The goals of the programs in the Department of Civil Engineering and Construction Management are designed to give students state-of-the-art knowledge for professional career and life-long development skills needed in the fields of civil engineering and construction management while meeting all the requirements to earn a Master of Science in Applied Engineering degree. The department engages in the best practices of teaching, scholarship, and service to ensure that graduates serve as ethical and highly qualified leaders of civil engineering and construction management. Students will find open doors to a dedicated and diverse faculty who are well-educated yet grounded in the practical aspects of "real world" civil engineering design and construction. The Bachelor of Science in Civil Engineering program is accredited by the Engineering Accreditation Commission of ABET, http://www.abet.org and the Bachelor of Science in Construction program is accredited by the American Council on Construction Education (ACCE), http://acce-hq.org.

**Civil Engineering and Construction Management Degrees**


**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 5139.

**CENG 5137G 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 5137.

**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 3323 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 5234G 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 5331G 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 or permission of instructor.
Cross Listing(s): CENG 5331.

CENG 5332G 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 5332.

CENG 5336G 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, frame, 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 5336.

TCM 5330G Green Building and Sustainable Construction
3 Credit Hours. 3 Lecture Hours. 0 Lab Hours.
This course is a study of advanced topics in green construction beginning with the philosophy behind sustainability related technology and its implementation. The course provides a thorough expansion on LEED (Leadership in Energy and Environmental Design) core concepts including construction and design for sustainable sites, water efficiency, energy & atmosphere, materials & resources, indoor environmental quality and innovation and design. The course also examines sustainable construction methodologies and their associated environmental impacts. 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 TCM 1131 and TCM 2234 or permission of instructor.
Cross Listing(s): TCM 5330.