

Civil and Environmental Engineering

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Civil Engineering Program

Civil engineers are involved in many field including structural engineering, transportation planning, environmental systems, and geotechnical analysis. The modern civil engineer uses traditional design and analysis methods as well as advanced experimental and computational techniques. At UAH, students are exposed to all of these areas of civil engineering and introduced to techniques that will make them competent practicing professional engineers. The civil engineering curriculum consists of general engineering classes (required of all engineering students), the civil engineering core classes, and the civil engineering concentration selected. The concentration requirements may be met by completing either a broad civil engineering curriculum or by specializing in structural, transportation, or environmental engineering.

The department of Civil Engineering offers the following degree programs:

- Civil and Environmental Engineering, BSCE
- C (<http://catalog.uah.edu/undergrad/colleges-departments/engineering/civil-environmental-engineering/civil-environmental-engineering-bsce>)ivil and Environmental Engineering, BSCE - Environmental Track (<http://catalog.uah.edu/undergrad/colleges-departments/engineering/civil-environmental-engineering/civil-environmental-engineering-environmental>)
- C (<http://catalog.uah.edu/undergrad/colleges-departments/engineering/civil-environmental-engineering/civil-environmental-engineering-bsce>)ivil and Environmental Engineering, BSCE - Structural Track (<http://catalog.uah.edu/undergrad/colleges-departments/engineering/civil-environmental-engineering/civil-environmental-engineering-structural>)
- C (<http://catalog.uah.edu/undergrad/colleges-departments/engineering/civil-environmental-engineering/civil-environmental-engineering-bsce>)ivil and Environmental Engineering, BSCE - Transportation Track (<http://catalog.uah.edu/undergrad/colleges-departments/engineering/civil-environmental-engineering/civil-environmental-engineering-transportation>)

The structural engineering concentration provides students with a strong background in many aspects of structural analysis, foundations, reinforced concrete, steel design, bridge design, and advanced structural design. Students may take additional courses in such areas as advanced concrete design, design of wood structures, wind and seismic loads, advanced cementitious and composite materials, experimental mechanics, and finite element methods.

The environmental engineering concentration provides students with a strong foundation in environmental management and remediation. Within the framework of the program, students are introduced to environmental engineering aspects such as water quality, atmospheric pollution, hydrology, environmental systems, and environmental sampling.

The transportation engineering concentration provides students with the skills necessary to tackle tomorrow's data management and transportation issues. Students are introduced to various topics, including transportation modeling and simulation, application of GIS to transportation issues, use of traffic crash data, and urban transportation planning.

Mission

The mission of the Civil Engineering Program is to educate students with the fundamental knowledge and analytical skills necessary for successful careers in civil and environmental engineering. Through rigorous scholarship, innovative instruction and service, we advance knowledge to improve our global community.

Program Educational Objectives

Within a few years of graduation, Civil Engineering graduates will have:

- Developed creative solutions in their profession through application of civil engineering knowledge and skills,
- Attained successful careers and recognition as emerging leaders in industry and in the civil engineering community, and
- Impacted the global community by addressing societal needs through a combination of professional practice, research, and/or service.

Undergraduate Major in Civil Engineering

- Civil Engineering, BSCE (<http://catalog.uah.edu/undergrad/colleges-departments/engineering/civil-environmental-engineering/civil-environmental-engineering-bsce>)
- Civil Engineering, BSCE - Environmental Track (<http://catalog.uah.edu/undergrad/colleges-departments/engineering/civil-environmental-engineering/civil-environmental-engineering-environmental>)

- Civil Engineering, BSCE - Structural Track (<http://catalog.uah.edu/undergrad/colleges-departments/engineering/civil-environmental-engineering/civil-environmental-engineering-structural>)
- Civil Engineering, BSCE - Transportation Track (<http://catalog.uah.edu/undergrad/colleges-departments/engineering/civil-environmental-engineering/civil-environmental-engineering-transportation>)

CE 211 - CIVIL ENGINEERING GRAPHICS

Semester Hours: 2

Fundamental concepts in computer-aided graphics as they apply to civil engineering. Topics include lettering, sketching, manipulation of elements, rotation of views and input of data. Students will gain engineering practice through AutoCad laboratory exercises. Prerequisite: ENG 101 with minimum grade of C-.

CE 271 - STATICS

Semester Hours: 3

Topics include: forces, resultant forces, moments, couples, equivalent forces systems, equilibrium, distributed loads, two force members, trusses, centroids, moments of inertia, shear and bending moment diagrams, static and kinematic friction. (Same as MAE 271). Prerequisite: ENG 101, PH 111 and MA 201 w/concurrency.

CE 272 - DYNAMICS

Semester Hours: 3

Kinematics and kinetics of a particle and systems of particles with applications to central force motion, impact, relative motion, vibrations, and variable mass systems. Dynamics of rigid body in plane motion, relative motion in rotating coordinates, and gyroscopic motion. Same as MAE 272 Prerequisites: MA 201 and (CE 271 or MAE 271).

CE 284 - SURVEYING

Semester Hours: 2

Basic theory and practical field methods for engineering applications. Measurements and errors in surveying. Leveling, traversing, stadia, topographic surveys, mapping, and circular curves. 1.5 hour lecture and 2 hour lab. Consent of instructor/advisor. Prerequisite: CE 111.

CE 284L - SURVEYING LAB

Semester Hours: 0

CE 307 - SYSTOLIC ARRAY PROCESSING

Semester Hours: 3

CE 321 - INTRO TO TRANSPORTATION ENG

Semester Hours: 3

Theory, design, and operation of various modes of transportation with emphasis on traffic flow. Prerequisites: CE 284 and MA 171.

CE 370 - MECHANICS OF MATERIALS

Semester Hours: 4

Stress and strain, Hooke's law, stresses and deformations in bodies loaded by single and combined loads, and analysis of statically indeterminate systems. Laboratory includes experimental verification of lecture concepts, test procedures, instrumentation, and interpretation of results. Same as MAE 370. Prerequisites: (CPE 211 or MAE 211) and (MAE 271 or CE 271) and MA 244, corequisite CE 370L.

CE 370L - LABORATORY

Semester Hours: 0

CE 372 - SOIL MECHANICS & FOUNDATION

Semester Hours: 3

Index properties and characteristics of soils. Compaction shear, compressibility and permeability. Application to analysis and design of foundation elements. Laboratory included. Prerequisites: (CE 370 or MAE 370) and MAE 310.

CE 373 - SOIL MECHANICS LAB

Semester Hour: 1

Laboratory classification of soils. Determinations of soil properties.

CE 380 - CIVIL ENGINEERING MATERIALS

Semester Hours: 3

Performance properties and selection criteria of various materials used in the practice of civil engineering including aggregates, Portland cement, concrete, bituminous materials, and timber. Emphasis will be placed on standard methods of testing and characterization. Includes a weekly lab. Prerequisites: CE 370 or MAE 370.

CE 380L - CE MATERIALS LAB

Semester Hours: 0

Standard methods of testing and characterization of various materials used in the practice of civil engineering. Determination of civil engineering materials properties.

CE 381 - STRUCTURAL ANALYSIS I

Semester Hours: 3

Reactions, shears, moments in determinate structures. Influence lines, energy methods in computing deformations. Introduction to indeterminate structures. Prerequisites: (CE 272 or MAE 272) and (CE 370 or MAE 370).

CE 411 - INTRO GEOGRAPHICAL INFO SYS

Semester Hours: 3

Introduces vector, raster, and tabular concepts. Topics include spatial relationships, map features, attributes, relational database, layers of data, data ingesting, digitizing from maps, projections, output, and availability of public data sets. Same as CE 511, ESS 411/411, and ATS 411/511.

CE 412 - ADVANCED CE GRAPHICS

Semester Hours: 3

Trending geospatial and graphics technologies including 3-D land development workflows, GPS data acquisition and processing of aerial, lidar, and topographical surveys, terrain modeling, earthwork, sanitary, drainage, and transportation design methodologies within the graphical CAD environment. Prerequisite: CE 111.

CE 420 - URBAN TRANSPORTATION PLANNING

Semester Hours: 3

Planning of highways systems and terminals as part of a complete planning approach; public transportation system planning; transportation planning studies, projection analysis, plan formulation, and programming. Same as CE 520. Prerequisite: CE 321.

CE 422 - TRAFFIC ENGINEERING DESIGN

Semester Hours: 3

Driver, pedestrian and vehicle characteristics. Principles of traffic flow for improved highway traffic service and safety. Design freeways, rural roads, urban streets, traffic signals, signs, channelization, and other traffic control measures. (Same as CE 522). Prerequisite: CE 321.

CE 441 - HYDRAULIC ENGINEERING DESIGN

Semester Hours: 3

Water-hammer analysis, open channel flow, hydraulic structures such as dams, spillways, stilling basins, flood control devices, locks, pipe-flow systems and water-supply facilities, computational methods. Prerequisite: MAE 310.

CE 449 - INTRO ENVIRONMENTAL ENGR

Semester Hours: 3

Engineering aspects of air, water, and thermal pollution. Hydrologic cycle, water sources and uses; industrial and other sources of primary and secondary pollutants. Transport process in environmental problems and their control. (Same as CE 549 and CHE 449/549) Prerequisites: MAE 310 and MAE 341.

CE 452 - CREDIT EXPERIENTIAL LEARNING

Semester Hours: 1-3

Students are engaged in research and creative projects as meaningful experiential learning opportunities. The course fosters cooperation between students and faculty in a research or creative endeavor, and enhances the students' education via active participation in a research, creative or scholarly project.

CE 456 - WATER QUALITY CONTROL PROC

Semester Hours: 3

Principles of public water-supply design. Source selection, collection, purification, and distribution for municipal use. Collection of waste waters, their treatment and disposal. (Same as CE 556). Prerequisite: CE 449.

CE 457 - HYDROLOGY

Semester Hours: 3

Occurrence and movements of water over the earth's surface for engineering planning and design. Relationship of precipitation to stream-flow with frequency analysis, flood routing, and unit hydrograph theory. (Same as CE 557) Prerequisite: MAE 310.

CE 458 - ENVIRONMENTAL ENGR DESIGN

Semester Hours: 3

Engineering design and project management of environmental quality/restoration systems. Design project focusing on: sanitary landfill, municipal incinerator, or groundwater/site remediation. Develops skills for technical communications, process design and decision making. (Same as CE 558)

Prerequisite: CE 449.

CE 459 - SEL TOP IN CIVIL ENGR

Semester Hours: 1-6

Special topics in Civil Engineering.

CE 471 - ADVANCED SOIL MECHANICS

Semester Hours: 3

Continuum mechanics applied to soil behavior. Theoretical approaches to consolidation, shear strength, slope stability and soil stabilization.

Prerequisites: CE 372.

CE 472 - SOIL DYNAMICS

Semester Hours: 3

Behavior of soils under dynamic, earthquake and blast loading. Analysis of foundation vibration and isolation. Prerequisites: CE 372.

CE 473 - EARTH STRUCTURES ENGRG

Semester Hours: 3

Earth structure design. Theories of earth pressures and the design of retaining wall systems including gravity, cantilever, mechanically stabilized earth, flexible-sheet pile, and anchored wall systems. Stability analyses for retaining walls, earth slopes, and embankment designs. (Same as CE 573)

Prerequisites: CE 372 and CE 373.

CE 474 - APP MECHANICS OF SOLIDS

Semester Hours: 3

Stresses and strains at a point, theories of failures, stress concentration factors, thick-walled cylinders, torsion of noncircular members, curved beams, unsymmetrical bending and shear center. (Same as CE 574 and MAE 474/574) Prerequisites: CE 370 or MAE 370.

CE 481 - STRUCTURAL ANALYSIS II

Semester Hours: 3

Reactions, shears, moments and deformations in complex structural systems. Statically indeterminate systems, advanced geometric and energy methods. Prerequisites: CE 381.

CE 483 - REINFORCED CONCRETE DESIGN

Semester Hours: 3

Theory and practice of reinforced concrete design. Theory and design of high strength concrete mixtures. Design of reinforced concrete beams, slabs, and columns using the ultimate strength design code of the American Concrete Institute. Same as CE 583. Prerequisites: CE 380 and CE 381.

CE 484 - STEEL DESIGN

Semester Hours: 3

Principles of design of steel structures using ASD methods. Analysis and design of structural elements using beams, columns, connection details. (Same as CE 584). Prerequisites: CE 381 and MA 244.

CE 485 - FOUNDATION ENGINEERING

Semester Hours: 3

Design of foundations with emphasis on reinforced concrete, footings, caissons, piles retaining walls, and mat foundations. Effect of bearing pressure on foundations. (Same as CE 585) Prerequisites: CE 372 and CE 483.

CE 487 - BRIDGE DESIGN

Semester Hours: 3

Bridge loads, load distribution, composite beam bridges, bridge bearings, reinforced and prestressed concrete slab and T-beam bridges, bridge evaluations and ratings, and upgrade methodology. (Same as CE 583) Prerequisite: CE 483.

CE 498 - CIVIL ENGINEERING DESIGN I

Semester Hour: 1

Planning and analysis for a preliminary civil engineering design project. Topics include fundamentals of management, public policy, cost estimation, environmental impacts, soils analysis, and ethical considerations. Part 1 of a 2-part course. Prerequisites: CE 321, CE 372, and CE 483.

CE 499 - CIVIL ENGINEERING DESIGN II

Semester Hours: 2

Analysis and design of a complete civil engineering project including establishment of design criteria, cost estimates, specifications, and plans. Topics include ethical considerations in engineering design and practice. Emphasis on developing written and oral communication skills. Prerequisites: CE 483 and CE 498.

CE 499L - DESIGN II LABORATORY

Semester Hours: 0