CENG Civil Engineering

CENG 5090G Selected Topics in Civil Engineering
3 Credit Hours. 2 Lecture Hours. 1 Lab Hour.
This course is scheduled on an infrequent basis to explore special areas in civil engineering. Graduate students will be required to complete a case study or research project not required of undergraduate students.
Prerequisite(s): Permission of Instructor.
Cross Listing(s): CENG 5090.

CENG 5133G 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 basic hydraulics, major and minor head losses, pipes in series and parallel, water distribution network analysis, design of water supply distribution systems, sanitary sewer collection systems, and storm sewer collection systems. 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.
Cross Listing(s): CENG 5133.

CENG 5136G Advanced Structural Analysis
3 Credit Hours. 2 Lecture Hours. 2 Lab Hours.
This course introduces students to the design of common 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 3232 and CENG 3233 or permission of instructor.
Cross Listing(s): CENG 5136.

CENG 5137G Engineering Hydrology and Hydraulics
3 Credit Hours. 2 Lecture Hours. 2 Lab Hours.
This course integrates concepts developed in Fluid Mechanics with fundamental hydrologic and hydraulic processes used in the analysis and design of urban drainage, flood control, and measurement structures. Hydrology topics include the hydrologic cycle, precipitation, hydrograph analysis, evapotranspiration, runoff, and flood routing. Hydraulics topics include open channel flow, hydraulic design, pump classification, pump and system curves, and water/wastewater pumping stations. 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 5137.

CENG 5138G 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 5138.

CENG 5139G 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 5139.

CENG 5231G Pavement Analysis and Design
3 Credit Hours. 2 Lecture Hours. 2 Lab Hours.
This 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 and CENG 3233 or permission of instructor.
Cross Listing(s): CENG 5231.

CENG 5232G 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 5232.

CENG 5233G 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 5234.

CENG 5311G 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 and MATH 2331 and ENGR 1731 or permission of instructor.
Cross Listing(s): CENG 5311.

CENG 5331G Advanced Structural Analysis
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 5332.

CENG 5332G Prestressed Concrete Design
3 Credit Hours. 3 Lecture Hours. 1 Lab Hour.
This 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 3333 or permission of instructor.
Cross Listing(s): CENG 5332.
CENG 5336G  Introduction to Finite Elements
3 Credit Hours.  1 Lecture Hour.  4 Lab Hours.
This course provides an introduction to the Finite Element Method focusing on the analysis of common structural components encountered in civil engineering discipline utilizing a commercial FEA software package. The course covers key FEA principles and procedures associated with linearly behaving static structural members modeled using a variety of appropriate two-dimensional and three-dimensional elements. Graduate students will be required to complete individual advanced level projects in areas 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 all of the following: CENG 3331 and MATH 2331 or permission of instructor.
Cross Listing(s): CENG 5336.

CENG 7891  Independent Study
1-3 Credit Hours.  0 Lecture Hours.  0 Lab Hours.
Independent study is available for students to undertake individualized experimentation, research, and study related to civil engineering, and/or a capstone project. The specific topic will be approved by a faculty member in the program, and credit will be assigned commensurate with the magnitude of the study.

CENG 7895  Special Problems in Civil Engineering
1-3 Credit Hours.  0 Lecture Hours.  0 Lab Hours.
Individual and specialized study in the area of civil engineering not otherwise covered in the program. Students must submit a proposal of the special problem for approval by the faculty member of record. Credit will be assigned commensurate with the magnitude of the study.

CENG 7999  Thesis
1-6 Credit Hours.  0 Lecture Hours.  0 Lab Hours.
This course focuses on the preparation and completion of the thesis.