

CIVIL & ENVIRONMENTAL ENGINEERING (CEE)

Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

CEE 400 - Introduction to Civil Engineering

Credits: 0 or 4

Introduction to the civil engineering profession: structural, geotechnical, water resources, materials, and environmental. Overviews the civil project process including the creative design process, teamwork, bidding and construction. The relationship between civil engineering works and society including ethics, earthquakes, failures, successful signature structures, current events, and professional licensure. The production of professional engineering documents including writing tasks and calculations sets. Campus resources, the University system, and relationship between required curriculum, student objectives, and the civil engineering profession. Introduction to spreadsheet software, data analysis, and probability and statistics.

Attributes: Environment, TechSociety(Disc); Inquiry (Discovery)

Equivalent(s): CIE 402

Grade Mode: Letter Grading

CEE 402 - 2D Computer Aided Design

Credits: 3

This course will serve as an introduction to some of the fundamental principles of building design and land planning. You will prepare plans representative of building construction and land development commonly used in the architectural, engineering, surveying and construction fields. The emphasis will be on the end result: Preparing complete and professional plans. Through this, you will acquire basic skills in designing and plan layout required by these industries. We will approach this material by designing and drafting using computer software (AutoCAD). Another end outcome is that you will gain a certain level of competency with this AutoCAD software, a program used by the majority of the firms in these professions.

Equivalent(s): TECH 564

Grade Mode: Letter Grading

CEE 403 - GIS for Civil and Environmental Engineering

Credits: 3

This course will serve as an introduction to some of the fundamental principles of Geographic Information Systems integral to Civil and Environmental Engineering. Students will develop an understanding of imagery and data acquisition; develop skills in identification, interpretation, and mapping of civil and land features, terrain analysis, and achieve an understanding of map projections; gain experience in GIS software to perform fundamental geoprocessing and mapping techniques.

Grade Mode: Letter Grading

CEE 404 - Surveying and Mapping

Credits: 0 or 4

Principles of land measurements by ground, photogrammetric and satellite methods to model the environment. Application of theory of measurements to perform and adjust engineering survey. Conformal mapping and its application to state plane coordinates. Digital mapping and Geographic Information Systems. Construction and cadastral surveying. Pre- or Coreq: MATH 425 or permission. Lab. Writing intensive.

Attributes: Writing Intensive Course

Equivalent(s): CIE 505

Grade Mode: Letter Grading

CEE 420 - Environmental Engineering Lectures I

Credits: 3

Introduces the profession, the environmental engineer as planner, designer, problem solver, and interdisciplinary team player; and the goals of the environmental engineering curriculum. Lectures by faculty and practitioners. Introduction to computer skills required for environmental engineering. Engineering ethics.

Equivalent(s): ENCV 400, ENE 400

Grade Mode: Letter Grading

CEE #444 - Housing - Everyone Needs a Place to Live

Credits: 4

A discussion of residential housing, whether from the larger societal view or from the viewpoint of an individual, involves more than just the concepts associated with engineering. In order for the discussion to be complete, one needs to include legislative issues, economic issues, land issue, energy issues and environmental issues along with a variety of engineering issues (construction, transportation, water, materials, environmental controls, etc.). Thus a major focus of the course will be to provide a student with an appreciation of breadth and complexity of the issues associated with providing housing.

Attributes: Environment, TechSociety(Disc); Inquiry (Discovery)

Equivalent(s): CIE 444

Grade Mode: Letter Grading

CEE 500 - Statics for Civil Engineers

Credits: 3

Introduction to statics with emphasis on civil engineering topics; two and three dimensional force systems; static equilibrium; friction; analysis of trusses and beams; centroids; and moment and shear diagrams for flexural members. Prereq: PHYS 407. Pre- or Coreq: MATH 426.

Equivalent(s): CIE 525, CIE 528, ME 525

Grade Mode: Letter Grading

CEE 501 - Strength of Materials

Credits: 3

Strength of materials with emphasis on civil engineering applications. Virtual work; work and energy relationships; analysis of members subjected to flexure, torsion, and axial loads; stresses and strains; and stability of columns. Prereq: CEE 500 or ME 525.

Equivalent(s): CIE 526, CIE 529, ME 526

Grade Mode: Letter Grading

CEE 502 - Project Engineering

Credits: 3

Techniques for financial analysis, and operation and management of engineering systems, engineering economics, material take-offs, estimating, scheduling, modeling physical systems, and decision-making. CEE major or permission.

Equivalent(s): CIE 533, CIE 633, CIE 733

Grade Mode: Letter Grading

CEE 520 - Environmental Pollution and Protection: A Global Context**Credits:** 0 or 4

Introduces environmental science and engineering and the anthropogenic causes of environmental change. Emphasizes the causes, effects, and controls of air, water, and land pollution. The political, ecological, economic, ethical, and engineering aspects of environmental pollution and control are discussed. Field trips. Writing intensive.

Attributes: Environment, TechSociety(Disc); Writing Intensive Course**Equivalent(s):** BIOL 520, ENCV 520, ENE 520**Grade Mode:** Letter Grading**CEE 620 - Fundamental Aspects of Environmental Engineering****Credits:** 4

Application of fundamental concepts of mass balance in treatment processes. Physical, chemical, and biological aspects of pollution control, and design concepts for operations and processes used in environmental engineering are discussed. Concepts of engineering ethics are presented. Students participate in a design project that involves an oral presentation and written report. Prereq: CHEM 404, CEE 650, CEE 520; or permission. Writing intensive.

Attributes: Writing Intensive Course**Equivalent(s):** ENCV 645, ENE 645**Grade Mode:** Letter Grading**CEE #626 - Field Experience****Credits:** 1

Based on appropriate career-oriented work experience in environmental engineering. Student can get one credit for field experience. A written final report is required as well as permission of student's adviser.

Equivalent(s): ENCV 696, ENE 696**Grade Mode:** Letter Grading**CEE #627 - Internship****Credits:** 2

Off-campus work in the environmental engineering field for on-the-job skill development. Needs to be supervised by an environmental engineering faculty member; and a proposal for the internship must be submitted and have permission of the ENE faculty prior to the start of the internship. Prereq: permission. IA (continuous grading).

Equivalent(s): ENCV 697, ENE 697**Grade Mode:** Letter Grading**CEE 635 - Engineering Materials****Credits:** 0 or 4

Structural properties and applications of the various materials used in civil engineering projects, including steel, cement, mineral aggregates, concrete, timber, and bituminous materials. Microstructure and properties of common metals, plastics, and ceramics. Prereq: CEE major or permission, CEE 501 or ME 526. Lab. Writing intensive.

Attributes: Writing Intensive Course**Equivalent(s):** CIE 622**Grade Mode:** Letter Grading**CEE 650 - Fluid Mechanics****Credits:** 0 or 4

Properties of fluids, fluid statics, continuity, momentum and energy equations, resistance to flow, boundary layer theory, flow in open channels and piping systems, dimensional analysis, similitude, drag, and lift. Laboratory exercises on measurement of fluid properties, energy principles, flow resistance, discharge measurements, momentum, hydropower, groundwater flow, and settling of spheres. Prereq: PHYS 407, CEE Hydrology major; or permission. Lab. Writing intensive.

Attributes: Writing Intensive Course**Equivalent(s):** CIE 642**Grade Mode:** Letter Grading**CEE 665 - Soil Mechanics****Credits:** 0 or 4

Soil classification and physical properties. Permeability, compressibility, consolidation, and shearing resistance are related to the behavior of soils subjected to various loading conditions. Prereq: CEE 635, CEE 650, CEE major; or permission. Lab.

Equivalent(s): CIE 665**Grade Mode:** Letter Grading**CEE 680 - Classical Structural Analysis****Credits:** 3

Analytical stress and deflection analysis of determinate and indeterminate structures under static and moving loads by classical methods. Prereq: CEE 501, CEE major; or permission.

Equivalent(s): CIE 681**Grade Mode:** Letter Grading**CEE 700 - Building Information Modeling****Credits:** 3

Building Information Modeling (BIM) is the process of generating and managing project data during its life cycle by integrating 3D multidisciplinary drawings with dynamic scheduling and visualization. BIM provides a digital representation of project data to facilitate the exchange of information beyond the standard two dimensional plan set. This course introduces students to the fundamentals of model creation, scheduling, material take-offs, visualizations, and animations that improve the communication of information to potential clients. Pre- or Coreq: TECH 564. Open to CEE and EnvEngr.MunicipalProc majors only.

Equivalent(s): CIE 780**Grade Mode:** Letter Grading**CEE #702 - Issues in Engineering Practice and Management****Credits:** 3

Non-technical professional engineering topics including: participation in multidisciplinary teams, interpersonal and human resources skills, verbal and written communication skills, project management, marketing, ethics, professional licensure, professional liability, and contract administration. Prereq: seniors only; juniors with permission.

Equivalent(s): CIE 778**Grade Mode:** Letter Grading**CEE 703 - Site Design and Project Development****Credits:** 3

Provides an in-depth introduction to the various design activities undertaken for Land Development (Site Design) projects. Investigates aspects of site design: parking, grading, drainage, traffic, due diligence, permitting, cost estimating, and financing. Introduces concepts of Project Development process including project management, financing, delivery methods, design development, client relations, and construction administration. Course format will include lectures, guest presenters, and site visits. Grading based upon writing examination, assignments, group project, and professional development activities. Prereq: CEE 502/equiv, or permission required.

Equivalent(s): CIE 753**Grade Mode:** Letter Grading**CEE 704 - Transportation Eng & Planning****Credits:** 3

Fundamental relationships of traffic speed, density, and flow applied to public and private modes of transport. Principles of demand forecasting and urban systems planning. Prereq: permission.

Equivalent(s): CIE 751, CIE 754**Grade Mode:** Letter Grading

CEE 705 - Introduction to Sustainable Engineering**Credits:** 3

This course begins with exploration of the precept that we live in, and must design engineering works for, a world with a finite supply of natural resources and with limited life support capacity. Tools for sustainability engineering are the focus of the course, which includes life cycle analysis and life cycle impact analysis, the metrics and mass and energy flow analyses used in the field of industrial ecology, and environmental management systems.

Grade Mode: Letter Grading**CEE 706 - Environmental Life Cycle Assessment****Credits:** 3

This course teaches knowledge and hands-on-skills in conducting environmental life cycle assessment (LCA), which is a widely used technique by industries, academics, and governments. Students will learn to use popular LCA software (e.g. SimaPro), apply proper LCA techniques, critically analyze LCA results, and provide client-oriented suggestions during this course. Class time is primarily devoted to a combination of lectures and computer labs.

Grade Mode: Letter Grading**CEE 719 - Green Building Design****Credits:** 3

This course gives an overview of green designs and sustainable practices in building construction. We will cover technical topics and requirements of a nationally recognized rating system (LEED), with a specific focus on Green Building Design and Construction. Students are introduced to basic building designs and systems related to sustainability. Additionally, they learn about green design topics such as site plans, water and energy efficiency, material and resources usage, environmental quality and renewable energy source. As an outcome of the course, students are able to assess and incorporate green technologies and designs into building projects.

Equivalent(s): CIE 781**Grade Mode:** Letter Grading**CEE 720 - Solid and Hazardous Waste Engineering****Credits:** 3

A thorough examination of the problems that exist in hazardous and solid waste management are presented in terms of the current regulations and engineering approaches used to develop solutions. Topics include risk-based decision making, transport and fate of contaminants, and the fundamental physical, chemical, and biological concepts, which make up the basis for technological solutions to these waste management problems. Case studies are used throughout the course to highlight key concepts and provide real-world examples.

Equivalent(s): ENCV 742, ENE 742**Grade Mode:** Letter Grading**CEE 721 - Environmental Sampling and Analysis****Credits:** 4

Theory of analytical and sampling techniques used in environmental engineering. Topics include potentiometry, spectroscopy, chromatography, automated analysis, quality control, sampling design, and collection methods. Methods discussed in lecture are demonstrated in labs. Prereq: CHEM 404 and CEE 620 or permission. Lab.

Equivalent(s): CEE 721W, ENCV 643, ENE 643, ENE 743, ENE 743W**Grade Mode:** Letter Grading**CEE 722 - Introduction to Marine Pollution and Control****Credits:** 4

Introduces the sources, effects, and control of pollutants in the marine environment. Dynamic and kinetic modeling; ocean disposal of on-shore wastes, shipboard wastes, solid wastes, dredge spoils, and radioactive wastes; and oil spills. Prereq: CEE 620 or permission.

Equivalent(s): ENCV 747, ENE 747**Grade Mode:** Letter Grading**CEE 723 - Environmental Water Chemistry****Credits:** 4

Emphasizes the use of chemical equilibrium principles and theory, calculations, and applications of ionic equilibrium stresses. Topics include thermodynamics, kinetics, acid/base, complexation, precipitation/dissolution, and redox equilibria. Computer equilibrium modeling is presented. Prereq: CHEM 404 or CHEM 405.

Equivalent(s): ENCV 749, ENE 749**Grade Mode:** Letter Grading**CEE 724 - Environmental Engineering Microbiology****Credits:** 4

Concepts of environmental engineering microbiology. Topics include taxonomy of species important in environmental engineering processes; microbial metabolism, interaction, and growth kinetics in environmental treatment processes; biogeochemical cycling in water; and effects of environmental parameters on environmental engineering microbial processes. Laboratories focus on microbiological methods and laboratory-scale biological treatment experiments. Prereq: CEE 520 and CEE 650 or permission. Lab. Writing intensive.

Attributes: Writing Intensive Course**Equivalent(s):** ENCV 656, ENE 656, ENE 756**Grade Mode:** Letter Grading**CEE 730 - Public Health Engineering for Rural and Developing Communities****Credits:** 3

The application of environmental health engineering and sanitation principles in disease prevention and control are discussed. Special emphasis is given to areas of the world where communicable and related diseases have not yet been brought under control and to what can happen in more advanced countries when basic sanitary safeguards are relaxed. The following topics are covered: water-related diseases to include their transmission and control; safe water development, treatment, distribution and storage; and on-site wastewater treatment and disposal system.

Equivalent(s): ENCV 740, ENE 740**Grade Mode:** Letter Grading**CEE 731 - Advanced Water Treatment Processes****Credits:** 4

The primary objective of this course is to provide the environmental engineer with an overview of physical-chemical and biological unit water treatment processes. Major emphasis is placed on the analysis and design of both conventional and advanced water treatment unit processes/operations.

Equivalent(s): ENCV 744, ENE 744**Grade Mode:** Letter Grading

CEE 732 - Solid and Hazardous Waste Design**Credits:** 4

Selection, design, and evaluation of unit processes employed in the treatment of solid wastes and hazardous wastes will be studied. Topics include design of materials recovery facilities, landfills, waste-to-energy facilities and hazardous waste site remedial technologies. A group term project taken from a real-world project will be required. An oral presentation by the group and preparation of a final written engineering report including alternative evaluation, permits, scheduling and economic analysis will be required from each group. Prereq: CEE 720 or permission. Writing intensive.

Attributes: Writing Intensive Course**Equivalent(s):** ENCV 748, ENE 748**Grade Mode:** Letter Grading**CEE 733 - Public Infrastructure Asset Management****Credits:** 4

The course provides a thorough examination of the growing engineering field of Public Infrastructure Assess Management (IAM). The course enables the student to design an IAM system. It touches upon all types of public infrastructure with a particular focus on water infrastructure for the semester design project. Students build upon their engineering economics and project engineering skills and use simple IAM software along with GIS applications. Practice leaders from the industry provide guest lectures throughout the semester. A focus on triple bottom line or the Societal, Environmental and Economic aspects of IAM are included. The format is a modified team base design learning experience providing practice in processing of technical lecture material, personal performance evaluation (frequent quizzes) and team based performance evaluation. Student groups will present their design to the class and provide a written engineering report. Pre- or Coreq: CEE 502 and CEE 620.

Equivalent(s): ENE 739**Grade Mode:** Letter Grading**CEE #734 - Bioenvironmental Engineering Design****Credits:** 4

Selection, design, and evaluation of unit processes employed in biological treatment of waters, wastewaters, and hazardous wastes. Preparation of engineering reports, including developing design alternatives and economic analysis, is required. Prereq: CEE 620 and CEE 724 or permission. Writing intensive.

Attributes: Writing Intensive Course**Equivalent(s):** ENCV 746, ENE 746**Grade Mode:** Letter Grading**CEE 735 - Properties and Production of Concrete****Credits:** 3

Basic properties of hydraulic cements and mineral aggregates, and their interactions in the properties of plastic and hardened concrete; modifications through admixtures; production handling and placement problems; specifications; quality control and acceptance testing; lightweight, heavyweight, and other special concretes. Prereq: CEE 635 or permission.

Equivalent(s): CIE 722**Grade Mode:** Letter Grading**CEE 736 - Asphalt Mixtures and Construction****Credits:** 3

Specification of asphalt cements, aggregates and proportioning of mixture constituents for paving applications. Asphalt mixture design methods, production, construction, and quality control are discussed. Current new material production and construction technologies are introduced. Prereq: CEE 635.

Equivalent(s): CIE 723**Grade Mode:** Letter Grading**CEE 737 - Pavement Rehabilitation, Maintenance, and Management****Credits:** 3

This course covers the technical and financial strategies to extend the life of highway and airfield pavements. The course topics will include: Assessment of pavement functional and structural condition, suitability of pavement maintenance and repair techniques, use of pavement preservation processes, and application of asset management to extend the life of pavement infrastructure. Prereq: CEE 635.

Grade Mode: Letter Grading**CEE 748 - Pavement Design Project****Credits:** 1

Semester long design project accompanying CEE 749 Pavement Design Analysis. The design project will require weekly meetings (either online or in person) for the duration of the semester. Meeting times will be arranged based on student schedules. This course, in combination with the 3-credit CEE 749 Pavement Design Analysis, will satisfy a senior level materials principal design elective in the CEE department.

Co-requisite: CEE 749**Grade Mode:** Letter Grading**CEE 749 - Pavement Design and Analysis****Credits:** 3

Introduction to flexible and rigid pavement design and analysis for highways and airports. Examines design inputs, materials, analysis methods, design tools, and maintenance treatments. This course satisfies a senior level materials design elective in the CEE department. This course, in combination with the 1-credit CEE 748 Pavement Design Project, will satisfy a senior level materials principal design elective in the CEE department. Prereq: CEE 635 and CEE 665.

Equivalent(s): CIE 721**Grade Mode:** Letter Grading**CEE #750 - Ecohydrology****Credits:** 3

Introduction to ecohydrological concepts in terrestrial and riverine systems. Topics include the historical practices, resource management impacts, hydrologic variability, and the relationships among water and ecology, vegetation, biology, geomorphology, and water quality. Prereq: CEE 754 or ESCI 705 or permission.

Equivalent(s): CIE 750**Grade Mode:** Letter Grading**CEE 751 - Open Channel Flow****Credits:** 3

Energy and momentum principles in open channel flow; flow resistance; channel controls and transitions; unsteady flow concepts and dam failure studies. Modeling with HEC programs. Prereq: CEE 650 or permission.

Equivalent(s): CIE 741**Grade Mode:** Letter Grading

CEE 753 - Snow Hydrology**Credits:** 3

Snow is a significant component of the hydrologic cycle in high latitude and high elevation environments. It is also a part of engineering design and practice that is frequently overlooked. In this course, we will examine spatial controls on snow accumulation and the dynamics of snowmelt processes through readings in snow hydrology, field assays of snow distribution, and analytical exercises. Of particular interest will be the role of snow in water resource engineering.

Prerequisite(s): CEE 650 with a minimum grade of D- and (MATH 539 with a minimum grade of D- or MATH 644 with a minimum grade of D-).

Grade Mode: Letter Grading**CEE 754 - Engineering Hydrology****Credits:** 3

Hydrologic cycle, probability theory related to hydrology and the design of water resources structures, water law, flood discharge prediction, hydrograph development, hydraulic and hydrologic river routing, reservoir routing, theory of storage, reservoir operations, hydropower development, modeling of watershed hydrology with program HEC-1, HEC-HMS, multipurpose projects.

Equivalent(s): CIE 745**Grade Mode:** Letter Grading**CEE 755 - Design of Pressurized Water Transmission Systems****Credits:** 4

Theory developed for individual components to large complex systems. Analysis and designs of components and systems. Topics include: steady and unsteady closed conduit flow, valves and meters, pump requirements, pump selection, system planning and layout, water hammer, and system operation and maintenance. Pressure system modeling with program EPANET. Prereq: CEE 650 or permission.

Equivalent(s): CIE 755**Grade Mode:** Letter Grading**CEE #757 - Coastal Engineering and Processes****Credits:** 3

Introduction to small amplitude and finite amplitude wave theories. Wave forecasting by significant wave and wave spectrum method. Coastal processes and shoreline protection. Wave forces and wave-structure interaction. Design of coastal structures. Introduction to mathematical and physical modeling. Prereq: CEE 650 or permission.

Equivalent(s): CIE 757, ME #757, OE 757**Grade Mode:** Letter Grading**CEE 758 - Stormwater Management Designs****Credits:** 3

Historic review of stormwater management leading up to the current regulatory framework. Overview of stormwater management strategies, strategy selection, and the targeting of specific contaminants, contaminant removal efficiencies, construction and site selection, and system maintenance. Hydrologic concepts including watershed and storm characteristics, design hydrology (peak flows, storm and treatment volumes), hydrograph routing, and critical review of hydrology and drainage reports. Design and sizing of treatment systems including: conventional, BMPs, low impact development, and manufactured devices. Rainfall runoff calculations with US SCS TR55 model. Prereq: CEE 650 or permission.

Equivalent(s): CIE 758**Grade Mode:** Letter Grading**CEE 759 - Stream Restoration****Credits:** 4

The assessment, planning, design, engineering, and monitoring of stream and watershed practices intended to protect and restore the quality and quantity of flowing surface waters and stream corridors. Lecture material covers hydrology, geomorphology, and ecosystems, with the intent of understanding the variables associated with stream systems and their interplay. Students measure field variables and then are challenged with actual designs. Examples of stream restoration issues include: in-stream flow, dam removal, induced recharge, improvements to fish habitat, and channel stabilization. Prereq: CEE 650.

Equivalent(s): CIE 759**Grade Mode:** Letter Grading**CEE 765 - Engineering Behavior of Soils****Credits:** 4

Review of stress and strain in soil. Introduction to continuum mechanics. Development of engineering soil properties. Application of soil mechanics to shear strength and stress-strain behaviors of soils. Failure states and residual strength. Application of stress paths in engineering problems. Unstaturated soil mechanics. Laboratory exercises using direct shear test, triaxial test, and soil-water retention measurements.

Equivalent(s): CIE 767**Grade Mode:** Letter Grading**CEE 766 - Introduction to Geotechnical Earthquake Engineering****Credits:** 3

Overviews earthquake source mechanisms; magnitude and intensity; seismicity of the United States. Dynamics of simple structures; response spectra. Selection of design parameters; source, magnitude, input records. Measurement of dynamic characteristics of soils; site response, liquefaction, and ground deformation. Prereq: CEE 778 or permission.

Equivalent(s): CIE 762**Grade Mode:** Letter Grading**CEE 767 - Geological Engineering****Credits:** 3

Functional classification of rocks and rock masses, stereographic projection, engineering properties of rocks, and rock mechanics. The influence of geology in the design of underground excavations, tunneling, foundations, and rock slope engineering. Prereq: ESCI 401 or permission.

Equivalent(s): CIE 763**Grade Mode:** Letter Grading**CEE 768 - Geo-Environmental Engineering****Credits:** 3

Soil composition and structure; hydrogeology; attenuation and contaminant transport; containment design including landfills, geo-synthetics for liners and covers, leachate collection systems, vertical cutoff walls and stability analyses; geo-environmental site characterization and investigation using geotechnical and geophysical methods; ground water, soil and gas monitoring and sampling; remediation including in situ and ex situ techniques and treatment methods. Prereq: CEE 665 or permission.

Equivalent(s): CIE 766**Grade Mode:** Letter Grading

CEE 778 - Foundation Design I**Credits:** 4

Foundation design based on subsurface investigation and characterization using current methods of laboratory and in situ testing. Use of consolidation theory and bearing capacity theory for the design of shallow foundations including footings and rafts. Basic design of pile foundations. Earth pressure theory applied to design of retaining walls. Slope stability theory and applications. Prereq: CEE 665 or permission.

Equivalent(s): CIE 760**Grade Mode:** Letter Grading**CEE 779 - Foundation Design II****Credits:** 3

Advanced pile and pier design under vertical and lateral loads. Slope stability by circular and noncircular arc methods. Design of flexible bulkhead walls and mechanically stabilized walls. Excavation and dewatering. Soil and site improvement. Prereq: CEE 778 or permission.

Equivalent(s): CIE 761**Grade Mode:** Letter Grading**CEE 780 - Matrix Structural Analysis and Modeling****Credits:** 3

Modeling and analysis of determinate and indeterminate structures by matrix computer methods. Creation of matrix elements using compatibility, equilibrium, and constitutive relationships. Plane trusses, beams, frames, and space trusses. Prereq: CEE 680 or permission.

Equivalent(s): CIE 685, CIE 783**Grade Mode:** Letter Grading**CEE 781 - Dynamics of Structures****Credits:** 3

Dynamics of single- and multi-story buildings. Response due to earthquakes, blasting, traffic, and mechanical equipment. Analysis in the time domain and through the Fourier Transform. Fundamentals of structural vibration measurement. Prereq: CEE 780, permission.

Equivalent(s): CIE 787**Grade Mode:** Letter Grading**CEE 789 - Timber Design****Credits:** 3

Introduces the design of timber structures. Structural properties of wood, determination of horizontal and vertical loads, horizontal and vertical load-resisting systems, and design of horizontal diaphragms, shear walls, beams, and columns. Bolted, screwed, and nailed connections. Prereq: CEE 680 or permission.

Equivalent(s): CIE 782**Grade Mode:** Letter Grading**CEE 790 - Structural Design in Masonry****Credits:** 3

Introduces the design of reinforced masonry structural members by the stress and strength method and considering deflection and other serviceability performance criteria. Includes development of wind and seismic load, curtain wall, shear wall, lintels and columns. Prereq: CEE 635, CEE 680; or permission.

Equivalent(s): CIE 776**Grade Mode:** Letter Grading**CEE 791 - Reinforced Concrete Design****Credits:** 0 or 4

Introduces the design of reinforced concrete structural members by the strength method and considering deflection performance. Includes loads, approximate analyses, slabs, beams, and columns. Prereq: CEE 635, CEE 680; or permission.

Equivalent(s): CIE 774**Grade Mode:** Letter Grading**CEE 792 - Pre-stressed Concrete****Credits:** 3

Analysis and design of prestressed and post-tensioned concrete sections in flexure and shear. Strength, deflection, and losses in flexural members. Optimization of section and prestressing force selection. Prereq: CEE 791 or permission.

Equivalent(s): CIE 791**Grade Mode:** Letter Grading**CEE 793 - Structural Design in Steel****Credits:** 4

Introduction to steel member design, including horizontal and vertical members for design and analysis of buildings. Examines design inputs, material choice, analysis methods and design and construction methodologies. Prereq: CEE 635 and CEE 680.

Equivalent(s): CIE 793**Grade Mode:** Letter Grading**CEE 794 - Bridge Design****Credits:** 3

Analysis of two-span, continuous, slab and beam bridges using the AASHTO LRFD Bridge Design Specifications. Use of influence lines, load distribution, load factoring, deck design, analysis and design of composite beams and plate girders. Bridge aesthetics. Prereq: CEE 791. Pre- or Coreq: CEE 793.

Equivalent(s): CIE 792**Grade Mode:** Letter Grading**CEE 795 - Independent Study****Credits:** 1-4

Seniors in good standing may pursue independent studies under faculty guidance. A written culminating report is required. Prereq: permission.

Repeat Rule: May be repeated up to unlimited times.**Equivalent(s):** CIE 795**Grade Mode:** Letter Grading**CEE 796 - Special Topics****Credits:** 1-4

Advanced or specialized topics not normally covered in regular course offerings. May be repeated, but not in duplicate areas. Prereq: permission.

Repeat Rule: May be repeated up to unlimited times.**Equivalent(s):** CIE 795**Grade Mode:** Letter Grading**CEE 797 - Introduction to Project Planning and Design****Credits:** 2

Part one of a two-part sequence. Student groups develop a project statement to address a large-scale civil engineering system design. Each team prepares a project plan to be executed in CEE 798, part two of this sequence.

Equivalent(s): CIE 784**Grade Mode:** Letter Grading

CEE 798 - Project Planning and Design**Credits:** 2

Student groups are formed into design teams to prepare a design plan for a large-scale civil engineering system including consideration of budgetary constraints, building code criteria, and environmental impacts. Each team prepares a final written report and gives a formal presentation.

Prereq: CEE 797; Civil Engineering and EnvEngr: Civil Engr majors only.

Attributes: Writing Intensive Course

Equivalent(s): CIE 682, CIE 788

Grade Mode: Letter Grading

CEE 799H - Senior Honors Thesis**Credits:** 4

Students in the honors program in civil engineering complete a project under the direction of a faculty sponsor resulting in a written thesis which must be accepted by the sponsor by the end of the second semester, senior year. Four credits total during senior year; 3 of which may be used to fulfill a CEE non-design elective.

Attributes: Honors course

Equivalent(s): CIE 799H

Grade Mode: Letter Grading