a pass-fail basis, where passing is considered to be a grade of C or better.

Doctor of Philosophy. Persons interested in pursuing a doctoral degree must contact a correspondent in the department well in advance of admission to the Graduate College. Preliminary screening of candidates and program planning for those admitted are essential features of the Ph.D. program. Programs are offered with specialization in the following general areas: (1) water resources and hydraulics; (2) structures, structural mechanics, and construction materials; (3) geotechnical engineering with a major in soil mechanics; (4) transportation engineering; and (5) environmental engineering. The qualifying examination is written and/or oral, and the preliminary examination is written and oral. In addition, one of the following requirements must be satisfied: (1) satisfactory completion of a foreign language examination conducted by the Department of Foreign Languages and Literatures, or (2) completion of a humanistic-social study program approved by the Department of Civil Engineering.