Department of Civil and Environmental Engineering

Accreditation
The Bachelor of Science (B.S.) program in Civil Engineering (CE) is accredited by the Engineering Accreditation Commission of ABET, http://www.abet.org.

Mission Statement
Our mission is to educate the next generation of civil engineers and leaders to develop sustainable infrastructures and to advance the state of the profession. We strive for close student-faculty relations through a small effective educational setting in a friendly environment. We prepare traditional and nontraditional students to succeed in professional practice.

Educational Objectives
The following educational objectives have been established:

- Graduates will apply technical knowledge in complex engineering projects and obtain professional licensure.
- Graduates will be professionally competent, evidenced by leadership, teamwork, management, and communication skills.
- Graduates will engage in professional development, life-long learning, and service to their profession and society.

General Information
Idaho State University civil engineering graduates are successfully employed in many areas and many have chosen to continue advanced studies in a wide variety of specialized engineering disciplines throughout the region and nation.

Every student entering the civil engineering program is assigned a faculty advisor to guarantee an appropriate plan of study and to ensure continuity throughout the program. Each student completes university general education courses and civil engineering program requirements that include elective courses.

Students entering the civil engineering program should have adequate credentials in algebra and trigonometry or higher to enter the calculus sequence. Students not entering at the calculus level will not be eligible to register for civil engineering courses until meeting the mathematics requirement. This may result in a delay in graduation.

General Education Requirements
Students working toward the Bachelor of Science degree must complete 8 of the 9 General Education Objectives (a minimum of 36 credits). See the General Education Requirements (http://coursecat.isu.edu/undergraduate/academicinformation/generaleducation) in the Academic Information section of the catalog.

Fundamentals of Engineering (FE) Exam
Civil engineering students are encouraged to take the Fundamentals of Engineering (FE) exam during their senior year, while the breadth of the engineering material covered on the examination is still fresh in their minds. This exam is considered the first step in professional licensure for engineers.

Surveying Licensure
Civil engineering students interested in obtaining a professional surveying license from the State of Idaho will need to complete the following courses from the Geomatics Program in addition to a Bachelor of Science in Civil Engineering.

- CET 0216 Route Survey and GPS Fundamentals
- GEMT 3310 Boundary Surveying Law
- GEMT 3312 Public Land Surveying
- GEMT 4411 Geodesy
- GEMT 4430 GPS Principles and Applications
- GEMT Electives - Any surveying courses (10 credits)

Civil and Environmental Engineering

Academic Rules and Policies
A current Idaho State University civil engineering major student who intends to transfer an engineering course to Idaho State University must obtain prior approval for the transfer either via transfer credit review (petition process) or through existing program articulation.

Transfer credits must be posted to the student’s ISU transcript prior to registering for any course that has the transfer course credits as a prerequisite or co-requisite.

A student requesting a credit limit overload must have a 2.0 GPA or better. A student’s advisor can submit an email request to the department chair after meeting with the student and discussing their schedule. Upon concurrence, the chair will submit the request for final approval to the associate dean. A student that has been allowed an overload and failed one of the courses in a previous semester, will not be allowed additional overloads in future semesters. Overloads will be considered starting one week before courses start, allowing other students the opportunity to register first.

Any student missing the first week of a civil engineering class, in any semester, may be dropped from that course.

To maintain “academic satisfactory progress” and avoid academic probation and/or academic dismissal, undergraduate students must maintain a cumulative Idaho State University GPA of 2.0 or higher every semester.

Prerequisites are placed on courses to help students succeed. Students are required to meet course prerequisites prior to taking the course.

Faculty
Chair and Associate Professor
Savage, Bruce M.,* Chair and Associate Professor, Civil and Environmental Engineering. B.S. 1992, M.S. 1997, Ph.D. 2002, Utah State University. (2006)

Associate Chair and Professor
Sato, Chikashi,* Professor, Civil and Environmental Engineering. B.S. 1971, Fukushima National College of Technology; M.S. 1976, University of Kansas; Ph.D. 1981, University of Iowa. (1994)

Professors

Assistant Professor

Mashal, Mustafa, *Assistant Professor, Civil and Environmental Engineering. B.Sc. 2008, Kabul University; M.Sc. 2011, University of Buffalo-State University of New York; Ph.D. 2015, University of Canterbury. (2016)

Senior Lecturer

Mahar, James, *Senior Lecturer, Civil and Environmental Engineering; Affiliate Faculty, Geosciences. B.S. 1967, Idaho State University; M.S. 1972, Colorado State University; Ph.D. 1977, University of Illinois. (2003)

Adjunct Faculty

Fellows

Gale

Gossett

Keating

Leavitt

Wright

Bachelor of Science in Civil Engineering

Including the University's General Education Requirements (a minimum of 36 credits--see the General Education Requirements (http://coursecat.isu.edu/undergraduate/academicinformation/generaleducation) in the Academic Information section of this catalog), students must complete the required courses listed below. Some of the required courses also satisfy or partially satisfy the General Education Objectives, as noted. The courses are listed in the sequence they are to be taken.

Required Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL 1102</td>
<td>Critical Reading and Writing (Partially satisfies General Education Objective 1)</td>
<td>3</td>
</tr>
<tr>
<td>MATH 1170</td>
<td>Calculus I (Satisfies General Education Objective 3)</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 1111</td>
<td>General Chemistry I and General Chemistry I Lab (Partially satisfies General Education Objective 5)</td>
<td>5</td>
</tr>
<tr>
<td>GEOL 1101</td>
<td>Physical Geology and Physical Geology Lab Concepts Biology Human Concerns</td>
<td>4</td>
</tr>
<tr>
<td>MATH 1175</td>
<td>Calculus II</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 2211</td>
<td>Engineering Physics I (Partially satisfies General Education Objective 5)</td>
<td>4</td>
</tr>
<tr>
<td>CE 1105</td>
<td>Engineering Graphics</td>
<td>2</td>
</tr>
<tr>
<td>CE/ME 2210</td>
<td>Engineering Statics</td>
<td>3</td>
</tr>
<tr>
<td>CS/INFO 1181</td>
<td>Computer Science and Programming I</td>
<td>3</td>
</tr>
<tr>
<td>MATH 3352</td>
<td>Introduction to Probability</td>
<td>3</td>
</tr>
<tr>
<td>MATH 2240</td>
<td>Linear Algebra</td>
<td>3</td>
</tr>
<tr>
<td>CE 2200</td>
<td>Civil Engineering Tools</td>
<td>1</td>
</tr>
<tr>
<td>COMM 1101</td>
<td>Principles of Speech (Satisfies General Education Objective 2)</td>
<td>3</td>
</tr>
<tr>
<td>CE/ME 2220</td>
<td>Engineering Dynamics</td>
<td>3</td>
</tr>
<tr>
<td>CE/ME 3350</td>
<td>Mechanics of Materials</td>
<td>3</td>
</tr>
</tbody>
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MATH 3360 Differential Equations 3
CE 3332 Basic Geotechnics 4 3
CE 3337 Geotechnical Engineering Laboratory 1
CE 3301 Surveying 3
CE 3362 Structural Analysis 3
CE 3361 Engineering Economics and Management 3
CE 3366 Civil Engineering Materials 2
CE 3367 Civil Engineering Materials Laboratory 1
CE 4434 Geotechnical Design 3
CE/ME 3341 Fluid Mechanics 4 3
CE 3351 Engineering Hydrology 3
ENVE 4408 Water and Waste Water Quality 1 3
CE 4462 Design of Steel Structures 3
CE 4464 Design of Concrete Structures 3
ENVE 4410 Introduction to Environmental Engineering 3
CE 4435 Hydraulic Design 3
CE 4496A Project Design I 3
CE 4436 Transportation Engineering 3
CE 4496B Project Design II 3
CE Technical Electives 2 9

Add'l General Education Objectives 3

1 Students must earn a minimum of C- in CHEM 1111/1111L before enrolling in ENVE 4408.

2 List of approved courses is available in the Civil Engineering Checklist. Two of the three CE Technical Elective courses must be selected from at least two different areas of Geotechnical, Structures, Water Resources, Environmental, or other areas. The third technical elective can be taken from any of the above areas or from another category or course that has been approved by the Department.

Geotechnical: CE 4438, CE 4454, CE 4455, CE 4475, CE 4476, CE 4480
Structures: CE 4431, CE 4462, CE 4464, CE 4465, CE 4466, CE 4468
Water Resources: CE 4424, CE 4425
Environmental: CE 4406, ENVE 4404, ENVE 4409, ENVE 4430
Other: CE 4460, CE 4481, ME 4440

3 See the General Education Requirements (http://coursecat.isu.edu/undergraduate/academicinformation/generaleducation) in the Academic Information section of this catalog.

4 A minimum of C- is required for CE 3332, CE/ME 3341 and CE/ME 3350

Emphasis in Engineering Geology

Complete the following courses in addition to the Bachelor of Science in Civil Engineering:

CE/GEOL 4454 Basic Engineering Geology 3
CE/GEOL 4455 Geologic Data Methods 3
CE/GEOL 4475 Essentials of Geomechanics 3
CE/GEOL 4476 Engineering Geology Project 1
CE 4480/GEOL 4483 Earthquake Engineering 3
Civil Engineering Courses

**CE 1100 Engineering Fundamentals: 3 semester hours.**
Fundamental tools are covered for success in civil engineering and other majors, especially engineering and science majors. Includes basic skills and study strategies to succeed in college courses including: test taking, math essentials, good note taking, time scheduling, unit conversions, email protocol, faculty/student interactions, cultural issues and problem-solving strategies. F, S

**CE 1105 Engineering Graphics: 2 semester hours.**
Engineering drawing emphasizing projections, sketching and 3-D visualization. Introduction to CAD with civil, electrical and mechanical engineering applications. PREREQ: MATH 1147 or equivalent. F, S

**CE 1120 Introduction to Engineering: 2 semester hours.**
Introduction to engineering problem solving, engineering design, analysis of contemporary societal issues and methods of presenting engineering information. Design projects and/or presentations of current engineering challenges. F, S

**CE 1199 Experimental Course: 1-6 semester hours.**
This is an experimental course. The course title and number of credits are announced in the class schedule by the scheduling department. Experimental courses may be offered no more than three times with the same title and content.

**CE 2200 Civil Engineering Tools: 1 semester hour.**
Civil engineering problem solving using spreadsheets as a modern data analysis, reporting and database tool; word processing, reading plans/drawings and specifications. PREREQ: MATH 1170 and CS 1181 or INFO 1181. F

**CE 2210 Engineering Statics: 3 semester hours.**
Concepts of force vectors and equilibrium with emphasis on free body diagrams. Trusses, beams, frames, centroids, fluid statics, and friction. Equivalent to ME 2210. PREREQ or COREQ: CE 1105 or ME 1105; PHYS 2211; and MATH 1175. F, S

**CE 2220 Engineering Dynamics: 3 semester hours.**
Principles of kinetics. Angular and linear displacement, velocity, and acceleration analysis. Rigid bodies in motion and types of motion. Application of principles of force-mass acceleration, work-kinetic energy, and impulse-momentum to solution of problems of force systems acting on moving particles and rigid bodies. Equivalent to ME 2220. PREREQ: CE 2210 or PHYS 2211, CE 1105 or ME 1105, and MATH 1175. F, S

**CE 2230 Basic Geotechnics: 3 semester hours.**
Classification, analysis and evaluation of soils as engineering material. Water movement through soils. Soil mechanics applied to analysis of foundations, earth slopes and other structures. PREREQ: CE 2210 or ME 2210, PHYS 2211, CE 1105 or ME 1105; and MATH 1175. S

**CE 3317 Geotechnical Engineering Laboratory: 1 semester hour.**
Field and laboratory work on site investigation, soil sampling, classification and testing. Evaluation of soil properties. Design of experiments. PREREQ: ENGL 1102. PRE-or-COREQ: CE 3332. S

**CE 3341 Fluid Mechanics: 3 semester hours.**
Fluid statics, incompressible fluid flow, open channel flow, compressible fluid flow, pipe flow, flow measurements, pumps, valves, other devices. Equivalent to ME 3341. PREREQ: ME 2220 and MATH 3360. S

**CE 3350 Mechanics of Materials: 3 semester hours.**
Theories of stresses and strains for ties, shafts, beams, columns and connections. Determination of deflections and the investigation of indeterminate members. An introduction to design. Equivalent to ME 3350. PREREQ: CE 2210 or ME 2210, PHYS 2211, CE 1105 or ME 1105; and MATH 1175. F, S

**CE 3351 Engineering Hydrology: 3 semester hours.**
Quantitative descriptions of hydrologic processes and dynamics for the understanding and prediction of precipitation, storm water runoff, groundwater flow, flood routing, and water quality, ground water and detention and retention systems. PRE-or-COREQ: CE/ME 3341. S

**CE 3360 Engineering Economics: 2 semester hours.**
Economic analysis and comparison of engineering alternatives by annual cost, present and future worth, and rate of return methods. Study of cost factors upon which management decisions are based. PREREQ: CE 2210 or ME 2210 or permission of instructor. F, S

**CE 3361 Engineering Economics and Management: 3 semester hours.**
Economic analysis and comparison of engineering alternatives by annual cost, present and future worth, and rate of return methods. Study of cost factors upon which management decisions are based. Introduction to design/construction processes, cost estimating and scheduling with applications to civil engineering projects. PREREQ: CE/ME 2210. F, S

**CE 3362 Structural Analysis: 3 semester hours.**
Analysis of statically determinate and indeterminate trusses, beams, and frames; effects of moving loads; matrix stiffness method; computer applications. PREREQ: CE 2210 or ME 2210, CE 3350 or ME 3350 with minimum grade of C-, and MATH 2240. F

**CE 3366 Civil Engineering Materials: 2 semester hours.**
Mechanical behavior of materials used in civil engineering: metals, masonry, concrete, asphalt, and wood. Micro and macroscopic behavior. Methods of laboratory testing. Analysis and presentation of data and preparation of written reports. PREREQ: CE 3350 or ME 3350, CE 2210 or ME 2210, COREQ: CE 3367. F

**CE 3367 Civil Engineering Materials Laboratory: 1 semester hour.**
Laboratory measurement of mechanical behavior of civil engineering materials. Design of experiment. PREREQ: ENGL 1102, CE 3350 or ME 3350, CE 2210 or ME 2210. COREQ: CE 3366. F

**CE 4406 Green and Sustainable Engineering: 3 semester hours.**
Study of green engineering and sustainability. Topics focused on design of processes to advance sustainability, manufacturing and disposal alternatives, energy and material life-cycle assessment, and environmental law and related issues. PREREQ: CHEM 1111. D

**CE 4424 Open Channel Flow: 3 semester hours.**
Application of the principles of fluid mechanics to flow in open channels - natural and manmade. Topics include uniform flow, flow resistance, gradually varied flow, flow transitions, unsteady flow, and hydraulic structures (culverts, weirs, etc.) used in open channel control. Computer applications will be used in the analysis of open channel systems. Restricted to seniors. PREREQ: CE 3351. D

**CE 4425 Water Resources: 3 semester hours.**
Overview of the general field of water resources engineering. Course topics covered in other courses such as CE 3351, Engineering Hydrology, CE 4435/5535, Hydraulic Design, and CE 4424/5524, Open Channel Flow, will be limited. The course is structured to give students a background in the diverse field of water resources and help prepare them for future careers in water supply, wastewater, floodplain, stormwater, and groundwater management. D

**CE 4431 Advanced Mechanics of Solids: 3 semester hours.**
An introduction to elasticity, plasticity, and energy foundations, stability, plates. PREREQ: CE/ME 3350 and MATH 3360. F
CE 4434 Geotechnical Design: 3 semester hours.
Application of soil mechanics to design of foundations, retaining wall, stable slopes, buried conduits and pavement structures. Computer methods utilized. PREREQ: CE 3350/ME 3350 and CE 3332 with minimum grade of C-. F

CE 4435 Hydraulic Design: 3 semester hours.
Hydraulic design of water control and transport structures, pipelines, and distribution systems. Computer methods utilized. PREREQ: Minimum grade of C- in CE 3341 or ME 3341. F

CE 4436 Transportation Engineering: 3 semester hours.
Fundamentals of earthwork, route location, drainage, and pavement materials with application to geometric and pavement design of highways, streets and rural roads. PREREQ: CE 3301, CE 3337, and CE 3367. S

CE 4438 Foundation Engineering: 3 semester hours.
Advanced geotechnical analysis and performance of shallow, driven pile and drilled shaft foundations (including lateral loads and seismic bearing capacity), braced excavations, retaining walls, dynamic slope stability, soil-structure interaction and soil liquefaction. PREREQ: CE 3332, CE 3337 and CE 4434. D

CE 4454 Basic Engineering Geology: 3 semester hours.
Geology applied to civil engineering projects; rock engineering classification systems and geotechnical parameters such as joint set orientation, ground behavior and underground construction. Preparation of baseline geotechnical reports. Equivalent to GEOL 4454. PREREQ or COREQ: GEOL 3314 or CE 3332. D

CE 4455 Geologic Data Methods: 3 semester hours.
Geotechnical investigations for civil works projects; geologic mapping for civil engineering purposes; development of engineering geologic profiles; core logging; preparation of Geotechnical Data Reports for civil works projects. Equivalent to GEOL 4455. PREREQ or COREQ: GEOL 3314 or CE 3332. D

CE 4460 Project Management: 3 semester hours.
Knowledge, techniques and tools for management of civil, electrical, mechanical and environmental engineering projects and firms. Topics include contract organization/interpretation; project responsibility/authority; cost estimating; scheduling; quality control; construction safety; environmental requirements and project closeout. Examples from actual construction projects used as teaching aids. PREREQ: CE 3360 or CE 3361. F

CE 4462 Design of Steel Structures: 3 semester hours.
Design of steel members and connections with emphasis on the AISC specifications. PREREQ: CE 3362. OS

CE 4464 Design of Concrete Structures: 3 semester hours.
Design of reinforced concrete beams, columns, and slabs. Introduction to prestressing. PREREQ: CE 3362. ES

CE 4465 Design of Prestressed Concrete Structures: 3 semester hours.
Basic concepts in prestressed concrete design, full versus partial prestressing, flexural design, ultimate load design, beams with constant and variable tendon eccentricity, design of reinforcement for shear and torsion. PREREQ: CE 4464. F

CE 4466 Design of Wood Structures: 3 semester hours.
Design of solid and laminated wood members and connections. Includes the design of wooden diaphragms for resisting lateral loads. PREREQ: CE 3362. D

CE 4467 Structural Engineering Laboratory: 1 semester hour.
Measurement of stresses and load distribution through concrete, steel and wood components and structures. Design of experiment. PREREQ: CE 3362. S

CE 4468 Behavior of Composite Materials: 3 semester hours.
Macro and micromechanical behavior of laminae and laminates; bending, buckling and vibration of laminated beams and plates. PREREQ: CE/ME 3350 and MATH 2240. D

CE 4475 Essentials of Geomechanics: 3 semester hours.
Essentials of rock fracture relevant to geological engineering including stress and strain, properties and classification of rock masses, rock fracture mechanisms. Equivalent to GEOG 4475. PREREQ: GEOL 4421 or CE/ME 3350. D

CE 4476 Engineering Geology Project: 1 semester hour.
Team projects studying actual problems in engineering geology. Equivalent to GEOG 4476. PREREQ: GEOG 4454 or CE 4454. D

CE 4480 Earthquake Engineering: 3 semester hours.
Topics include: mechanism and characterization of earthquakes; seismic risk analysis; site and structural response; applications from points of view of engineer and geologist. PREREQ: GEOL 3313, CE 3332, or permission of instructor. D

CE 4481 Independent Problems: 1-3 semester hours.
Students are assigned to, or request assignment to, independent problems on the basis of interest and preparation. May be repeated for a maximum of 6 credits. Equivalent to ENGR/EE 4481. PREREQ: Permission of instructor. D

CE 4496A Project Design I: 3 semester hours.
Semester one of a two semester sequence dealing with the conceptual design of multi-disciplinary projects requiring multi-disciplinary teams. PREREQ: COMM 1101, CE 3361, CE 3362, CE 3341, CE 3301, CE 3332, CE 3337, CE 3366, CE 3367 and CE 3351 or CE 4462 or CE 4464 or CE 4435 or CE 4434 or ENVE 4408. F

CE 4496B Project Design II: 3 semester hours.
Continuation of design sequence dealing with the design, analysis, implementation, and consequences of multi-disciplinary projects. PREREQ: CE 4496A. S

CE 4499 Experimental Course: 1-3 semester hours.
This is an experimental course. The course title and number of credits are noted by course section and announced in the class schedule by the scheduling department. Experimental courses may be offered no more than three times. May be repeated.

Env Engr Courses

ENVE 4404 Environmental Risk Assessment: 3 semester hours.
Quantitative and qualitative approaches to characterizing and controlling contaminant pathways. Risk assessment requirements and implications in superfund projects for engineers working on remediation. PREREQ: Permission of major advisor. F

ENVE 4408 Water and Waste Water Quality: 3 semester hours.
Principles of chemistry in application to water and wastewater treatment systems for water quality control and reuse. PREREQ: Minimum grade of C- in CHEM 1111 and CHEM 1111L or equivalent. S, D

ENVE 4409 Water and Waste Water Lab: 1 semester hour.
Fundamental analytical procedures for measurement of water and waste water quality. Introduction to materials and protocols associated with general environmental analytical techniques. COREQ or PREREQ: ENVE 4408. D

ENVE 4410 Introduction to Environmental Engineering: 3 semester hours.
Introduction to physical, chemical, and biological principles of solid and hazardous waste management, water and wastewater treatment, air pollution control and national environmental regulation. PREREQ: ENVE 4408 or equivalent. F

ENVE 4430 Air Pollution and Solid Waste: 3 semester hours.
Sources, characteristics, regulations, and effects of air pollution and solid waste on environmental quality; analysis and design of control systems, including the recovery of resources from solid waste. PREREQ: Senior standing in Engineering or permission of instructor. D
ENVE 4499 Experimental Course: 1-6 semester hours.
This course is not described in the catalog. The course title and number of credits are announced in the class schedule by the scheduling department. Experimental courses may be offered no more than three times.