Joint Civil Engineering

Courses

**J C ENGR 1430 Introduction to Engineering Design: CAD & GIS: 2 semester hours**
Prerequisites: Civil Engineering major. An introduction to engineering design in the context of civil engineering problems and applications. Students will learn the basics of GIS and computer-aided design and drafting concepts and techniques to learn the fundamentals of spatial reasoning and graphical representation. Introduction to terminology, symbols, multiple use blocks and details, origins and uses of survey data, contours, alignments, working with 2D and 3D, using both model space and layouts, dimensioning and dimension style, attributes, and xrefs, and using templates. Freehand sketching, including pictorial and orthographic views, applied to the design process as well.

**J C ENGR 2160 Surveying: 3 semester hours**
Prerequisites: Civil Engineering major. Horizontal and vertical control surveys, including traverses, triangulation, trilateration, and leveling; basic adjustments of observations; geologic data; coordinate systems. Basic route surveying, including horizontal and vertical curves.

**J C ENGR 3210 Computer Methods of Engineering Analysis: 2 semester hours**
Prerequisites: MATH 2020, CMP SCI 1250 (may be taken concurrently), and junior standing. This course provides an introduction to engineering design and analysis utilizing numerical methods, spreadsheet functions, and database queries. Students will build on skills gained in CMP SCI 1250 to utilize a high level programming language and spreadsheet functions to develop techniques for civil engineering design and problem solving.

**J C ENGR 3360 Civil Engineering Materials Lab: 1 semester hour**
Prerequisite: J M ENGR 2410. This course and J M ENGR 3360 should be taken concurrently. Testing procedures, testing machines, use of laboratory equipment, analysis of data, and presentation of results. Laboratory tests on static tension, compression, bending, and torsion of metal specimens. Tests on wood. Determination of compressive and tensile strengths of concrete. Design of concrete mixes and verification of strength. Experiments in advanced topics in mechanics of materials.

**J C ENGR 3410 Structural Analysis: 3 semester hours**

**J C ENGR 3420 Structural Design: 3 semester hours**
Prerequisites: J M ENGR 2410 and J C ENGR 3410. Fundamentals of structural design in steel, reinforced concrete, and timber. Familiarization with the sources of various design codes and practice in interpreting them. Computer graphics applications.
J C ENGR 4640 Foundation Engineering: 3 semester hours
Prerequisites: J C ENGR 3420, J C ENGR 4190, J C ENGR 4200 and Civil Engineering major. Principal problems in design and construction of foundations for bridges and buildings. Bearing capacity of deep and shallow foundations; pressure on retaining walls and shallow foundations; pressure on retaining walls and slope stability; modern developments in piling, cofferdams, open caissons, pneumatic caissons.

J C ENGR 4660 Advanced Design of Concrete Structures: 3 semester hours
Prerequisites: J M ENGR 3360, J C ENGR 3410, J C ENGR 3420, and Civil Engineering major. Flexural behavior and design, strength and deformation of rectangular and nonrectangular sections, shear strength, beam-columns, long columns, slab systems, design of frames, and footings will be covered.

J C ENGR 4670 Structural Design Projects: 3 semester hours
Prerequisites: J C ENGR 4630 and Civil Engineering major. Students carry out the complete design of typical and unusual building and bridge structures. Use of the computer as a design tool is emphasized. Projects are conducted in cooperation with production engineers.

J C ENGR 4720 Legal Aspects of Construction: 3 semester hours
Prerequisites: Junior standing or permission of instructor, and Civil Engineering major.

J C ENGR 4740 Economic Decisions in Engineering: 3 semester hours
Same as J M ENGR 4730. Prerequisites: Enrolled in the Joint Engineering Program. This course examines the principles of economics involved in engineering decisions. It looks at decisions between alternatives based on the efficient allocation of resources. Topics include the time element in economics, analytical techniques for economic studies and taxes.

J C ENGR 4830 Fundamentals of Surface Water Hydrology and Environmental Engineering: 3 semester hours
Prerequisites: J M ENGR 3700 and senior status. The principles of the hydrologic cycle including precipitation, evaporation, transpiration, infiltration, runoff, streamflow, and groundwater will be discussed and illustrated. In addition, computational fundamentals of hydrologic analysis will be presented such as unit hydrographs, routing, data analysis, and flood frequency. Elements of quantitative problems in urban stormwater systems and management, water quality and urbanization. Concepts of sustainability and green engineering such as low impact development and other best management practices will be presented. Computer software will be utilized.

J C ENGR 4910 Hydrology and Hydraulic Design Project: 3 semester hours
Prerequisites: J M ENGR 3700, J C ENGR 3760, J C ENGR 4830 and Civil Engineering major. This course is designed to provide seniors in Hydrology and Hydraulics with a major design/facility plan project. The principals of hydrologic and hydraulic design will be utilized in developing the hydrology, hydraulic and floodplain analysis for a local watershed or land area. Hydrologic analysis is performed to size hydraulic systems and evaluate watershed and floodplain performance. The course is structured to apply hydrologic theory and modeling techniques to engineering hydrology and hydraulics for watershed analysis, floodplain delineation, and urban stormwater. The student will also consider the next generation of hydrologic computation, watershed evaluation and the importance of severe storm impacts and flood management. Consideration of sustainability and green infrastructure practices will also be included. A final written report and class presentation of the design project is included.

J C ENGR 4950 Fundamentals of Civil Engineering Review: 1 semester hour
Prerequisite: Senior standing. A review and preparation of the most recent NCEES Fundamentals of Engineering (FE) Exam specifications for Civil Engineering students is offered in a classroom setting. Exam strategies will be illustrated using examples.