

## Department of Civil Engineering

**Sunil Sharma, Dept. Chair (104 Buchanan Engr. Lab. 83844-1022; phone 208/885-6782). Faculty:** Ahmed Abdel-Rahim, Richard G. Allen, Fouad M. Bayomy, Michael P. Dixon, Roger Ferguson, Fritz R. Fiedler, Peter Goodwin, Klaus Jorde, S.J. Jung, Michael D. Kyte, Chyr Pyng Liou, Stanley M. Miller, Richard J. Nielsen, Howard S. Peavy, P. Steven Porter, Edwin R. Schmeckpeper, Sunil Sharma, Thomas J. Weaver.

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 15 credits of technical electives permit some specialization at the undergraduate level.

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 with a major in engineering management. Course work requirements in each of the degree programs is 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, 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) well grounded in the fundamentals of engineering and in the practice of civil engineering, (2) schooled in real-world scenarios that include the social and economic implications of engineered projects, (3) instilled with a sense of responsibility, ethics, and a commitment to life-long learning, (4) highly qualified, capable, ethical, and responsible, (5) academically capable and motivated to succeed, and (6) skilled in the design of civil engineering systems, components of systems, and processes to effectively and efficiently meet the needs of society. 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.

## 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 Measurements (3 cr)  
 CE 215 Civil Engineering Analysis and Design (2 cr)  
 CE 322 Hydraulics (3 cr)  
 CE 323 Hydraulics Laboratory (1 cr)  
 CE 325 Fundamentals of Hydrologic Engineering (3 cr)  
 CE 330 Fundamentals of Environmental Engineering (3 cr)  
 CE 342 Theory of Structures (3 cr)  
 CE 357 Properties of Construction Materials (3 cr)  
 CE 360 Fundamentals of Geotechnical Engineering (4 cr)  
 CE 372 Fundamentals of Transportation Engineering (4 cr)  
 CE 431 Design of Water and Wastewater Systems I (3 cr)  
 CE 441 Reinforced Concrete Design or CE 444 Steel Design (3 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 (3 cr)  
 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 (8-10 cr):

Biol 115 Cells and the Evolution of Life (4 cr)  
 Chem 112 Principles of Chemistry II (5 cr)  
 Chem 302/303 Principles of Physical Chemistry & Lab (4 cr)  
 Geol 111 Physical Geology for Science Majors (4 cr)  
 MMBB 154, 155 Introductory Biology of Bacteria and Viruses and Lab (4 cr)

Technical electives. To ensure sufficient breadth, technical electives must include at least 9 cr from CE 421, 422, 432, 441 or 444, 460, 473, 474, 475. Technical electives taken for breadth must be in at least two disciplines (i.e. 42x, 43x, 44x, 46x, or 47x). (12 cr)

Humanities and social sciences electives to satisfy UI core requirements listed in J-3.

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 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. The candidate must obtain grades of A or B in all courses submitted for the degree.

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 (3 cr), CE 342, Theory of Structures (3 cr), CE 357, Properties of Construction Materials (3 cr), CE 360, Fundamentals of Geotechnical Engineering (4 cr), CE 372, Fundamentals of Transportation Engineering (4 cr), and Engr 360, Engineering Economy (3 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.