CIVIL ENGINEERING (CVNG)

CVNG 1010 - Freshman Engineering I
Credit(s): 1 Credit
An introduction to Civil Engineering profession that consists of a series of project-based learning modules designed to explore various specialty areas within Civil Engineering. Offered every fall semester.

CVNG 1020 - Freshman Engineering II
Credit(s): 1 Credit
Introduction to engineering drawing and computer aided drafting techniques. Offered every spring semester.

Prerequisite(s): CVNG 1010

CVNG 1500 - Civil Engineering Computing
Credit(s): 3 Credits
Introduction to computer programming tools applicable to Civil Engineering, including Matlab/Mathcad, advanced Excel, and 3-D CAD applications. (Offered every Spring)

Prerequisite(s): (CVNG 1020 or MATH 1510*)

* Concurrent enrollment allowed.

CVNG 2010 - GIS and Surveying in Civil Engineering
Credit(s): 3 Credits
This course discusses the fundamental concepts of geographic information system (GIS) at different scales and resolutions. Spatial analysis methods and software are used to solve problems with data collected in the field and other sources. GIS and surveying topics are presented in the same context. The course is complemented with a database development and analysis lab that includes remote sensing data, basic and differential GPS, and traditional surveying to prepare students for today's growing business needs in the civil engineering industry.

Corequisite(s): CVNG 2020

CVNG 2017 - Spanish Civil Architectural Infrastructure: Ancient and Modern
Credit(s): 0-3 Credits
A study of civil engineering, architectural, and construction practices within the Spanish civilization with emphasis on comparisons of the old and the new. The course is focused on inter-relationships between human and built environment: aqueducts, canals, dams, bridges, highways. Includes a 2-week field trip in the Spanish country side; with academic seminars at the SLU-Madrid campus. Instructor approval required.

[Independent study, experiential learning, 0-3 credits]

CVNG 2020 - GIS and Surveying in Civil Engineering Lab
Credit(s): 1 Credit
Introduction to data collection techniques used in geospatial analysis in civil engineering. Data types include, vector and raster imagery, LiDAR, GPS, and traditional surveying. Hands-on training of equipment [total station, GPS receivers with differential correction, LiDAR scanners (demo)] and other data collection techniques.

Prerequisite(s): (CVNG 2010* or GIS 4010*)

* Concurrent enrollment allowed.

CVNG 2910 - Co-Op with Industry
Credit(s): 0 Credits

CVNG 2930 - Special Topics
Credit(s): 3 Credits

CVNG 2980 - Independent Study
Credit(s): 1 or 3 Credits

CVNG 3010 - Structural Analysis
Credit(s): 3 Credits
Analysis of statically determinate structures including influence lines. Deformations using different techniques. Analysis of statically indeterminate structures using the force method and displacement method.

Prerequisite(s): ESCI 3100

Corequisite(s): CVNG 3020

CVNG 3020 - Structural Analysis Lab
Credit(s): 1 Credit
Application of methods and computational tools used for the analysis of structures.

Corequisite(s): CVNG 3010

CVNG 3030 - Civil Engineering Materials
Credit(s): 3 Credits
Introduction to the characteristic properties and the fundamental behavior of the materials used by civil engineers with emphasis on concrete, steel, masonry, and wood. Laboratory experiments and testing is used to give knowledgeable perception of the behavior when materials are subjected to various loads.

Prerequisite(s): ESCI 3100, ESCI 3101

CVNG 3040 - Sustainability and Environmental Engineering
Credit(s): 3 Credits
Course provides an overview of sustainability and environmental engineering principles. Topics include: population, environmental impact, and resource depletion; environmental laws; biodiversity and ecosystem functioning; climate change, air pollution, and ozone depletion; solid-waste management; hazardous and nuclear waste management; water resource and pollution management; and water and wastewater treatment and systems. (Offered every Fall)

Prerequisite(s): (CHEM 1070 or CHEM 1110)

Corequisite(s): CVNG 3041

Attributes: Urban Poverty - Applied

CVNG 3041 - Sustainability and Environmental Engineering Lab
Credit(s): 1 Credit
Course provides an overview of environmental testing methods, including dissolved oxygen, BOD, pH and alkalinity, conductivity, plate counts, and turbidity. (Offered every Fall)

Prerequisite(s): CHEM 1115

Corequisite(s): CVNG 3040

CVNG 3070 - Engineering Project Management
Credit(s): 2 Credits
An introduction to basic concepts of management, business, public policy, and leadership. Topics include engineering economics and cost estimating methods, including labor, material, equipment and indirect costs; analytical techniques for project planning and scheduling; legal issues in engineering projects, including zoning regulations, proposals, and contracts; and understanding the importance of professional licensure. Offered every fall semester.

CVNG 3090 - Geotechnical Engineering
Credit(s): 3 Credits
This course is an introduction to soil properties and analysis techniques for geotechnical applications. Topics include soil formations, mass-volume relationships, soil classification, effective stress, compaction, seepage, soil deformation, sate of stress, consolidation, strength, and failure. (Offered every Spring)

Prerequisite(s): CVNG 3030

Corequisite(s): CVNG 3100
partnership between the student, industry, and faculty.

Field-based course. This course is an experiential learning course, which takes place in the place with a partner in industry. It is intended to be in partnership between the student, industry, and faculty.
CVNG 4170 - Seismic Design
Credit(s): 3 Credits
Theory, analysis, and design of building structures under earthquake loading. Application of current codes and standards related to steel, concrete, masonry, and wood structures.
Prerequisite(s): CVNG 3150

CVNG 4190 - Sustainable Land Development Engineering
Credit(s): 3 Credits
Introduction to land development engineering and urban planning: site design and sediment control; transportation planning and roadway design; water resource and waste disposal issues; ecological impact analysis' application sustainable development principles to land development projects at local and regional scales.

CVNG 4210 - Sustainable Water Resources Management
Credit(s): 3 Credits
Water Management and alternative analysis considering water resource, legal, political, and ecological issues; determination and forecasting of water demand; supply and estimating drought impacts resulting from cycle and permanent shifts in the climate.
Prerequisite(s): CVNG 2030; CVNG 3130

CVNG 4250 - Water Treatment Processes
Credit(s): 3 Credits
The purpose of this course is to provide the student with a qualitative and quantitative understanding of the physical and chemical unit operations commonly used in water treatment (including drinking water and groundwater, as well as aspects of municipal and industrial wastewater). The course will provide the student with a design experience of individual unit operations. Course covers principles of physical and chemical environmental engineering processes, including sedimentation, filtration, gas transfer, aeration, absorption, ion exchange, membrane processes, coagulation, flocculation, precipitation, oxidation, reduction, and disinfection. Process modeling and analysis applications in treatment of water, wastewater, industrial wastes, vapor treatment, and soil remediation. A general chemistry or biology, or related course are recommended. Introductory course in environmental engineering or environmental science is recommended.

CVNG 4260 - Environmental Solutions in Developing Countries
Credit(s): 3 Credits
The course is designed for students of all majors (engineering, science, health, and others) and covers technology, education, and social approaches to successful WASH (Water, Sanitation and Hygiene) projects in the developing world. The course covers technical, social and economic aspects of successful humanitarian projects. This includes appropriate safe water, sanitation, air pollution technologies, and public health principles, for developing nations. Additionally, the course focuses in detail on social and educational approaches, and project management principles required for successful project implementation. In addition to classroom presentations and discussion, students will participate in a variety of field activities such as use of a wide variety of field tests for chemical and biological water quality; use and testing of common water and sanitation technologies used in developing nations (e.g., chemical disinfection and filtration technologies, solar disinfection technologies); testing and surveying using handheld GPS; and other projects. The topic spans social and technical topics and students from diverse majors can excel. General chemistry or biology, or related courses are recommended prerequisites.

CVNG 4330 - Open-Channel Flow
Credit(s): 3 Credits
Physical principles that govern the flow of water in open channels, analytical methods to describe and predict behavior of open-channel flow using modern computational tools, application of these principles for engineering solutions. (Offered every Fall)
Prerequisite(s): CVNG 3130

CVNG 4350 - Hydraulic Modeling
Credit(s): 3 Credits
Hydraulic Modeling Techniques with a focus on Open-Channel Flow Applications. (Offered every Spring)
Prerequisite(s): CVNG 3130

CVNG 4370 - River Engineering
Credit(s): 3 Credits
River engineering concepts including sediment transport, channel classification, fluvial geomorphology, stable channel design, and design of revetment. (Offered each Fall)
Prerequisite(s): CVNG 3130

CVNG 4450 - Traffic Engineering
Credit(s): 3 Credits
Design, analysis and use of traffic control devices. Traffic administration, traffic flow theory, and highway capacity. An introduction to computer and traffic engineering. Acquisition, evaluation, statistical analysis and reporting of traffic engineering date used to design, evaluate and operate transportation systems.
Prerequisite(s): CVNG 3110

CVNG 4460 - Multimodal Roadway Safety
Credit(s): 3 Credits
This is an introduction to the fundamentals of roadway safety. At the end of this course students will be able to define nominal and substantive roadway safety. The students are expected to comprehend and explain network screening and countermeasure selection methods. Students are expected to apply highway safety manual procedures to propose safety improvement alternatives and to evaluate the effectiveness of the proposed alternatives. Other topics covered in the course include statistical applications in roadway safety, pedestrian and cyclist safety, conflict studies and crash surrogates.
Prerequisite(s): CVNG 3110

CVNG 4470 - Urban Transportation Planning
Credit(s): 3 Credits
Prerequisite(s): CVNG 3110

CVNG 4500 - Capstone Design I
Credit(s): 3 Credits
Interdisciplinary teams working on an open-ended project. Topics include application of civil engineering principles to design problems with an emphasis on large-scale problem solving, engineering professional practice and ethics, and sustainability principles. Written, graphical and oral communications will be an integral part of the course. offered every fall semester.
Prerequisite(s): (CVNG 3040, CVNG 3090, CVNG 3110, CVNG 3130, and CVNG 3150)

CVNG 4510 - Capstone Design II
Credit(s): 3 Credits
Continuation of CVNG 4500 (Offered every Spring)

CVNG 4910 - Co-Op with Industry
Credit(s): 0 Credits
Prerequisite(s): slabs' prestress losses; composite beams. Extensive study of materials methods of prestressing; design of simple and continuous beams and Theory and analysis of prestressed concrete members by various existing bridges, specifications and economic factors.

CVNG 5120 - Sustainable Water Resources Management
Credit(s): 3 Credits
Water Management and alternative analysis considering water resource, legal, political, and ecological issues; determination and forecasting of water demand; supply and estimating drought impacts resulting from cycle and permanent shifts in the climate.

CVNG 5260 - Environmental Solutions in Developing Countries
Credit(s): 3 Credits
The course is designed for students of all majors (engineering, science, health, and others) and covers technology, education, and social approaches to successful WASH (Water, Sanitation and Hygiene) projects in the developing world. The course covers technical, social and economic aspects of successful humanitarian projects. This includes appropriate safe water, sanitation, air pollution technologies, and public health principles, for developing nations. Additionally, the course focuses in detail on social and educational approaches, and project management principles required for successful project implementation. In addition to classroom presentations and discussion, students will participate in a variety of field activities such as use of a wide variety of field tests for chemical and biological water quality; use and testing of common water and sanitation technologies used in developing nations (e.g., chemical disinfection and filtration technologies, solar disinfection technologies); testing and surveying using handheld GPS; and other projects. The topic spans social and technical topics and students from diverse majors can excel. General chemistry or biology, or related course are recommended. Introductory course in environmental engineering or environmental science is recommended.
CVNG 5330 - Open-Channel Flow
Credit(s): 3 Credits
Physical principles that govern the flow of water in open channels, analytical methods to describe and predict behavior of open-channel flow using modern computational tools, application of these principles for engineering solutions. (Offered every Fall)
Prerequisite(s): CVNG 3130

CVNG 5350 - Hydraulic Modeling
Credit(s): 3 Credits
Hydraulic Modeling Techniques with a focus on Open-Channel Flow Applications. (Offered every spring)
Prerequisite(s): CVNG 3130

CVNG 5370 - River Engineering
Credit(s): 3 Credits
River engineering concepts including sediment transport, channel classification, fluvial geomorphology, stable channel design, and design of revetment. (Offered every Fall)
Prerequisite(s): CVNG 3130

CVNG 5450 - Traffic Engineering
Credit(s): 3 Credits
Design, analysis and use of traffic control devices. Traffic administration, traffic flow theory and highway capacity. An introduction to computer and traffic engineering. Acquisition, evaluation, statistical analysis and reporting of traffic engineering data used to design, evaluate and operate transportation systems.
Prerequisite(s): CVNG 3110

CVNG 5460 - Multimodal Roadway Safety
Credit(s): 3 Credits
This is an introduction to the fundamentals of roadway safety. At the end of this course students will be able to define nominal and substantive roadway safety. The students are expected to comprehend and explain network screening and countermeasure selection methods. Students are expected to apply highway safety manual procedures to propose safety improvement alternatives and to evaluate the effectiveness of the proposed alternatives. Other topics covered in the course include statistical applications in roadway safety, pedestrian and cyclist safety, conflict studies and crash surrogates.
Prerequisite(s): CVNG 3110

CVNG 5470 - Urban Transportation Planning
Credit(s): 3 Credits
Prerequisite(s): CVNG 3110

CVNG 5910 - Co-op with Industry
Credit(s): 1-6 Credits

CVNG 5915 - Internship with Industry
Credit(s): 1-3 Credits

CVNG 5930 - Special Topics
Credit(s): 1-3 Credits
A one-time course on a particular topic or a trial course that is expected to become a standard course with its own unique course number.

CVNG 5960 - Masters Project
Credit(s): 1-3 Credits
Masters Project is for students in the MS Non-Thesis degree program who will conduct a small project under the supervision of their Faculty Advisor. No more than 3 hours will be devoted to the Project.

CVNG 5980 - Independent Study
Credit(s): 1 or 3 Credits

CVNG 5990 - Thesis Research
Credit(s): 0-6 Credits
Research that leads to a Master’s Thesis and final defense of the Thesis.

CVNG 6930 - Special Topics
Credit(s): 1-6 Credits

CVNG 6980 - Independent Study
Credit(s): 1 or 3 Credits

CVNG 6990 - Doctoral Dissertation Research
Credit(s): 0-6 Credits
A non-classroom course in which a student explores a topic that is related to the student’s doctoral work and career goals.