Civil Engineering (CE)

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 interdeterminate 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 movement. 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 EXPERIENTAL 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.
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**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


**CE 473 - EARTH STRUCTURES ENGRGL**
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 mixes. 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