

A'Sharqiyah University

College of Engineering

Department of Civil and Construction Engineering

Bachelor of Engineering in Civil Engineering

Course Descriptions

University Requirements (12 CH)

ISLM101 Islamic Civilization (3 CH)

This course aims to introduce students to the concept of civilization, the composition and evolution factors, introduce them to the most important political and administrative systems and economic and social development in the Islamic civilization, and aims to the statement of contributions to Islamic civilization in other civilizations, especially the European civilization, also aims to publicize the importance of the site Oman and how to interact with other previous civilizations in different eras, and the factors that allowed it to be a center of cultural divisions history.

ENGL101 English Communication Skills I (3 CH)

This course develops students' proficiency through grammar instruction and fluency exercises. While the emphasis of the class is on speaking and listening, there are also reading and writing exercises which reinforce the grammar and vocabulary students learn. Finally, students are required to participate in discussions regularly basis and give several presentations.

ENGL102 English Communication Skills II (3 CH)

This course further develops reading sub-skills, comprehension, and vocabulary. The texts are more demanding lexically and structurally than ENGL101 and are mainly literary. Written and oral activities require students to respond to these texts critically.

MNGT 313 Entrepreneurship (3 CH)

This course is an introductory course in Entrepreneurship and Innovation. The course aims to expose students to business venturing and entrepreneurial activity. The students would apply knowledge and skills acquired during the course by developing and evaluating their business ideas. This course is an introductory entrepreneurship course that focuses on the vital role played by entrepreneurs and entrepreneurship in the 21st-century global economy. The process of successfully launching and growing an entrepreneurial venture by applying the entrepreneurial process is examined. The course integrates several different disciplines, ranging from sociology and psychology to economics, finance, marketing, and human resource management. It is a course that mixes theory with practice by applying principles, concepts, and frameworks to real-world situations.

College Requirements (42 CH)

ENGR111 Computer Applications (3 CH)

The course teaches students how to use MATLAB and Visual Basic programming languages in a numerical computing and integrated development environment. The topics covered in the course include using variables, solving problems, data analysis functions, manipulating matrices, plotting, data presentation, logical operators, flowcharts, pseudocode, selection structures, and an introduction to Visual Basic programming language with its applications.

MATH101 Calculus 1 (3 CH)

The aim of this course is to lay a firm foundation for students in calculus. The course will introduce students to the concepts of Limits, Continuity, Derivatives, Hyperbolic functions and Integrals. It will develop MATHematic critical thinking and problem-solving skills.

PHYS101 Physics I (3 CH)

"This course presents concepts and methodologies for understanding physical phenomena. Topics

include kinematics, Newton's laws, work and energy, the universal law of gravitation, systems of particles, rotational motion, momentum, angular momentum, mass and energy conservation laws, thermodynamics, vibrations and waves, oscillations, and transverse waves."

CHEM101 Chemistry I (3 CH)

"This course presents the basic concepts and methodologies for understanding chemical phenomena. Stoichiometry of chemical reactions, quantum mechanical description of atoms, the elements and periodic table, chemical bonding, real and ideal gases, thermochemistry, introduction to thermodynamics and equilibrium, introduction to chemical kinetics, acid-base and solubility equilibria, introduction to oxidation-reduction reactions".

MATH102 Calculus II (3 CH)

The aim of this course is to lay a firm foundation for students in calculus. The course will introduce students to the concept's definite integrals, integration by substitution, integration by parts, sequences and series. This course also introduces students to the concepts of vector and scalar products, partial derivatives, solution of first-order ODE's and PDE's.

PHYS102 Physics II (3 CH)

This course presents introduction to electricity, magnetism, electromagnetic waves, optics, and modern physics. Topics include Coulomb's Law, electric fields, Gauss' Law, electric potential, capacitance, circuits, magnetic forces and fields, Ampere's Law, induction, Maxwell's equations, electromagnetic waves, and geometrical optics.

ENGR201 Engineering Drawing (3 CH)

This course provides basic knowledge and skills of engineering drawing so that students can efficiently develop engineering plans and details. Main topics includ freehand sketching, principles of orthographic projection, dimensioning, section, isometric and working drawings, 2D and 3D drawings using AutoCAD.

ENGR202 Technical Writing and Presentation (3 CH)

The objectives of this course are to develop engineering students' abilities to improve the communication skills and specialist language knowledge of engineers; to listen to and speak about engineering-related situations; to ask and answer important engineering-related questions; and to present engineering projects in an engaging and convincing format.

ENGR322 Summer Internship (0 CH)

This course is basically focused on practical and project based-training, research and development, communication and development skills, costing and safety awareness, exposure to data collection, troubleshooting, improvement, design and development of systems, and understanding on system operation as whole.

ENGR404 Engineering Economics (3 CH)

The objective of this course is to introduce the basic concepts of engineering economy and to demonstrate the importance of financial management and engineering decisions in financial project analysis. The topics covered includes an overview of financial accounting, time-value of money, risk in financial decisions, and book and tax depreciation.

MATH203 Differential Equations (3 CH)

Solution of first-order ODE by analytical, graphical, and numerical methods. Linear ODE's with emphasis on the second order with constant coefficients. Sinusoidal and exponential signals. Fourier series and periodic solutions. Delta functions, convolution, and Laplace Transform methods. Matrix and first-order linear systems. Classical partial differential equations of applied mathematics are covered: diffusion, Laplace/Poisson, and wave equations. Methods and tools for solving PDEs: separation of variables, Fourier series, and transforms.

MATH215 Linear Algebra (3 CH)

The course aims to introduce students to different methods of solving systems of linear equations using matrices and to teach the representation of geometric transformations through matrices. The course covers topics such as the algebra of matrices and vector spaces, as well as applications of matrices to solutions of systems of linear equations and geometric transformations.

MATH204 Probability and Statistics (3 CH)

Basic concepts of descriptive statistics, statistical inference, regression, correlation analysis, hypotheses test, and confidence intervals, elements of set theory, sample space and events, probability, conditional probability and independence, examples of discrete and continuous probability distributions, multivariate probability distributions, functions of random variables, and central limit theorem.

MATH305 Numerical Methods (3 CH)

Programming for numerical calculations, round-off error and approximation, solving nonlinear equation, solving system of linear equations, curve fitting and interpolation, numerical differentiation and integration, and solution of ordinary differential equations. Practice on the computer.

MATH406 Calculus III (3 CH)

Multivariable Calculus: partial derivatives, directional derivatives, chain rules, tangent planes, maximum, and minimum, Lagrange multiplier, cylindrical and spherical coordinates, multiple integrals, and substitutions. Theorems of Green, Gauss and Stokes.

Program Requirements (74 CH)

ENGR110 Engineering Laboratories (3 CH)

The course aims to introduce students to the core disciplines of civil engineering such as Transportation Engineering, Structural Engineering, Materials Engineering, Environmental Engineering,

Geotechnical Engineering, and Thermo-Fluids Engineering. The course includes laboratory sessions in each of these disciplines, where students will conduct experiments related to Structures and Materials, Environmental Engineering, Transportation Engineering, and Thermofluids.

CVEN310 Surveying (3 CH)

The course focuses on teaching students the fundamentals of measuring distance, elevation, and angles using surveying instruments, as well as determining areas and volumes. Additionally, the course covers the setting out of construction works and introduces students to GPS and GIS. The course includes intensive field work to provide hands-on experience to the students.

CVEN332 Civil Engineering Materials (3 CH)

This course introduces students to geology and its impact on the design and construction of civil engineering constructed facilities. Students will learn about the engineering elements of rocks and geologic processes from an engineering perspective.

ENGR220 Statics (3 CH)

The course aims to help students apply their knowledge of mathematics and science to understand the basic principles of mechanics and apply them to solve a wide range of engineering problems. Topics covered in the course include vector operations, free body diagrams, moments, distributed loads, truss analysis, centroids, center of gravity, composite bodies, composite areas, radius of gyration, and Mohr's circle.

CVEN232 Engineering Geology (3 CH)

The course focuses on the study of the earth's structure, including rocks, sediments, and geological structures. It also covers the use of rocks in construction and mapping techniques. Additionally, the course includes the study of soil, groundwater, and rivers, with a focus on their relevance to civil and environmental engineering.

CVEN333 Mechanics of Material (3 CH)

The course introduces the basic fundamentals of mechanics, focusing on two-dimensional stresses and strains, and the deflections of statically-determinate members subjected to axial, torsional, and transverse loads. The course also covers buckling of columns, as well as Mohr's circle and stress transformation.

CVEN362 Transportation Engineering (3 CH)

This course introduces students to the discipline of transportation engineering and acts as the background for more advanced transportation courses. It includes highway planning, highway materials: soils and aggregates, asphalt binders and mixtures, geometric design of highways, surface drainage, road construction, and introduction to pavement design. The lectures are supplemented by extensive laboratory sessions.

CVEN340 Analysis of Structures I (3 CH)

The course covers the analysis of statically determinate and indeterminate trusses, beams, and frames using classical methods such as virtual work, slope deflection, and moment distribution methods. The course also includes deflection calculations and influence lines in beams and trusses. Additionally, the course covers the use of commercial software packages for structural analysis.

ENGR321 Dynamics (3 CH)

This course focuses on the fundamental principles of engineering mechanics with a focus on dynamics. Topics covered in the course include the kinematics and kinetics of a particle, work and energy, and impulse and momentum.

CVEN301 Design of Concrete Structure I (3 CH)

The course focuses on loads and load combinations acting on structures, including methods and codes for the design of reinforced concrete elements. The course covers the design of various structural elements such as slabs, beams, columns, staircases, and foundations. Additionally, the course includes factors of safety related to design.

CNMN405 Building Information Modelling (3 CH)

The course introduces students to the innovative concepts and processes of Building Information Modelling (BIM). It gives students a practical hands-on Autodesk's BIM software (Revit Architecture) as used in professional applications and analysis of current and future trends in BIM design. The course will be focusing on the processes involved in developing a full 3D design object model, not for the purpose of visualization alone, but more importantly as a tool for understanding and documenting how a proposed building design fits together and how it will perform during use.

CVEN324 Integrating Group Project (3 CH)

The course involves applying knowledge in the core areas of civil engineering learned at the diploma level and gaining an in-depth perspective of the planning, design, organization, and construction methods involved in delivering buildings and infrastructure across the project life cycle. Additionally, the course includes a design project of a civil engineering system that involves more than one civil engineering specialization.

CVEN471 Engineering Project Management (3 CH)

This course prepares students to build their skills in areas of Project Management. It includes training on MS Project 2013/Primavera P6. Main topics cover organizational structure on a project, roles and responsabilities of project manager, the components of time management, purpose of activity definition and sequencing, different diagramming techniques, factors affecting activity duration, estimating activity duration, usage of mathematical analysis techniques for schedule development, schedule control, and the importance of schedule adherence.

CVEN260 Geotechnical Engineering (3 CH)

The course covers the fundamental principles of geotechnical engineering, with a focus on soil mechanics. Topics covered include the basic characteristics of soils, the effective stress principle, seepage and flow nets, consolidation, and shear strength of soils.

CVEN350 Thermofluids Engineering (3 CH)

The course covers the fundamental principles of fluid mechanics, heat transfer, thermodynamics, and fluid flow. Topics covered include properties of fluids, fluid statics, momentum, entropy and energy principles, similitude, dimensional analysis, fluid flow, and heat transfer.

CVEN443 Foundation Engineering (3 CH)

This course focuses on geotechnical analysis and design of shallow and deep foundations. Students will learn about the fundamentals of foundation engineering and apply these principles to practical engineering problems. Topics include shallow and deep foundations, bearing capacity and limit analysis, stresses beneath shallow foundations, settlements from elastic and consolidation theory, and pile resistance under compressive loads.

CVEN451 Hydraulics Engineering (3 CH)

This course covers the applications of fluid mechanics for designing water works such as pipelines, pipe networks, open channels, and turbomachinery. It also includes the design of hydraulic structures and an introduction to coastal and harbor engineering. The fundamental concepts of applied fluid mechanics are taught to solve problems in municipal water and wastewater systems design while considering codes, standards, and regulatory requirements. Topics include Fluid properties and basic equations, Pipeline design and analysis, Pump and pump system design, Design of open channels and culverts.

CVEN444 Design of Concrete Structures II (3 CH)

The course focuses on the different structural systems used in building design and their behavior under loads. The goal of the course is to provide students with a comprehensive understanding of structural systems and the ability to apply that knowledge to practical building design. The course covers topics such as floor and stair types, foundations, reinforced concrete members, and computer applications in structural design.

CVEN491 Capstone Design Project I (3 CH)

This course deals with a design project of a civil engineering system that involves more than one civil specialization. Students work in groups under close supervision of faculty members.

CVEN361 Environmental Engineering (3 CH)

This course teaches environmental science from engineering approach. It covers an introduction to environmental engineering, water pollution, air pollution, soil contamination, hazardous and solid waste.

CVEN545 Analysis of Structures II (3 CH)

This course covers advanced structural analysis methods including flexibility and stiffness matrix methods, which are used to determine forces and deflections of framed structures. Topics include variational approaches for structural analysis, member force-deformation relations, applications of stiffness method to trusses, beams, frames, and an introduction to programming.

CVEN441 Design of Steel Structures (3 CH)

The course covers the fundamentals of designing steel structures such as beams, columns, frames, and connections, as well as the behavior of steel structures under tension and compression. Topics include loads on steel structures, properties of steel and common steel sections, Bolted and welded connections, and practical applications of structural steel design.

CVEN592 Capstone Design Project II (3 CH)

This course is a continuation of the course CVEN 491. The aim is to prepare students for professional engineering work. The course involves planning, design, and presentation including engineering drawings. Typical projects could be water-distribution or wastewater-collection systems, transportation system, strucural system, air polution, project planning, scheduling time management, leadership, team building skills, and technical communications: Written, oral and graphical.

CVEN552 Engineering Hydrology (3 CH)

This course introduces the basics of hydrology and its principles for water resources engineering design, including hydrologic cycle, statistics, design storm, and aquifer modeling. It also covers topics

such as urban storm-water drainage, flood damage mitigation, and seawater intrusion in coastal aquifers.

CVEN563 Traffic Engineering (3 CH)

The aim of this course is to provide students with an overview of the fundamentals of traffic engineering, with emphasis on transport modes, planning models, traffic-flow characteristics and highway capacity, speed, travel time and delay, traffic volumes, traffic accidents, parking study, intersections and at-grade intersection design.

Program Elective Courses (Choose three courses of 9 CH)

CVEN536 Pre-stressed Concrete (3 CH)

This course aims to teach the principles of pre-stressed concrete analysis and design. Topics covered include analysis and design of pre-stressed concrete structures in flexure, shear, torsion, and deflection, as well as time-dependent effects such as creep and shrinkage.

COEN586 Sustainable Construction (3 CH)

This course prepares students with the fundamentals and principles of sustainable construction. It provides information on technical requirements of the LEED Green Building Rating System for New Construction & Major Renovations (LEED-NC). Additionally, it provides an understanding of how LEED is being used nationally throughout the design and construction industries to define various levels of sustainable project design; the resources available for successfully achieving LEED project certifications.

CVEN544 Design of Temporary Structures (3 CH)

This course covers the analysis, design, and assessment of temporary structures used in construction projects. Topics include engineering principles, design considerations, construction loads, shoring, cofferdams, horizzontal and vertical forwork design and practical applications of temporary structural design and operations.

CVEN537 Ground Improvement (3 CH)

This course focuses on the design and implementation of geotechnical engineering applications in construction. The course aims to increase understanding of practical geotechnical engineering applications. It covers the properties of difficult soils, such as soft and loose soils, expansive soils, and collapsible soils, and various improvement techniques, including compaction, dynamic compaction, dewatering, soil stabilization, and geosynthetics reinforcement.

CVEN538 Earth Retaining Structures (3 CH)

This course is focused on the analysis and design of various types of earth retaining structures commonly used in civil engineering, such as gravity retaining structures, embedded walls, braced excavation, and reinforced soil retaining structures. The course covers the fundamentals of lateral earth pressures and provides practical applications of these principles in designing and analyzing earth retaining structures.

CVEN546 Design and Rehabilitation of Pavements (3 CH)

This course provides a basic introduction to design and rehabilitation procedures for pavements. It enforces design principles taught to students and increases their understanding of transportation engineering. The course includes the analysis and design of flexible and rigid highway and airfield pavements, advanced technologies and materials for pavements, performance evaluation and rehabilitation of pavements, and introduction to Superpave systems.

CVEN554 Hydrogeology and Groundwater Contamination (3 CH)

This course focuses on providing students with a comprehensive understanding of hydrogeology and groundwater contamination, including basic topics and models. Through the course, students will learn about subsurface flow, confined and unconfined aquifers, groundwater flow equation solutions, aquifer property estimation, analysis of multiple well systems, design of well fields and aquifer pumping tests, groundwater quality, contaminant transport models, and computer models.

ENEN431 Water and Wastewater Treatment (3 CH)

This course introduces a discussion of physical, chemical, and biological processes for water, and wastewater treatment, process kinetics, coagulation, flocculation, sedimentation, activated sludge, trickling filters, rotating biological contactors, filtration, disinfection, ion exchange, air stripping, electro-dialysis and reverse osmosis.

CVEN553 Water Resources Engineering (3 CH)

This course provides students with an understanding of water resources, their quality, and engineering models used to manage them. The course covers topics such as water quality, surface water bodies, and their management, including the fate of man-made discharges. The course also addresses the technical and non-technical considerations for water resource planning and management projects.

ENEN531 Advanced Wastewater Treatment (3 CH)

The course introduces the main concepts to understand the physical, biological, and advanced treatment of wastewater. It covers topics such as physical unit operations and design, biological unit processes, design of facilities for the biological treatment of wastewater, and advanced wastewater treatment and and design of facilities for the treatment and disposal of sludge is also discussed.

COEN282 Construction Equipment (3 CH)

This course provides basic knowledge of construction equipment to students so that they can efficiently identify types and uses of construction equipment. It covers time value of money, cost estimating associated with equipment, fundamentals of earthmoving (Tractors, loaders, scrapers, excavators, trucks, haulers, and graders), soil compaction and stabilization, lifting and loading equipment, operational analysis, and equipment fleet management.

COEN585 GIS Applications in Civil Engineering (3 CH)

This course prepares students with the basic knowledge and skills of Geographic Information System so that they can be applied efficiently in civil, construction and environment engineering. Main topics cover an introduction to GIS, spatial data structures, map projections and coordinate systems, raster and vector spatial data models, topology and relational query, selecting and editing features, feature proximity, containment, intersection, spatial joins, overlays, buffers, geo-processing, image processing, supervised and unsupervised classification, and image rectification.

COEN587 Cost Estimating (3 CH)

The course aims to equip students with the basic knowledge and skills of cost estimating to manage various types of construction projects efficiently. It covers the fundamentals of cost estimating, including bidding and budgeting construction projects. Additionally, the course introduces the utilization of cost estimating software through lab exercises.

CVEN520 Rock Engineering (3 CH)

This course provides an introduction to rock mechanics. The aim is to equip students with the necessary knowledge and skills to design and analyze structures in rock formations. The topics covers principles such as site investigations, rock mass characterization, deformation, settlement, bearing capacity, and stability of rock masses. The aim is to equip students with the necessary knowledge and skills to design and analyze structures in rock formations.

CVEN521 Dynamics of Structures (3 CH)

This course analyses the fundamental principles of structural dynamics. This includes dynamic modelling of damped and undamped single degree of freedom free vibration. In addition, an introduction for multi-degree of freedom systems is provided. It concludes with the topics of eigenvalues, eigenvectors or eigenmode shapes.

CVEN564 COASTAL ENGINEERING (3 CH)

This course provides an introduction to coastal and harbor engineering and its applications in the design of coastal structures. It covers the physical processes and theory of waves, tides, and sediment transport in coastal areas. The course aims to equip students with the fundamental concepts of coastal engineering to solve problems encountered in coastal areas, such as determining sea parameters, wave properties, and sediment transport.

ENEN201 Renewable Energy (3 CH)

This course provides an overview of the technological principles of various renewable energy sources, such as solar energy, biomass, hydro, wind, wave tidal, and geothermal energy. It also covers techniques for analyzing the economics of renewable energy.

OJTR406 Industrial Internship I (0 CH)

This course is an internship course in which students need to spend two semesters in the industry of related fields. This internship course provides ASU's students with the opportunity to obtain experience in a typical work environment. Students will gain exposure to various aspects of general practices along with valuable industry experiences. This process will allow students to apply the theoretical knowledge in a professional work environment. This internship course is also intended to enhance the students' skills, competences, and employment prospects.

OJTR407 Industrial Internship II (0 CH)