

CIVIL ENGINEERING (CVEN)

CVEN 1201 Introduction to Civil Engineering 2 Credits

Department: College of Engineering

This is a project-based introductory course in engineering that focuses specifically on the civil engineering discipline. Students in this course will conduct a variety of team-based projects that will explore some of the physical phenomenon and design concepts in civil engineering systems. Design concepts will also be covered and physically implemented with the use of AutoCAD and a 3D printer. In addition, the students will be introduced to technical communication including reports, presentations and posters. The course will also introduce students to Microsoft Excel and MATLAB.

Prerequisite(s)/Corequisite(s): MATH 2413

Grade Mode(s): Standard Letter, Registrar do not use FN, Registrar do not use FS

CVEN 2301 Statics 3 Credits

Department: College of Engineering

Statics of particles and rigid bodies. Use is made of basic physics, calculus and vector algebra.

Prerequisite(s): PHYS 2425

Grade Mode(s): Standard Letter, Registrar do not use FN, Registrar do not use FS

CVEN 2320 Diff Equations for Civil Eng 3 Credits

Department: College of Engineering

The study of linear differential equations of single and multiple variables as well as their solutions as they apply to Civil Engineering topics. Introduction to systems of linear differential equations and the use of modern computing tools to analytically and numerically solve the differential equations.

Prerequisite(s): MATH 2414

Grade Mode(s): Standard Letter, Registrar do not use FN, Registrar do not use FS

CVEN 2370 Intro to CAD and Surveying 3 Credits

Department: College of Engineering

This introductory course is aimed at covering fundamental design concepts of AutoCAD as it relates to civil/construction engineering and the basic principles of surveying. The AutoCAD portion of the course will be aimed at introducing civil/construction plans, comprehending scale, understanding the basic operation of AutoCAD software and 2D drawing skills for civil engineering systems. The surveying portion will cover introduction to surveying, basic surveying measurements and vertical distance measurements.

Prerequisite(s)/Corequisite(s): MATH 2413

Grade Mode(s): Standard Letter, Registrar do not use FN, Registrar do not use FS

CVEN 2372 Mechanics of Solids 3 Credits

Department: College of Engineering

Effect of loads on deformable bodies, Uniaxial and biaxial stress-strain relationships and Indeterminate systems. Study of stresses due to axial, torsional and bending effects. Bucking of columns. Introduction to design.

Prerequisite(s): CVEN 2301

Grade Mode(s): Standard Letter, Registrar do not use FN, Registrar do not use FS

CVEN 3290 Engineering Probability and Statistics 2 Credits

Department: College of Engineering

Principles of systems analysis utilized for solving civil engineering problems. Application of probability, statistics, and regression analysis to the engineering design process. Specific examples in civil engineering taken under consideration. Course title and description may vary when taught as a CE Elective.

Prerequisite(s): MATH 2413

Grade Mode(s): Standard Letter, Registrar do not use FN, Registrar do not use FS

CVEN 3300 Engineering Materials Systems 3 Credits

Department: College of Engineering

Engineering Material Systems covers basic principles in materials science with a focus on civil engineering materials. topics covered in this course include mechanical and physical properties of steel, aluminum, aggregate, cement and concrete, asphalt, timber and composite materials. Students will be required to conduct laboratory experiments which include the quantification of the elastic modulus and toughness of hot-rolled steel, cold formed steel and aluminum; fine and coarse aggregate gradation; absorption capacity, bulk-specific gravity; and the characterization of fresh and hardened concrete properties. Students will also complete a broad open-ended engineering design project encompassing structural analysis software, ASCE 7-10, ASTM D3737 and NDS 2015 specifications.

Prerequisite(s): CVEN 2372

Grade Mode(s): Standard Letter, Registrar do not use FN, Registrar do not use FS

CVEN 3311 Introduction to Environmental Engineering 3 Credits

Department: College of Engineering

In introduction to Environmental Engineering the laws of conservation of mass and energy and simple models are used to derive formulae and solve basic problems as they relate to the impact of pollutants on the environment, air and water quality.

Prerequisite(s): CHEM 1311 and MATH 2413

Grade Mode(s): Standard Letter, Registrar do not use FN, Registrar do not use FS

CVEN 3340 Structural Analysis 3 Credits

Department: College of Engineering

Analysis of loading for bridges and buildings. Effects of moving loads using influence lines. Shear and bending moment diagrams. Analysis of indeterminate structures. Introduction to structural design. Investigation of frames, girders and bents.

Prerequisite(s): CVEN 2372

Grade Mode(s): Standard Letter, Registrar do not use FN, Registrar do not use FS

CVEN 3351 Fluid Mechanics 3 Credits

Department: College of Engineering

This course introduces the students to the fascinating field of fluid mechanics. Fluid mechanics examines the behavior of fluids, both liquids and gases, at rest and in motion (dynamics). This examination will rely on Newton's laws of motion, as well as the fundamental thermodynamic principles and the conservation of mass and energy. This course covers topics including fluid statics, fundamentals of fluid motion, systems and control volumes, basic laws of fluid flow, flow characteristics of closed conduits, friction and drag studies, similitude and dimensional analysis.

Prerequisite(s): MEEN 2302

Grade Mode(s): Standard Letter, Registrar do not use FN, Registrar do not use FS

CVEN 3360 Engineering Hydrology 3 Credits**Department:** College of Engineering

Precipitation, surface water, infiltration, and sub-surface water. Analysis of rainfall and runoff data. Collection studies. Hydraulics of wells. Net storm rain; peak discharge and flood runoff.

Prerequisite(s)/Corequisite(s): MEEN 2302**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**CVEN 3370 Water & Wastewater Treatment 3 Credits****Department:** College of Engineering

General survey of environmental engineering covering water supply and sanitary sewerage treatment systems. Design of drinking water and wastewater treatment facilities.

Prerequisite(s): (CVEN 3310 or CVEN 3311) and (CVEN 3350 or CVEN 3351)**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**CVEN 3390 Geo-technical Engineering 3 Credits****Department:** College of Engineering

Basic principles of soil behavior under load. Soil properties and classification. Study of hydraulics as applied to soil mechanics.

Prerequisite(s): CVEN 2372**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**CVEN 4110 Seminar 1 Credit****Department:** College of Engineering

Discussion of ethical, professional, and technical topics related to the practice of civil engineering. Presentation of oral and written reports.

Restriction(s):

Enrollment limited to students with a class of Senior.

Grade Mode(s): Standard Letter, Registrar do not use FN, Registrar do not use FS**CVEN 4212 Civil Engineering Systems Design Project 2 Credits****Department:** College of Engineering

The first course of two senior design project courses providing a major design experience before graduation. Topics include project planning, conceptual design, data collection and code interpretation of a civil engineering project in a term environment. Application of civil engineering principles in a selected civil engineering field. Development of project proposals.

Prerequisite(s): (CVEN 3300 and CVEN 3311 and CVEN 3340 and CVEN 3351) or (CVEN 3300 and CVEN 3311 and CVEN 3340 and CVEN 3390) or (CVEN 3300 and CVEN 3311 and CVEN 3351 and CVEN 3390) or (CVEN 3300 and CVEN 3340 and CVEN 3351 and CVEN 3390) or (CVEN 3311 and CVEN 3340 and CVEN 3351 and CVEN 3390)**Corequisite(s):** CVEN 4380**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**CVEN 4312 Civil Engineering System Design Project (I) 3 Credits****Department:** College of Engineering

The first course of two senior design project courses providing a major design experience before graduation. Topics include project planning, conceptual design, data collection and code interpretation of a civil engineering project in a term environment. Application of civil engineering principles in a selected civil engineering field. Development of project proposals.

Prerequisite(s): (CVEN 3300 and CVEN 3311 and CVEN 3340 and CVEN 3351) or (CVEN 3300 and CVEN 3311 and CVEN 3340 and CVEN 3390) or (CVEN 3300 and CVEN 3311 and CVEN 3351 and CVEN 3390) or (CVEN 3300 and CVEN 3340 and CVEN 3351 and CVEN 3390) or (CVEN 3311 and CVEN 3340 and CVEN 3351 and CVEN 3390)**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**CVEN 4313 Civil Engineering System Design Project (II) 3 Credits****Department:** College of Engineering

The second of two senior design project courses providing a major design experience which is to provide senior students the experience of performing comprehensive designs to address the needs of a realistic civil engineering project. This process includes the identification of the engineering goal, scoping and planning of the project, evaluation of viable alternatives, design of engineering components, cost analysis and assessment of social & environmental impacts. Topics include enhanced design process, application of specialty software, material selection, economical evaluation, and technical communication with professionals. Written preparation and oral presentation of the final project report is required.

Prerequisite(s): (CVEN 3300 and CVEN 3311 and CVEN 3340 and CVEN 3351) or (CVEN 3300 and CVEN 3311 and CVEN 3340 and CVEN 3390) or (CVEN 3300 and CVEN 3311 and CVEN 3351 and CVEN 3390) or (CVEN 3300 and CVEN 3340 and CVEN 3351 and CVEN 3390) or (CVEN 3311 and CVEN 3340 and CVEN 3351 and CVEN 3390)**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**CVEN 4320 Engineering Project Management 3 Credits****Department:** College of Engineering

Principles governing the effective and efficient management of engineering projects including the application of comprehensive planning, scheduling, and cost estimation procedures. Presentation of oral and written design reports.

Restriction(s):

Enrollment limited to students with a class of Senior.

Grade Mode(s): Standard Letter, Registrar do not use FN, Registrar do not use FS**CVEN 4340 Foundation Engineering 3 Credits****Department:** College of Engineering

The practice of geotechnical engineering: subsurface explorations; geotechnical analysis and design of shallow footings, deep foundations, and retaining structures; stability of earth slopes, and soil improvement.

Prerequisite(s): CVEN 3390**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS

CVEN 4350 Hydraulic Engineering 3 Credits**Department:** College of Engineering

Continuation of CVEN 3350-Hydraulics I emphasizing practical design applications of basic fluid mechanics principles in fluid measurement, machinery, closed conduit flow, open channel flow and hydraulic transients. Presentation of oral and written design reports.

Prerequisite(s): CVEN 3350 or CVEN 3351**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**CVEN 4365 Introduction to Transportation Engineering 3 Credits****Department:** College of Engineering

An introduction to the principles of transportation engineering with focus on highway engineering and traffic analysis. this course covers fundamental concepts and principles that guide road design as well as movement and control of vehicular traffic; specifically, geometric design, traffic control theory, highway capacity analysis, and traffic signal operations.

Prerequisite(s)/Corequisite(s): CVEN 3290 or MATH 3370**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**CVEN 4370 Computer Aided Design 3 Credits****Department:** College of Engineering

Introduction of graphical computer-aided techniques to design various civil engineering systems. It may include introduction of AutoCAD and MicroStation, and also introduction of geographical information system (GIS - ArcView or Arc/Info) to analyze spatial data for feasibility study. May be repeated for credit when subject matter varies.

May be Repeated for a maximum of 6 hours

Restriction(s):

Enrollment limited to students with a class of Junior, Post Baccalaureate or Senior.

Grade Mode(s): Standard Letter, Registrar do not use FN, Registrar do not use FS**CVEN 4375 GIS for Civil Engineers 3 Credits****Department:** College of Engineering

Introduce students to modern GIS and Geospatial analysis and demonstrate their use in civil engineering analysis and design. Students will utilize spatial datasets specific to civil engineering. Students will apply terrain, network and geostatistical methods using LiDAR, InSAR and other data from modern day sensors.

Prerequisite(s): CVEN 2320**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**CVEN 4380 Reinforced Concrete Design 3 Credits****Department:** College of Engineering

The design of structural concrete members based upon working stress and strength design methods. Study of standard specifications. Introduction to pre-stressed concrete.

Prerequisite(s): CVEN 3340**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**CVEN 4390 Structural Steel Design 3 Credits****Department:** College of Engineering

The design of buildings and bridge components according to standard specifications. Application of load and resistance factor and allowable stress design methods. Introduction to plastic design of steel structures.

Prerequisite(s): CVEN 3340**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**CVEN 5300 Advanced Structural Analysis 3 Credits****Department:** College of Engineering

Review for methods of statically indeterminate structural analysis including constant deformation, slope deflection and moment distribution; introduction of stiffness and flexibility methods using matrix algebra, theories of arches, cables, cylindrical structures using classical and energy methods.

Restriction(s):Undergraduate level students may **not** enroll.**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**CVEN 5301 Special Topics 3 Credits****Department:** College of Engineering

An investigation into specialized study in advanced areas of engineering under guidance of a faculty member. This course may be repeated for credit when topics of investigation differ.

May be Repeated for a maximum of 12 hours

Restriction(s):Undergraduate level students may **not** enroll.**Grade Mode(s):** Satisfactory/Unsatisfactory, Registrar do not use FN, Registrar do not use FS, Standard Letter**CVEN 5306 Computer Aided Design 3 Credits****Department:** College of Engineering

Offered: Other

Restriction(s):Undergraduate level students may **not** enroll.**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**CVEN 5307 Bridge Design 3 Credits****Department:** College of Engineering

The course is a graduate course on the design of bridge structures. It is intended for students who have completed basic indeterminate structural analysis and design of steel and reinforced concrete structures. The topics in this course include history, development and classification of bridges, use of AASHTO LRFD Specification for the design of superstructure and substructure of straight simple and continuous I-girder type bridges, rating of existing bridges and a full design of a bridge project.

Prerequisite(s): CVEN 4380 and CVEN 4390**Restriction(s):**Undergraduate level students may **not** enroll.**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS

CVEN 5309 Civil Engineering Fundamentals 3 Credits**Department:** College of Engineering

A review and preparation for the most recent NCEE Fundamentals of Engineering (FE) Exam specifications is offered in a classroom setting. Exam strategies will be illustrated using examples. The main topics for the review include engineering mathematics, statics, dynamics, fluids, heat transfer and mechanics of materials, hydraulics, transportation, environmental engineering and geotechnical engineering. A discussion of engineering licensure along with ethics will be included.

Restriction(s):Undergraduate level students may **not** enroll.**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**CVEN 5310 Advanced Concrete Design 3 Credits****Department:** College of Engineering

Analysis and design of concrete members based upon working stress and strength design methods. Consideration given to pre-stressing or post-stressing of beams and structural components. May be repeated for credit when the subject matter varies.

Restriction(s):Undergraduate level students may **not** enroll.**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**CVEN 5311 Advanced Structural Dynamics 3 Credits****Department:** College of Engineering

Structural dynamics is an upper level engineering course covering fundamental topics on the analysis of single and multiple degree of freedom civil engineering systems under dynamic loading, ground accelerations, and blast loadings. The formulation of the second order ordinary differential equation of motion will be discussed and a variety of mathematical techniques used to solve accelerating inertial systems will be discussed: some topics include Laplace and Fourier transforms, convolution integral, modal and spectral matrices, Rayleigh Ritz method, and the central difference method for numerical analysis. An introduction to spectral analysis and earthquake design will also be discussed, which includes concepts in pseudo acceleration and equivalent lateral design loads for base shear. Although this course focuses on structural engineering applications, the basic principles and techniques learned here can be applied to other types of vibrating systems: aerospace vehicles, satellites, vibrating machinery, etc.

Prerequisite(s): CVEN 5300**Restriction(s):**Undergraduate level students may **not** enroll.**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**CVEN 5318 Stress Analysis & Matl System 3 Credits****Department:** College of Engineering

A study of solid mechanics and/or building/hydraulic systems related to the performance of different materials such as soils, metals, timber, masonry, and composites under various loading conditions. Consideration of construction and environmental effects. Topics may include, if applicable, unsymmetrical sections, shear center, curved beams, torsion of noncircular cross sections, strain energy, virtual work, plasticity, fatigue, and introduction to the theory of elasticity.

Prerequisite(s): CVEN 2372 and CVEN 3340**Restriction(s):**Undergraduate level students may **not** enroll.**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**CVEN 5320 Engineering Project Management 3 Credits****Department:** College of Engineering

Principles governing the effective and efficient management of engineering projects including the application of comprehensive planning, scheduling, and cost estimation procedures. Presentation of oral and written design reports.

Restriction(s):Undergraduate level students may **not** enroll.**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**CVEN 5323 Advanced Steel Design 3 Credits****Department:** College of Engineering

Analysis and design of structural members using steel. Consideration is given to elastic and inelastic buckling in beams and columns due to local, flexural, torsional and torsional flexural action. May be repeated for credit when the subject matter varies.

Restriction(s):Undergraduate level students may **not** enroll.**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**CVEN 5324 Models in Hydrological Systems 3 Credits****Department:** College of Engineering

Analysis of basin hydrology, streamflow frequency, and water surface profiles, introduction to wave machines and hydrological transport processes including water quality simulation in hydrodynamic systems (oceans, estuaries, lakes/reservoirs, rivers/streams, storm water control facilities). May be repeated for credit when subject matter varies.

Restriction(s):Undergraduate level students may **not** enroll.**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS

CVEN 5325 Fundamentals of Air Pollution 3 Credits**Department:** College of Engineering

Pollutant sources, emissions and transport. Air pollution control methods. Particulate collection theory, gaseous pollutant removal theory. Atmospheric sampling and analysis methods. May be repeated for credit when the subject matter varies.

Restriction(s):Undergraduate level students may **not** enroll.**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**CVEN 5326 Hydrologic Analysis 3 Credits****Department:** College of Engineering

Overview of hydrological models, hydrological design and hydrodynamic processes in bodies of water (rivers/streams, oceans, estuaries, inland lakes, and reservoirs); energy and momentum transfer through a water surface; standing or progressive waves; salt water and fresh water interaction; wind effects of stratification and circulations; analysis of stratified flow and density currents; selective withdrawal; turbulent wind mixing. Consideration of environmental effects. May be repeated for credit when the subject matter varies.

Restriction(s):Undergraduate level students may **not** enroll.**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**CVEN 5329 Water Supply & Treatment 3 Credits****Department:** College of Engineering

An investigation of the chemistry of water treatment processes including the study of treatment process selection and associated design parameters.

Restriction(s):Undergraduate level students may **not** enroll.**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**CVEN 5331 Biological Wastewater Treatment 3 Credits****Department:** College of Engineering

Principles of treatment for domestic and industrial wastewaters with emphasis on process kinetics and biological action.

Restriction(s):Undergraduate level students may **not** enroll.**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**CVEN 5332 Intro in Composite Structures 3 Credits****Department:** College of Engineering

Mechanics and technology of composite materials and applications of composites in structures. Structure-properties dependencies and design of composite materials. Stress and strength analysis and optimization for typical composite structures. Beams, plates and shells made from composites. Mechanics of effectively anisotropic bodies.

Restriction(s):Undergraduate level students may **not** enroll.**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**CVEN 5333 Advanced Pavement Analysis and Design 3 Credits****Department:** College of Engineering

This course covers topics on both the classical empirical and current mechanistic rigid and flexible pavement analysis methods which includes the AASHTO 1986/1993 design method and the mechanistic, the Asphalt Institute Method, and PavementME methods for both flexible and rigid pavements, respectively. Other relevant topics include traffic loading, pavement subgrade characterization, pavement evaluation, environmental effects, structural design of rigid and asphalt pavements, pavement rehabilitation and pavement economics.

Restriction(s):Students with a class of Freshman, Junior or Sophomore may **not** enroll.Undergraduate level students may **not** enroll.**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**CVEN 5334 Sustainability: Green Engineering 3 Credits****Department:** College of Engineering

This course focuses on the engineering concepts and environmental concerns important to sustainability engineering with a focus on the LEED green building rating system with topics on sustainable site selection, alternative transportation, heat island effect light pollution, water and energy efficiency/use, regional and global climate/air issues, use/reuse of many materials and resources and indoor environmental quality.

Restriction(s):Undergraduate level students may **not** enroll.

Enrollment limited to students in the College of Engineering college.

Grade Mode(s): Standard Letter, Registrar do not use FN, Registrar do not use FS**CVEN 5335 Engineering with Nature: Interdisciplinary 3 Credits****Department:** College of Engineering

This course will introduce and broaden students' horizons to the overall concept of Engineering with Nature (EwN) as being developed and implemented by the US Army Corps of Engineers (USACE). The USACE defines EwN as the intentional alignment of natural and engineering processes to efficiently and sustainably deliver economic, environmental and social benefits through collaboration.

Restriction(s):Undergraduate level students may **not** enroll.**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS

CVEN 5336 Engineering With Nature: Ecology 3 Credits**Department:** College of Engineering

The US Army corps of Engineers defines Engineering with Nature (EwN) as the intentional alignment of natural and engineering processes to efficiently and sustainably deliver economic, environmental and social benefits through collaboration. Engineering with Nature Ecology provides an in-depth view into the ecological processes and implications for this interdisciplinary field.

Restriction(s):Undergraduate level students may **not** enroll.**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**CVEN 5337 Engineering With Nature: Engineering 3 Credits****Department:** College of Engineering

the US Army Corps of Engineers defines Engineering with Nature (EwN) as the intentional alignment of natural and engineering processes to efficiently and sustainably deliver economic, environmental and social benefits through collaboration. Engineering with Nature Engineering provides an in-depth view into the hydrological processes and other coastal engineering principals for this interdisciplinary field.

Restriction(s):Undergraduate level students may **not** enroll.**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**CVEN 5338 Solid Waste Management 3 Credits****Department:** College of Engineering

A study of solid waste collection, transfer and disposal systems. Investigation of the reclamation of resources by multiple use, reuse and improvement of existing sources to meet quality requirements.

Restriction(s):Undergraduate level students may **not** enroll.**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**CVEN 5339 Engineering with Nature: Dredging Practices 3 Credits****Department:** College of Engineering

The US Army Corps of Engineers defines Engineering with Nature (EwN) as the intentional alignment of natural and engineering processes to efficiently and sustainably deliver economic, environmental and social benefits through collaboration. Engineering with Nature: Dredging Practices provides an in-depth understanding of dredging operations and dredged material management. It covers beneficial uses and thin-layer placement of dredged sediment; focusing particular attention to the role of sustainable maritime infrastructure.

Restriction(s):Undergraduate level students may **not** enroll.**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**CVEN 5340 Foundation Engineering 3 Credits****Department:** College of Engineering

The practice of geotechnical engineering: subsurface explorations; geotechnical analysis and design of shallow footings, deep foundations, and retaining structures; stability of earth slopes, and soil improvement.

Restriction(s):Undergraduate level students may **not** enroll.**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**CVEN 5343 Industrial Waste Treatment 3 Credits****Department:** College of Engineering

Procedures for analysis of the industrial waste problem, methods of collecting experimental data and process design for required treatment. Case studies and special laboratory problems for translating experimental data to prototype design. May be repeated for credit when the subject matter varies.

Restriction(s):Undergraduate level students may **not** enroll.**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**CVEN 5350 Hydraulic Engineering Systems 3 Credits****Department:** College of Engineering

Continuation of CVEN 3350Hydraulics I emphasizing practical design applications of basic fluid mechanics principles in fluid measurement, machinery, closed conduit flow, open channel flow and hydraulic transients. Presentation of oral and written design reports.

Restriction(s):Undergraduate level students may **not** enroll.**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**CVEN 5351 Unit Oper Environmental Engr 3 Credits****Department:** College of Engineering

Theory of fluid and slurry movement under gravity and pressure systems, mixing processes, coagulation and flocculation of chemical treatment, separatory processes including flotation and sedimentation, and gas transfer and absorption of the biological systems. Selected laboratory assignments for model studies of these unit operations.

Restriction(s):Undergraduate level students may **not** enroll.**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS

CVEN 5364 Transportation Engineering & Traffic Analysis 3 Credits**Department:** College of Engineering

Introduce students to the principles of transportation engineering with a focus on highway engineering and traffic analysis. The course covers fundamental concepts and principles that guide road design, as well as the movement and control of vehicular traffic. Specifically, these include geometric design, traffic flow theory, highway capacity analysis, traffic signal operations and travel demand and forecasting.

Restriction(s):Undergraduate level students may **not** enroll.**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**CVEN 5366 Travel Demand Analysis 3 Credits****Department:** College of Engineering

This course introduces foundations of travel demand analysis, including theory and practices. It describes the statistical concepts used for estimation, provides a complete description of the theoretical and practical bases for disaggregate models, and shows how these models can be used in travel demand forecasting. The class also synthesizes and illustrates state-of-the-art applications of the most significant developments in travel demand modeling. The major topics covered in this class are: fundamentals of transportation systems analysis, theoretical aspects of travel demand, travel behavior, modeling of performance characteristics and costs of transportation modes, development of travel choice models including mode, route and destination choice, and equilibrium.

Restriction(s):Undergraduate level students may **not** enroll.**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**CVEN 5370 GIS Applications in Engineering 3 Credits****Department:** College of Engineering

This course aims to help students: 1. Understand the theory of relational database 2. Understand and operate a database through the structured query language (SQL) 3. Understand the basic theory of geographic information systems (GIS) 4. Learn how to use ArcGIS

Restriction(s):Undergraduate level students may **not** enroll.**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**CVEN 5381 Building Design/Construction 3 Credits****Department:** College of Engineering

Advanced topics in Building and/or Construction Systems. Topics may include the treatment of contaminated soils, and the effects of various static, dynamic, hydraulic, and wind loads on structural frames and foundations. Environmental, social, and safety requirements may be taken under consideration. Presentation of oral and written design reports. May be repeated for credit when topics vary.

Restriction(s):Undergraduate level students may **not** enroll.**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**CVEN 5387 Special Topics 3 Credits****Department:** College of Engineering

The course is designed to meet special needs of students. Each topic is offered on an irregular schedule as the demand requires. Sample topics include: (1) Kinetic theory of gases; (2) Transients in compressible flow; (3) Nonlinear vibrations; (4) Protective construction; (5) Transients in engineering systems; (6) Stagewise mass transfer; (7) Nuclear engineering; (8) Hybrid and analog computers; (9) Adaptive control; (10) Optimization techniques; (11) Sampling techniques.

May be Repeated for a maximum of 12 hours

Restriction(s):Undergraduate level students may **not** enroll.**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**CVEN 5398 Reinforced Concrete Design 3 Credits****Department:** College of Engineering

The design of structural concrete members based upon working stress and strength design methods. Study of standard specifications. Introduction to prestressed concrete.

Restriction(s):Undergraduate level students may **not** enroll.**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**CVEN 5399 Structural Steel Design 3 Credits****Department:** College of Engineering

The design of buildings and bridge components according to standard specifications. Application of load and resistance factor and allowable stress design methods. Introduction to plastic design of steel structures.

Restriction(s):Undergraduate level students may **not** enroll.**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS**CVEN 6110 Professional Seminar 1 Credit****Department:** College of Engineering

Advanced topics suitable for research along with research procedures will be discussed. Field study organization and content together with doctoral research problems and progress will be represented. Topics will vary each semester and course may be repeated for credit. Registration and completion for three semesters is required of all doctoral candidates.

Restriction(s):Undergraduate level students may **not** enroll.**Grade Mode(s):** Standard Letter, Registrar do not use FN, Registrar do not use FS

CVEN 6301 Special Topics 3 Credits

Department: College of Engineering

An investigation into specialized study in advanced areas of engineering under guidance of a faculty member. This course may be repeated for credit when topics of investigation differ.

May be Repeated for a maximum of 12 hours

Restriction(s):

Undergraduate level students may **not** enroll.

Grade Mode(s): Standard Letter, Registrar do not use FN, Registrar do not use FS

CVEN 6310 Design Projects 3 Credits

Department: College of Engineering

May be repeated for credit when the subject matter varies. Prerequisite:

Admission to candidacy Offered: Fall, Spring

Restriction(s):

Undergraduate level students may **not** enroll.

Grade Mode(s): Standard Letter, Registrar do not use FN, Registrar do not use FS

CVEN 6320 Justification Engineering Proj 3 Credits

Department: College of Engineering

The preparation of proposals for advanced engineering work. The student will be given individual assistance in preparing a proposal for his field of study.

Restriction(s):

Undergraduate level students may **not** enroll.

Grade Mode(s): Satisfactory/Unsatisfactory, Registrar do not use FN, Registrar do not use FS

CVEN 6332 Adv Geotech Engineering 3 Credits

Department: College of Engineering

Investigate practical applications of soil mechanics principals to geotechnical engineering, dewatering techniques, design and analysis of deep foundations and retaining structures.

Restriction(s):

Undergraduate level students may **not** enroll.

Grade Mode(s): Standard Letter, Registrar do not use FN, Registrar do not use FS

CVEN 6333 Chem Principles Envrmt Systems 3 Credits

Department: College of Engineering

Introduction to aquatic and atmospheric chemistry, chemical kinetics and equilibrium, acid-base chemistry, chemical buffer, metal-ligand chemistry, precipitation and dissolution, redox chemistry and radical chemistry.

Restriction(s):

Undergraduate level students may **not** enroll.

Grade Mode(s): Standard Letter, Registrar do not use FN, Registrar do not use FS

CVEN 6334 Sustainability: Life Cycle 3 Credits

Department: College of Engineering

This course focuses on engineering concepts and environmental concerns in environmental and resource life cycle assessment (LCA) as per ISO 14040/14044. It overviews the framework, methods and some tools for LCA on products, processes or infrastructure. Topics include the principles of LCA, investigation of various environmental impacts and indicators and resources for life cycle inventory. The course aims to encourage systems thinking and to facilitate life cycle techniques to students' individual research topics.

Restriction(s):

Undergraduate level students may **not** enroll.

Enrollment limited to students in the College of Engineering college.

Grade Mode(s): Standard Letter, Registrar do not use FN, Registrar do not use FS

CVEN 6336 Stormwater Mgmt & Design 3 Credits

Department: College of Engineering

Introduction of stormwater quality and quantity management and simulation models (e.g., SWMM, StormCAD), introduction to the Best Management Practice and Total Maximum Daily Load for coastal areas, and design of urban stormwater system facilities, e.g., detention ponds, culverts, channel system and stormwater pipes.

Restriction(s):

Undergraduate level students may **not** enroll.

Grade Mode(s): Standard Letter, Registrar do not use FN, Registrar do not use FS

CVEN 6339 Hazardous Waste Management 3 Credits

Department: College of Engineering

The design, operation and applicability of standard destruction and detoxification technologies will be presented. The various types of incineration, thermal, biological, physical and chemical treatment methods will be included, as well as the technologies now in the later stages of research and development. Emphasis will be on applicability and functional design as opposed to detailed design.

Restriction(s):

Undergraduate level students may **not** enroll.

Grade Mode(s): Standard Letter, Registrar do not use FN, Registrar do not use FS

CVEN 6345 Water Qual Modeling/Monitoring 3 Credits

Department: College of Engineering

Introduction to water quality simulation in natural water systems, e.g., water temperate, dissolved oxygen model in lakes/reservoirs/estuaries, turbulent diffusion and dispersion in one and two dimensional systems, and chemical and biological kinetics in water quality model. Introduction to monitoring of air and water quality parameters in coastal areas, including solids, dissolved oxygen, BOD, COD, salinity, criterion pollutants and selected instrumental analysis.

Restriction(s):

Undergraduate level students may **not** enroll.

Grade Mode(s): Standard Letter, Registrar do not use FN, Registrar do not use FS

CVEN 6387 Hydraulics of Env Systems 3 Credits

Department: College of Engineering

Hydraulic design of municipal utilities including storm water and waste water collections systems, water distribution networks and treatment plant facilities.

Restriction(s):

Undergraduate level students may **not** enroll.

Grade Mode(s): Standard Letter, Registrar do not use FN, Registrar do not use FS

CVEN 6388 Computer Methds Engr Proj Mgmt 3 Credits

Department: College of Engineering

Principles governing the effective and efficient management of engineering projects including the application of comprehensive planning, scheduling and cost estimation procedures. Utilization of various computer methods and systems will be emphasized.

Restriction(s):

Undergraduate level students may **not** enroll.

Grade Mode(s): Standard Letter, Registrar do not use FN, Registrar do not use FS