

# CVE - CIVIL ENGINEERING (CVE)

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## **CVE 2001 Applied Drafting and CAD: Civil (0-3-1)**

This course develops skills to use CAD drafting as a means of communication in the civil and construction industry.

## **CVE 2013 CAD tools in Civil Engineering (1-4-3)**

Covers drafting fundamentals to advanced applications of CAD in a civil engineering environment. Introduces cutting-edge technology to create CAD drawings for multiple aspects of the civil engineering construction industry. Manage multiple drawing files in a digital environment.

**Prerequisites:** CVE 2001

## **CVE 2103 Site Surveying (2-2-3)**

Introduces modern surveying tools and methods used in civil engineering applications related to buildings, highways, utilities and any construction activity in the built environment. Covers the use of cutting-edge, state-of-the-art surveying equipment to perform a variety of surveying activities. Includes production of field notes, drawings, plots and calculations to meet industry standards.

**Prerequisites:** MTH 0103

## **CVE 2113 Quantity Surveying and Estimating (2-2-3)**

Examines project cost measurement and monitoring relative to the client, the consultant, and the contractor. Emphasis is placed on the roles of the quantity surveyor and estimator with respect to estimation and measurement at all stages throughout the project. The course also examines the various constraints placed on the project to conform to the client's planned project expenditure, and the role of the contractor's project management team in estimating, monitoring and controlling costs, from the tender phase to completion.

**Prerequisites:** CVE 2103

## **CVE 2203 Engineering Mechanics (2-2-3)**

Covers the concepts of equilibrium to determine the forces acting on static engineering structures such as beams, columns, trusses and cantilevers. Illustrate these forces graphically. Introduces methods used to calculate key structural properties related to centroids and moments of inertia that are required for structural analysis and design.

**Prerequisites:** PHY 1103

## **CVE 2213 Strength of Materials (2-2-3)**

Explores fundamental engineering mechanics principles and practices to determine shear force and bending moments in structures. Assess the flexural behavior of structural members subjected to transverse loading. Apply key concepts in a hands-on, structures-related project.

**Prerequisites:** CVE 2203

## **CVE 2303 Soil Mechanics (2-2-3)**

Covers the origin and formation of rocks and soils and evaluates the basic physical properties of soils as a material for use in civil engineering applications. Studies the engineering properties of soils through a set of standard laboratory tests. Covers application of engineering principles in the analysis of the test results.

**Prerequisites:** CVE 2603

## **CVE 2403 Fluid Mechanics and Hydraulics (2-2-3)**

Introduces the basic concepts of fluid mechanics including fluid properties, hydro statics, basic fluid flow, continuity and momentum equations, energy equations, laminar and turbulent flow and pressure losses. Includes practical work will reinforce the theory through a set of experiments in the fluid dynamics laboratory.

**Prerequisites:** PHY 1103

## **CVE 2603 Construction Materials (2-2-3)**

Examines properties of key construction materials including aggregates, Portland cement, concrete, asphalt, various metals, glass and wood. Prepare and perform tests using international standards on aggregate, concrete and asphalt samples in a hands-on environment in the civil engineering workshop and laboratories.

**Prerequisites:** PHY 1103

## **CVE 2613 Civil Engineering Construction (2-2-3)**

Explores topics related to civil engineering construction covering above ground and below ground projects. Reviews the common types of formwork, steel and precast concrete frames and causes of deterioration in concrete structures. Introduces local, regional and international building standards and practices.

**Prerequisites:** CVE 2603

## **CVE 2903 Sophomore Design Project (2-2-3)**

Learn the necessary tools and information to manage engineering projects and resources. It covers a range of principles and practices in initiating, planning, staffing, coordinating and completing a project within the triple constraint of schedule, budget, and performance. The course strives to strike a balance between the general knowledge of project management and available tools, such as Primavera, OpenProj, and Microsoft Project, to assist in managing real life projects.

**Prerequisites:** EGN 1133, LSS 1123, CVE 2001

## **CVE 3203 Structural Analysis (2-2-3)**

Introduces principles of engineering mechanics and strength of materials to the analysis of determinate and indeterminate structures. Covers forces on beams, frames and arches, analyses of structures for deflection using regional and international codes.

**Prerequisites:** CVE 2213

## **CVE 3303 Highway Engineering (2-2-3)**

Extends the core knowledge and principles of surveying to the design and construction of highways. Covers regional and international geometric design parameters to highways for vertical and horizontal alignment, cross-sections, drawing preparation, drainage, and intersections at grade and interchanges. Emphasis is on design practices and construction procedures to achieve a highway with acceptable levels of performance in terms of safety, operation, economics and environmental concerns.

**Prerequisites:** CVE 2103

## **CVE 3403 Water Resources and Supply (3-1-3)**

Introduces hydrologic concepts, development of water supply sources, principals involved in the collection and transportation of water/ wastewater/storm runoff, and distribution of water for municipal use. Covers water system management, principles of hydraulics and water cycle precipitation hydrology, design of water supply systems to international standards. Includes site visits to water supply engineering sites relevant to the development and growth of world-class, large cities.

**Prerequisites:** CVE 2403

## **CVE 3503 Foundation Engineering (2-2-3)**

Extends the core knowledge of soil mechanics to the analysis and design of geotechnical engineering systems. Covers shallow and deep foundations and their use in local, regional and international settings. Explores alternatives for retaining structures and related stability of soils in civil engineering applications such as excavations, road embankments and earth dams.

**Prerequisites:** CVE 2303

**CVE 3513 Concrete Design I (2-2-3)**

Covers the properties and design principles of reinforced concrete structural elements. Introduces the Limit State Design Theory and applies the principles and skills gained in structural analysis to the design of reinforced concrete structural elements. The Euro/British Codes of Practice are the basic codes of reference for all the design and detailing work in this course. The course includes the properties of structural concrete and the influence of each of its constituents on the performance of the final product.

**Prerequisites:** CVE 3203

**CVE 4303 Traffic Engineering (3-1-3)**

Examines the factors that influence the design, use and maintenance of roads with respect to traffic issues inclusive of local, international highway classifications and administration, traffic survey studies, economic and environmental considerations, driver, pedestrian and vehicle characteristics, roadway capacity, volume and flow characteristics, signalization of intersections, safety as well as modelling and computer simulation.

**CVE 4313 Urban Transportation (3-1-3)**

Covers history of development of transportation infrastructure in the UAE, factors affecting regional planning and local planning of transportation projects. Reviews evaluation and prioritization methods employed in urban transportation planning. Introduces asset management of transportation related infrastructure and safety considerations in urban transportation planning. Integration of freight into transportation planning process. Covers relevance of sustainability in existing and future transportation related projects.

**CVE 4323 Transportation Planning (3-1-3)**

Examines the processes involved in facilitating the planning for future transportation facilities. Covers factors to be considered in the planning of new transportation projects including traffic flow, safety, energy consumption, travel time, accessibility, socio-economic and environmental impacts. Introduces relevant sustainability and ethical issues.

**CVE 4333 GIS Applications in Civil Engineering (1-4-3)**

Examines the basic concepts and types of Geographic Information Systems (GIS) used in civil engineering practice. Covers collection and data analyses methods, to perform selected spatial operations. Introduce the five main components and functions of a GIS while differentiating between vector and raster methods for data capture. Students will be introduced to various GIS applications in civil engineering using appropriate software.

**Prerequisites:** CVE 2103

**CVE 4343 Bridge Engineering (3-1-3)**

Covers the design of new bridges and evaluation of existing bridges in accordance with current AASHTO specifications, and the procedures and requirements of bridge design and evaluation. Introduces the AASHTO code provisions used for bridge design through examples. Outline the history of bridge engineering. Explain methods and procedures for superstructure and substructure design and evaluation. Introduces bridge load rating methods. Outlines advanced methods and technologies for bridge condition assessment with case studies.

**CVE 4353 Road Design and Construction (3-1-3)**

Explores pavement types and the factors that impact their design with emphasis on equipment, materials and practices associated with the construction of flexible and rigid pavements. Maintenance methods including evaluation and rehabilitation are addressed. Explore the environmental impacts of construction and maintenance topics to sustainability, ethics and quality issues.

**CVE 4403 Waste Water Engineering (2-2-3)**

Covers the principles of hydraulics, water cycle and precipitation hydrology, design sewer systems to international standards. Includes site visits to relevant sites to fully comprehend the importance of waste water engineering to the development and growth of world-class, large cities like Abu Dhabi and Dubai.

**Prerequisites:** CVE 3403

**CVE 4413 Environmental Engineering (2-2-3)**

Covers the application of the fundamental principles of science and engineering toward environmental engineering situations, recognizing it is as an interdisciplinary science. Analyze the naturally occurring environmental phenomena, industry and human induced compounds and micro-organisms, and the changes and imbalances that occur in the environment. Explore sustainability, ethics and quality of life issues.

**Prerequisites:** CVE 3403

**CVE 4423 Solid Waste Management (3-1-3)**

Examines the different sources of solid waste management. Includes investigation of the important aspects of waste control legislation, waste reduction and waste recycling. Covers sustainability strategies to protect the local and global environment. Introduces local and international approaches to handling and disposal of hazardous waste, and quality assurance measures.

**Prerequisites:** CVE 3403

**CVE 4433 Sustainability in Civil Engineering (3-1-3)**

Introduces the concept of sustainability, emphasizes current practices and standards and simply addresses new concerns and constraints of building and construction. This new holistic approach requires some new ways of thinking and the frameworks for this are discussed. Students will be given the tools needed to understand this, a review of current practices for improving performance across the civil and environmental fields. These include water planning and treatment, building design and construction, community design and construction and more.

**CVE 4443 Coastal Engineering (3-1-3)**

Examines modern technology for civil engineering projects in a marine environment. The significant development along the shores of the UAE including the creation of coastline provide the backdrop for the course. Coastal climates, tides, waves and environmental issues are addressed. Construction techniques and structures including piles, break-walls, piers and off-shore facilities are part of the course. Computer modelling and relevant site visits round out the students learning experience.

**CVE 4453 Environmental Regulatory Compliance and Public Policy (3-1-3)**

Examines major environmental laws and the environmental impact assessment and permitting process. Key federal environmental statutes will be covered as well as the responsibilities of key regulatory agencies involved in environmental compliance. Local regulatory environment will be compared to global ones. In addition, the course emphasizes how to use critical thinking skills to analyze consequences of a planned action and determine impacts of changes in the environment, as compared with knowing the specifics of a particular regulation.

**Prerequisites:** CVE 4413

**CVE 4463 Green Buildings (3-1-3)**

Covers depletion of the earth's natural resources, soaring energy costs, pollution of vital water and food sources, irreversible environmental degradation and climate change are serious challenges facing the human civilization. Introduces engineering principles to develop innovative strategies to positively influence the human life, the environment, and productivity of engineering infrastructure. Includes green structures design and construction principles, design various components of green buildings and evaluate the building performance according to LEED standards.

**Prerequisites:** CVE 4413

**CVE 4503 Steel Design (2-2-3)**

Examines wind loads on portal frames. Given a floor-framing plan, analyse and design a simple beam with its compression flange fully restrained/unrestrained laterally. Design tension and compression members in roof trusses. Design columns subjected to pure compression and combined flexural and axial forces. Design welded and bolted connections and a base plate connection. Analyse and design a one-bay/two-bay braced and moment frames for gravity and lateral loads using software.

**Prerequisites:** CVE 3203

**CVE 4513 Concrete Design II (2-2-3)**

Apply the basics of design procedures, construction methods and detailing of reinforced concrete elements and structures to the design of specific concrete structural elements. Using the relevant regional or international code, design and detailing concrete footings, pile foundations, walls, shear walls, columns, beams, and slabs for reinforced concrete buildings.

**Prerequisites:** CVE 3513

**CVE 4523 Steel Design II (3-1-3)**

Design of connections for structural elements like a beam splice, column splice and connections for moment and braced frames. Analyze and design a continuous beam of four spans with its compression flange fully restrained laterally. Design of members subjected to combined flexural and axial forces. Analyze and design two story, three bay, braced and moment frames for gravity and lateral loads. Complete design of small industrial building for gravity and lateral loads. Explore the design parameters of steel bridges of the following types: trusses, arches, suspension and cable stayed bridges.

**Prerequisites:** CVE 4503

**CVE 4533 Prestressed Concrete Design (3-1-3)**

Covers the basic principles of pre-stressed concrete design and builds this to an ability to calculate, design and detail simple precast elements such as beams and slabs. The student will be able to complete both strength and serviceability checks and make appropriate allowances for fabrication and construction issues such as jacking techniques and joint details.

**Prerequisites:** CVE 3513

**CVE 4603 Construction Contract Management (3-1-3)**

Applies the principles and procedures involved in effective administration and management of engineering contracts, from tender to final completion. Explores the legal implications of contract documents; major issues in pricing and bidding; preparation of tenders and work breakdown for bidding; reading tender documents and estimating the cost of work; initiating, negotiating and signing agreements; coordinating with General Services as per UAE procedures.

**Prerequisites:** CVE 2113

**CVE 4613 Concrete Technology (2-2-3)**

Examines concrete-related topics, the quality assurance and quality control of Portland cement concrete, Portland cement characteristics and related tests, testing of fresh and hardened PCC, formwork, placement and curing of PCC, and reinforcement used in PCC elements. Explore concrete testing using local and international standards.

**Prerequisites:** CVE 3513

**CVE 4803 Special Topics in Civil Engineering (3-1-3)**

Presents a theoretical or practical topic proposed by the faculty beyond what is offered in existing courses. Can be repeated for credit.

**CVE 4893 Directed Study (3-1-3)**

Provides an opportunity to investigate under faculty supervision beyond what is offered in existing courses.

**CVE 4902 Capstone Design Project I (1-3-2)**

Coordinate to form project teams to propose, plan and design an engineering product. Gain the knowledge to identify design problems to meet industrial needs. Define design projects" criteria, components, resources, implementation schedule, and estimated costs.

**Prerequisites:** (EGN 3806 or EGN 3812), EGN 3012

**Corequisites:** EGN 3212

**CVE 4912 Capstone Design Project II (1-3-2)**

Continue on the engineering design project carried forward from the preceding semester. Implement, build, test, evaluate, and analyze the proposed design. Develop and gain organizational, communicational and interpersonal skills.

**Prerequisites:** CVE 4902