

CIVIL AND ENVIRONMENTAL ENGINEERING

The Department of Civil & Environmental Engineering offers two ABET-accredited degrees: a Bachelor of Science in Civil Engineering and a Bachelor of Science in Environmental Engineering. Additional information is available in the individual program sections of this catalogue.

REGULATIONS

Students pursuing the Bachelor of Science in Civil Engineering or the Bachelor of Science in Environmental Engineering are subject to the Academic Standards in CEMS outlined in this catalogue.

ADDITIONAL REGULATIONS

In order to earn the Bachelor of Science in Civil Engineering or the Bachelor of Science in Environmental Engineering, students must achieve a minimum 2.00 GPA in all Engineering (BME, CEE, CMPE, EMGT, ENGR, EE, ME), Mathematics, Statistics, Physics, Chemistry and Computer Science coursework.

MAJORS

CIVIL AND ENVIRONMENTAL ENGINEERING MAJORS

Civil Engineering B.S.CE.

Environmental Engineering B.S.EV.

MINORS

CIVIL AND ENVIRONMENTAL ENGINEERING MINORS

Sustainable Energy Engineering

GRADUATE

See the online Graduate Catalogue for more information.

Courses

CEE 1000. Intro to Civil & Envir Engr. 0 or 2 Credits.

Introduction to Civil and Environmental Engineering, sustainability, ethics, systems thinking, teamwork in engineering, laboratories, computational exercises, and project-based. Catamount Core: SU.

CEE 1100. Statics. 0 or 3 Credits.

Fundamentals of statics; composition and resolution of forces; the analysis of force systems in two and three dimensions; and centroids and moments of inertia. Credit not awarded for both CEE 1100 and CEE 1150. Prerequisites: MATH 1248 or MATH 1242; PHYS 1500.

CEE 1150. Applied Mechanics. 3 Credits.

Introduction to statics, mechanics of materials, and heat transfer. Credit not awarded for both CEE 1150 and CEE 1100. Prerequisites: MATH 1248 or MATH 1242; PHYS 1500.

CEE 1900. Career Preparation. 1 Credit.

Teaches students how to combine their curricula and development of key transferable skills to become civil or environmental engineering professionals; includes the path to professional engineering licensure and eventual leadership as a professional; preparation for internship/job search, interviews, and Fundamentals of Engineering examination. Prerequisites: Civil Engineering or Environmental Engineering major; minimum Sophomore standing; or Instructor permission.

CEE 1990. Special Topics. 1-18 Credits.

See Schedule of Courses for specific titles.

CEE 1991. Internship. 1-3 Credits.

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

CEE 1993. Independent Study. 1-18 Credits.

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

CEE 2000. Geomatics. 0 or 4 Credits.

An introduction to surveying including distance and angle measurements, leveling, traverse surveys, error propagation, topographical mapping, global positioning systems (GPS), and geographic information systems (GIS). Project-based. Prerequisites: MATH 1034, MATH 1212, or MATH 1234; Sophomore standing.

CEE 2100. Mechanics of Materials. 3 Credits.

Stress, strain, temperature relationships, torsion, bending stresses, and deflections. Columns, joints, thin-walled cylinders. Combined stresses and Mohr's circle. Prerequisite: CEE 1100 with a grade of C- or better or CEE 1150 with a grade C- or better. Co-requisite: MATH 2248. Cross-listed with: ME 1140.

CEE 2120. Environmental Systems. 3 Credits.

Systems thinking and the systems approach as applied to environmental systems; sustainability, mass and energy balances, kinetics, ecosystem health and the public welfare, environmental risk, green engineering, water and wastewater treatment, air resources engineering, solid-waste management. Prerequisites: CHEM 1400; MATH 1212 or MATH 1234. Catamount Core: SU.

CEE 2130. System Focused Design Engr. 3 Credits.

Systems-thinking applied to analysis and design of engineered systems and elements, including economic, social, and environmental aspects of sustainable designs within global contexts. Includes life-cycle cost analysis, uncertainty, risk, and engineering economics. Prerequisites: STAT 1410 or STAT 2430 or STAT 2510. Catamount Core: SU.

CEE 2990. Special Topics. 1-18 Credits.

See Schedule of Courses for specific titles. Prerequisites: Senior standing in Civil Engineering or Environmental Engineering.

CEE 2991. Internship. 1-18 Credits.

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

CEE 2993. Independent Study. 1-18 Credits.

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion. Prerequisites: Senior standing; Department permission.

CEE 2994. Teaching Assistantship. 1-3 Credits.

Undergraduate student service as a teaching assistant, usually in an introductory-level course in the discipline, for which credit is awarded. Offered at department discretion.

CEE 2995. Undergraduate Research. 1-18 Credits.

Undergraduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

CEE 2996. College Honors. 1-6 Credits.

Honors research leading to thesis.

CEE 3010. Materials and Structures Lab. 0 or 3 Credits.

Experimental stress analysis methods; experimental verification of static force-displacement relationship for beams, frames, and trusses; fundamental mechanical properties of metals, plastics, and wood; effects of size, shape, method, speed of loading and strain history on these properties. Co-requisites: CEE 2100 or ME 1140, and CEE 3700.

CEE 3400. Transportation Systems. 3 Credits.

Transportation systems planning, analysis, and design with foci on safety, modeling, decision support, and environmental impacts. Credit not awarded for both CEE 3400 and CEE 3415. Prerequisites: Engineering major; minimum Sophomore standing; or Instructor permission. Co-requisite: CEE 2000.

CEE 3415. Transportation Climate Environ. 3 Credits.

Transportation systems planning, analysis, and design with foci on climate and environmental impacts. Credit not awarded for both CEE 3415 and CEE 3400. Prerequisites: Engineering major; minimum Sophomore standing; or Instructor permission. Co-requisite: CEE 2000.

CEE 3510. Water Quality Engineering. 3 Credits.

Fundamentals and design of sustainable systems for stormwater, drinking water, and wastewater treatment in urban and rural settings. Project-based. Credit not awarded for both CEE 3510 and CEE 3515. Prerequisite: CEE 2120 with a grade of C- or better. Catamount Core: SU.

CEE 3515. Water & WasteW Treatment Proc. 3 Credits.

Fundamentals and design of sustainable systems for stormwater, drinking water, and wastewater treatment in urban and rural settings. Project-based. Credit not awarded for both CEE 3515 and CEE 3510. Prerequisite: CEE 2120 with a grade of C- or better.

CEE 3520. Env Eng Chemistry & Microbio. 3 Credits.

Fundamentals of (bio)chemical transformations in water, soil, and air and applications for pollution prevention and remediation. Topics include chemical thermodynamics, acid-base, reduction-oxidation, dissolution-precipitation, kinetics, molecular biology, metabolism, and bioenergetics. Prerequisites: CEE 3510 or CEE 3515.

CEE 3530. Environmental Quanti. Analysis. 0 or 4 Credits.

Focuses on chemical, biochemical and physical processes; diffusion, equilibria, reaction kinetics, acids/bases, colloids, air/water exchange; laboratories demonstrate standard environmental engineering techniques; project-based. Prerequisites: CEE 2120 with C- or better; STAT 1410 or STAT 2430. Co-requisite: CEE 3510 or CEE 3515.

CEE 3600. Hydraulics. 3 Credits.

Provides an understanding of the mechanics of incompressible fluids (fluid statics and fluid flow) with a focus on applications common in Civil Engineering such as flow meters, flow in closed conduits, and elements of hydraulic machinery (systems with pumps, cavitation, NPSH). Credit not for both CEE 3600 and CEE 3615. Prerequisites: MATH 2248; CEE 1100 with a grade of C- or better or CEE 1150 with C- or better. Co-requisite: CS 1210.

CEE 3610. Hydraulics Lab. 0-2 Credits.

Performing various laboratory studies of flow and hydraulic machinery determine index; computer modeling of hydraulic systems; associated laboratory and project report writing and presentations. Co-requisites: CEE 3600 or CEE 3615.

CEE 3615. Hydraulics for Environ Engrng. 3 Credits.

The mechanics of incompressible fluids (fluid statics and fluid flow) with applications common in Environmental Engineering such as flow in open and closed conduits, open channel flow, stream power, flow meters, capillarity, and elements of hydraulic machinery (systems with turbines, pumps). Credit not awarded for both CEE 3615 and CEE 3600. Prerequisites: MATH 2248; CEE 1100 with grade C- or better or CEE 1150 with grade C- or better. Co-requisite: CS 1210.

CEE 3700. Structural Analysis. 3 Credits.

Analysis of statically determinate beams, frames, and trusses; expected loads, reactions; influence lines; moving loads; geometric methods for displacement calculations; introduction to matrix analysis for trusses. Prerequisites: CS 1210. Co-requisites: MATH 2522 or MATH 2544 and MATH 3201; CEE 2100 or ME 1140.

CEE 3800. Geotechnical Engineering. 3 Credits.

Covers basic characteristics of geological materials; soil classifications; physical, mechanical, and hydraulic properties; the effective stress principle; seepage; consolidation; stress distribution; settlement analysis; and shear strength of soils. Credit not awarded for both CEE 3800 and CEE 3815. Prerequisites: CEE 1150 with grade C- or better or CEE 1100 with grade C- or better.

CEE 3810. Geotechnical Engineering Lab. 0-2 Credits.

Performing various laboratory tests to determine index, hydraulic, and mechanical properties of soils; computer modeling of geotechnical systems; associated laboratory and project report writing and presentations; project-based. Prerequisites: CEE 1150 with grade C- or better or CEE 1100 with grade C- or better. Co-requisite: CEE 3800.

CEE 3815. Geoenvironmental Engineering. 3 Credits.

Covers basic characteristics of soils (physical, mechanical, hydraulic, geochemistry); soil classifications; seepage and groundwater flow; contaminant transport in soil and groundwater; leakage in waste disposal and containment systems; the effective stress principle; consolidation and settlement analysis in landfills. Credit not awarded for both CEE 3800 and CEE 3815. Prerequisites: CEE 1150 with grade C- or better or CEE 1100 with grade C- or better.

CEE 3990. Special Topics. 1-18 Credits.

Content is dictated by expanding professional interest in newly developing, or recently developed, technical areas in which there is particular need or opportunity. Prerequisite: Senior standing.

CEE 3991. Internship. 1-18 Credits.

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

CEE 3993. Independent Study. 1-18 Credits.

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

CEE 3994. Teaching Assistantship. 1-3 Credits.

Undergraduate student service as a teaching assistant, usually in an introductory-level course in the discipline, for which credit is awarded. Offered at department discretion.

CEE 3995. Undergraduate Research. 1-18 Credits.

Undergraduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

CEE 4440. Transportation Demand Models. 3 Credits.

Study of specific methods used to analyze travel demand, travel behavior and network flows; process of travel demand modeling; collection, analysis and expansion of survey data and travel data; mathematical methods common to travel modeling. Credit not awarded for both CEE 4440 and CEE 5440. Prerequisite: CEE 3400 or CEE 3415.

CEE 4450. GIS Sustainable Transport Plan. 3 Credits.

Students will learn to use spatial analysis methods to support sustainable transportation and land use planning. Topics include spatial data types, mapping and data visualization, spatial operations and analysis, and network analysis. In-class examples and exercises will include applications related to transportation, land use, sustainability, planning, and equity. Credit not awarded for both CEE 4450 and CEE 5450. Prerequisite: CEE 3400 or CEE 3415 or Instructor permission.

CEE 4570. Sustain Resource Recovery Dsgn. 3 Credits.

Environmental engineering strategies to create circular economies emphasizing the role of wastes as resources. Course topics include life cycle assessment, carbon and nutrient management, materials recycling, and waste-to-energy processes. Project-based. Prerequisite: CEE 3510 or CEE 3515.

CEE 4600. Hydrology. 3 Credits.

Theory of precipitation, run-off, infiltration, and ground water; precipitation and run-off data; and application of data for use in development of water resources. Credit not awarded for both CEE 4600 and CEE 5600. Pre/Co-requisite: CEE 3600 or CEE 3615.

CEE 4650. Ground Water Hydrology. 3 Credits.

Principles of ground water hydraulics, well characteristics, aquifers, and use of numerical methods to solve ground water flow problems. Project-based. Credit not awarded for both CEE 4650 and CEE 5650. Prerequisite: CEE 3600 or CEE 3615.

CEE 4720. Structural Steel Design. 3 Credits.

Theory and design of steel structures including flexural members, axially loaded members and combined stress members; design of composite members; plastic analysis and design; project-based. Prerequisite: CEE 3700.

CEE 4730. Reinforced Concrete. 3 Credits.

Analysis of stresses in plain and reinforced concrete members; design of reinforced concrete structures; theory of prestressed concrete; project-based. Prerequisite: CEE 3700.

CEE 4810. Geotechnical Design. 3 Credits.

Bearing capacity, lateral earth pressures, slope stability; analysis and design of shallow and deep foundations, retaining structures, and slopes; project-based. Prerequisite: CEE 3800 or CEE 3815.

CEE 4950. Capstone Design. 3 Credits.

Student teams will integrate the multiple areas of specialization in Civil/Environmental Engineering in comprehensive design experience; professional practice; ethics; written and oral presentations to professional review panels. Prerequisites: Civil Engineering, Environmental Engineering, or Engineering Management major; minimum Senior standing. Co-requisite: CEE 2130. Catamount Core: GC2, SU, WIL2.

CEE 4990. Special Topics. 1-18 Credits.

See Schedule of Courses for specific titles.