CENG Civil Engineering

CENG 2131 Civil Engineering Fluid Mechanics
3 Credit Hours. 2 Lecture Hours. 2 Lab Hours.
This course covers basic concepts of fluid mechanics, and the fundamentals and applications of ideal and real fluid flow. Topics include fluid statics, conservation principles, the Bernoulli equation, fluid flow in pipes, fluid flow measurement devices, open channel flow, and basic hydraulic structures.
Prerequisite(s): A minimum grade of "C" in ENGR 2231.

CENG 2231 Surveying
0.3 Credit Hours. 0.2 Lecture Hours. 0.2 Lab Hours.
Principles of the level, theodolite, electronic distance measurement (EDM), total station and global positioning systems, taping, note keeping, coordinate geometry, control surveys, triangulation, trilateration, plane coordinate systems, azimuth and topographic mapping. Laboratory includes use of level, theodolite, EDM, total station, GPS, traverse closure, level net closure, topographic mapping, measuring distances and heights using coordinate geometry calculations.
Prerequisite(s): A minimum grade of "C" in ENGR 2231 or ENGR 3131.

CENG 3131 Introduction to Environmental Engineering
3 Credit Hours. 2 Lecture Hours. 2 Lab Hours.
The course is an introduction to environmental engineering. Topics include a review of the role of the United States Environmental Protection Agency (EPA) in environmental protection, mass balance, rainfall and runoff analysis, basic surface water and groundwater hydrology, water quality management, municipal solid waste and hazardous waste management, and air pollution control.
Prerequisite(s): A minimum grade of "C" in CHEM 1147.

CENG 3132 Introduction to Water and Wastewater Treatment
3 Credit Hours. 2 Lecture Hours. 2 Lab Hours.
The course is an introduction to water and wastewater treatment. Topics include sources and characteristics of water and wastewater, treatment standards, selection of different water and wastewater treatment processes, design principles for treatment units in water and wastewater treatment plants, and standard laboratory tests used to control the operation of water and wastewater treatment plants.
Prerequisite(s): A minimum grade of "C" in CENG 2131, CENG 3131. Cross Listing(s): CENG 3132H.

CENG 3132H Intro to W&WW Treatment Honors
3 Credit Hours. 2 Lecture Hours. 2 Lab Hours.
The course is an introduction to water and wastewater treatment. Topics include sources and characteristics of water and wastewater, treatment standards, selection of different water and wastewater treatment processes, design principles for treatment units in water and wastewater treatment plants, and standard laboratory tests used to control the operation of water and wastewater treatment plants.
Prerequisite(s): A minimum grade of "C" in CENG 2131, CENG 3131. Cross Listing(s): CENG 3132.

CENG 3133 Transportation Systems
3 Credit Hours. 2 Lecture Hours. 2 Lab Hours.
Overview of transportation engineering with respect to traffic operation and transportation planning, including mainly highway. Emphasis on design and traffic control devices with considerations of economy, safety, and environment. Laboratory involves data measurement and analysis techniques associated with transportation engineering using probability.
Prerequisite(s): A minimum grade of "C" in CENG 2231 and MATH 3337.

CENG 3135 Project Cost Analysis, Planning and Management
3 Credit Hours. 2 Lecture Hours. 0 Lab Hours.
This course introduces the long-term contract methods for recognizing revenue and their impact on construction company financial statements. The course also covers the analysis of construction company financial statements and their use in developing budgets, project cash needs, pricing construction projects, and forecasting the impact of business decisions on profit. The project cost control and the contract delivery methods are also discussed, along with ethical guidelines for professional conduct and code of ethics.
Prerequisite(s): A minimum grade of "C" in ECON 2105.

CENG 3232 Soil Mechanics
0.3 Credit Hours. 0.2 Lecture Hours. 0.2 Lab Hours.
This course is an introduction to soil mechanics, including an investigation of the mechanical and physical properties of soils and the relation to soil action in problems of engineering such as soil composition, index properties, classification, exploration, compaction, permeability, stress distribution, consolidation, settlement, shear strength, bearing capacity, and lateral earth pressure.
Prerequisite(s): A minimum grade of "C" in ENGR 2231.

CENG 3233 Civil Engineering Materials
0.3 Credit Hours. 0.2 Lecture Hours. 0.2 Lab Hours.
Introduction to materials science and basic engineering properties of common civil engineering materials including metals, soils, aggregates, Portland cement concrete, asphalt binder and asphalt concrete, wood, and masonry. Written and oral communication skills are an important part of this course.
Prerequisite(s): A minimum grade of "C" in ENGR 3233.

CENG 3311 Fluid Mechanics Lab
1 Credit Hour. 0 Lecture Hours. 2 Lab Hours.
The laboratory includes measurement of water properties including specific weight and dynamic viscosity, use of the Bernoulli equation, pressure measurement, flow rate measurement on a pipe, open channel flow, calibration of flow-measuring, head loss in piping systems, and characteristics of centrifugal pumps.
Corequisite(s): ENGR 3235.

CENG 3331 Structural Analysis
3 Credit Hours. 3 Lecture Hours. 1 Lab Hour.
This course investigates the behavior of common structural systems under various loading conditions. The course focuses on the accurate analysis of statically determinate trusses, beams and frames and uses approximate methods to analyze indeterminate frames. The calculation of deflections and the effects of moving loads are also considered.
Prerequisite(s): MATH 3230 and a minimum grade of "C" in ENGR 3233.

CENG 3333 Reinforced Concrete Design
0.3 Credit Hours. 0.3 Lecture Hours. 0.1 Lab Hours.
Course covers characteristics of concrete materials; introduction to ACI Building Code requirements for reinforced concrete; entrench design of slabs, beams, columns and footings.
Prerequisite(s): A minimum grade of "C" in CENG 3331.

CENG 4135 Highway Design
0.3 Credit Hours. 0.2 Lecture Hours. 0.2 Lab Hours.
This course provides an introduction to highway design based on conventional constraints including: vertical and horizontal geometry, traffic, safety, drainage, economic, and human factors.
Prerequisite(s): A minimum grade of "C" in CENG 2231 or TCM 2233.

CENG 4232 Foundation Design
3 Credit Hours. 2 Lecture Hours. 2 Lab Hours.
Introduction to foundation design methods, including shallow foundations, slope stability, pile foundation, and retaining walls.
Prerequisite(s): A minimum grade of "C" in CENG 3232.
CENG 4331 Structural Steel Design
3 Credit Hours. 0.3 Lecture Hours. 0.1 Lab Hours.
Course includes characteristics of structural steel; introduction to AISC Load and Resistance Factor Design (LRFD) specifications; design of tension members, columns, beams, beam-columns, and connections.
Prerequisite(s): A minimum grade of "C" in CENG 3331.

CENG 4518 Introduction to Senior Project
1 Credit Hour. 0 Lecture Hours. 0 Lab Hours.
This course is the first component of the senior project series of two courses designed to aid the students in successful completion of the capstone project required for the civil engineering curriculum. This first course introduces students to contemporary civil engineering considerations and professional engineering practice in a global, economic, environmental, and societal context. The course prepares students to function on multi-disciplinary teams while completing preliminary tasks required for the senior project. The importance of lifelong learning and professional licensure is also addressed.
Prerequisite(s): A minimum grade of "C" in CENG 4518 and Approval of Department Chair.
Cross Listing(s): CENG 4539S.

CENG 4539 Senior Project
3 Credit Hours. 0 Lecture Hours. 6 Lab Hours.
This course is designed to be the culmination of the undergraduate civil engineering education experience. The course draws together diverse elements of the Civil Engineering curriculum to provide an integrating experience and to develop competence in focusing both technical and nontechnical skills in solving problems. The senior project course involves design and analysis of a new or modified civil engineering project or system with demonstrated feasibility.
Prerequisite(s): A minimum grade of "C" in CENG 4518 and Approval of Department Chair.
Cross Listing(s): CENG 4539S.

CENG 4539S Senior Project
3 Credit Hours. 0 Lecture Hours. 6 Lab Hours.
This course is designed to be the culmination of the undergraduate civil engineering education experience. The course draws together diverse elements of the Civil Engineering curriculum to provide an integrating experience and to develop competence in focusing both technical and nontechnical skills in solving problems. The senior project course involves design and analysis of a new or modified civil engineering project or system with demonstrated feasibility.
Prerequisite(s): A minimum grade of "C" in CENG 4518 and Approval of Department Chair.
Cross Listing(s): CENG 4539S.

CENG 4890 Special Problems in Civil Engineering
1-4 Credit Hours. 1-3 Lecture Hours. 0-2 Lab Hours.
This course provides for specialized study in the area of Civil Engineering not otherwise covered by the CE program.
Prerequisite(s): As determined by instructor.
Cross Listing(s): CENG 4890S.

CENG 4890S Special Problems in CE
1-4 Credit Hours. 1-3 Lecture Hours. 0-2 Lab Hours.
This course provides for specialized study in the area of Civil Engineering not otherwise covered by the CE program.
Cross Listing(s): CENG 4890.

CENG 5133 Water Supply and Wastewater Collection Systems
3 Credit Hours. 2 Lecture Hours. 2 Lab Hours.
This course covers water supply and wastewater collection systems. Topics include uniform flow, flow resistance, gradually varied flow, flow transitions for open channels, pump classification, system hydraulics, pump curves and duty points, and water and wastewater pumping stations. The course additionally addresses open channel design, and pump station design. Graduate students will be required to complete individual advanced level research in an area beyond the scope of the undergraduate requirements that demonstrates a higher level of mastery in the subject matter with additional required deliverables representative of graduate level work, as determined by the instructor.
Prerequisite(s): A minimum grade of "C" in CENG 3132 or permission of instructor.
Cross Listing(s): CENG 5133G.

CENG 5137 Open Channels and Pumps
3 Credit Hours. 2 Lecture Hours. 2 Lab Hours.
The course covers the application of principles of fluid mechanics to flow in open channels and pumps. Topics include uniform flow, flow resistance, gradually varied flow, flow transitions for open channels, pump classification, system hydraulics, pump curves and duty points, and water and wastewater pumping stations. The course additionally addresses open channel design, and pump station design. Graduate students will be required to complete individual advanced level research in an area beyond the scope of the undergraduate requirements that demonstrates a higher level of mastery in the subject matter with additional required deliverables representative of graduate level work, as determined by the instructor.
Prerequisite(s): A minimum grade of "C" in CENG 2131 or permission of instructor.
Cross Listing(s): CENG 5137G.

CENG 5139 Advanced Water and Wastewater Treatment
3 Credit Hours. 2 Lecture Hours. 2 Lab Hours.
The course covers advanced water and wastewater treatment processes necessary for designing and managing modern drinking water and wastewater treatment plants. Topics include ion exchange, ozonation, adsorption, membrane, Biological Nutrients Removal (BNR), Membrane Biological Reactor (MBR), disinfection, sludge treatment and disposal, wastewater reclamation and reuse, and effluent disposal. Graduate students will be required to complete individual advanced level research in an area beyond the scope of the undergraduate requirements that demonstrates a higher level of mastery in the subject matter with additional required deliverables representative of graduate level work, as determined by the instructor.
Prerequisite(s): A minimum grade of "C" in CENG 3132 or permission of instructor.
Cross Listing(s): CENG 5139G.

CENG 5231 Pavement Analysis and Design
3 Credit Hours. 2 Lecture Hours. 2 Lab Hours.
The course provides an introduction to different approaches to pavement analysis and design, including flexible and rigid pavement design, preservation, rehabilitation, and management. Graduate students will be required to complete individual advanced level research in an area beyond the scope of the undergraduate requirements that demonstrates a higher level of mastery in the subject matter with additional required deliverables representative of graduate level work, as determined by the instructor.
Prerequisite(s): A minimum grade of "C" in CENG 3232, CENG 3233 or permission of instructor.
Cross Listing(s): CENG 5231G.
CENG 5232  Foundation Design
3 Credit Hours.  2 Lecture Hours.  2 Lab Hours.
This course provides an introduction to foundation design methods, including shallow foundations, slope stability analysis, pile foundations, and retaining walls. Graduate students will be required to complete individual advanced level research in an area beyond the scope of the undergraduate requirements that demonstrates a higher level of mastery in the subject matter with additional required deliverables representative of graduate level work, as determined by the instructor.
Prerequisite(s): A minimum grade of "C" in CENG 3232 or permission of instructor.
Cross Listing(s): CENG 5232G.

CENG 5234  Asphalt Mix Design
3 Credit Hours.  2 Lecture Hours.  2 Lab Hours.
This course is an introduction to contemporary materials and engineering properties of asphalt binders, modified binders, and asphalt mixtures including: modern binder and mixture specifications, mix design systems and test methods. Graduate students will be required to complete individual advanced level research in an area beyond the scope of the undergraduate requirements that demonstrates a higher level of mastery in the subject matter with additional required deliverables representative of graduate level work, as determined by the instructor.
Prerequisite(s): A minimum grade of "C" in CENG 3233 or permission of instructor.
Cross Listing(s): CENG 5234G.

CENG 5331  Advanced Structural Analysis
3 Credit Hours.  3 Lecture Hours.  1 Lab Hour.
This course covers the analysis of statically indeterminate structures. Classical methods, such as the slope-deflection and moment distribution techniques are presented. The course additionally covers the matrix-based stiffness method of analysis for indeterminate trusses, beams, and frames. Graduate students will be required to complete individual advanced level research in an area beyond the scope of the undergraduate requirements that demonstrates a higher level of mastery in the subject matter with additional required deliverables representative of graduate level work, as determined by the instructor.
Prerequisite(s): A minimum grade of "C" in CENG 3331, MATH 2331, ENGR 1731 or permission of instructor.
Cross Listing(s): CENG 5331G.

CENG 5332  Prestressed Concrete Design
3 Credit Hours.  3 Lecture Hours.  1 Lab Hour.
This course introduces students to the design of common prestressed concrete elements. It presents historical developments, the properties of constituent materials, prestress losses, and the design of prestressed structural members to support flexural and shear loadings. Graduate students will be required to complete individual advanced level research in an area beyond the scope of the undergraduate requirements that demonstrates a higher level of mastery in the subject matter with additional required deliverables representative of graduate level work, as determined by the instructor.
Prerequisite(s): A minimum grade of "C" in CENG 3333 or permission of instructor.
Cross Listing(s): CENG 5332G.

CENG 5336  Introduction to Finite Elements
3 Credit Hours.  3 Lecture Hours.  1 Lab Hour.
This course provides an introduction to the Finite Element Method, focusing on common elements and problems encountered in civil engineering practice. The course illustrates useful concepts and procedures associated with linearly behaving static structures, modeled by using truss, beam, name, plane and plate elements. Graduate students will be required to complete individual advanced level research in an area beyond the scope of the undergraduate requirements that demonstrates a higher level of mastery in the subject matter with additional required deliverables representative of graduate level work, as determined by the instructor.
Prerequisite(s): A minimum grade of "C" in CENG 5331 or permission of instructor.
Cross Listing(s): CENG 5336G.