



A'Sharqiyah University

College of Engineering

Department of Civil and Construction Engineering

Bachelor of Science in Water 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 centre 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.

MNGT313 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 (21 CH)

MATH101 Calculus I (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.

CHEM111 Applied Chemistry (3 CH)

The primary objective in this course is to build a firm foundation in chemical science and the basic principles that allow one to make qualitative and quantitative inquiries into various topics in natural/physical sciences and to demonstrate how observation and experimentation lead to the development of scientific theories. Another objective is to develop critical thinking, problem solving and communication skills.

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 product, partial derivatives, solution of first-order ODE's and PDE's.

PHYS111 Applied Physics (3 CH)

This course is a design course to increase understanding of the basic concepts of physics is fundamental for developing students' understanding of the more applied scientific disciplines such as Chemistry, Biology and other Applied Sciences.

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 include freehand sketching, principles of orthographic projection, dimensioning, section, isometric and working drawings, 2D and 3D drawings using AutoCAD.

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.

ENGR331 Applied Engineering Mathematics (3 CH)

This course aims at introducing the students to the fundamental of vectors, matrices, and application of linear and nonlinear systems. Algebra of vectors, matrices and applications of linear and nonlinear systems will be studied in this course. Programming for numerical calculations, round-off error and approximation, solving linear and nonlinear equations, curve fitting and interpolation, numerical differentiation and integration

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.

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.

Program Requirements (81 CH)

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 the effect of geology on the design and construction of civil engineering constructed facilities. Students will learn engineering elements of rock and geologic processes from an engineering perspective.

WATE211 Introduction to Water Quality (3 CH)

This course is designed to provide students with the basics and knowledge of water quality parameters (with a focus on toxic pollutants), their properties, measurement techniques, and control technologies. Risk assessment, and fate and transport of pollutants in relation with their physicochemical properties will also be covered.

WATE212 Water Microbiology (3 CH)

This course focuses on water microbiology and its impact on environment and health. This course considers water microbiology diseases and their risk assessment for surface water microorganism. Also, it will discuss the microbiology growth on water and wastewater. The course provides students with fundamentals and concepts that enable students to understand the water microbiology, microorganism growth, life, and other parameters.

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.

WATE213 Water Treatment I (3 CH)

This course provides students with the fundamental and basic tools for water treatment processes including chemical, physical, and biological processes. The course will cover different topics related to water treatment such as, filtration and separation processes, adsorption, disinfection, and other topics. The course provides students with fundamentals and concepts that enable them to understand water treatment techniques and the water important properties.

WATE121 Water Chemistry (3 CH)

This course provides students with essential and elementary tools for water chemistry including chemical composition, reactions, ionization, and water chemical properties. The course will cover different topics related to water chemistry such as, stabilization, diffusion, molarity and other topics.

CVEN231 Engineering Geology (3 CH)

This 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.

WATE221 Water Treatment II (3 CH)

This course provides students with knowledge and experience related to source water considerations, water parameters and characteristics, individual treatment processes, performance optimization, support systems, process control parameters, chemical handling, laboratory analysis and safety integration.

WATE222 Fluid Mechanics (3 CH)

This course introduces the engineering students to the principles of fluid mechanics and the application of theories to typical engineering problems such as: flow in pipes, fluid measurement, and calculation of fluid forces. Students completing this course should have the tools necessary for the analysis of field problems in fluid mechanics.

WATE311 Water Supply Technology (3 CH)

This course provides students with the technical classes in water distribution, water treatment, and wastewater collection. It will also cover other topics such as, water demand, water intake, treatment philosophy, water distribution systems, water losses and control, water economic and pricing, and automation in water supply.

WATE312 Computer Application in Water Resources (3 CH)

This course provides students with the basics of the advanced technologies in flow modelling and the emerging software applications in water resources management. In addition, it presents an overview of most of the advanced knowledge in software and flow modelling for water resources engineering and to make students able to identify and adapt appropriate strategies.

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 harbour 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.

ENEN201 Renewable Energy (3 CH)

In this course, students will receive an overview of underlying technological principles of renewable energy including solar energy, biomass, hydro, wind, wave tidal, and geothermal energy sources. Students will gain an understanding of some techniques involved in the analysis of the economics of renewable energy.

WATE321 Irrigation & Drainage Technology (3 CH)

This course offers students a comprehensive introduction to the water balance of cropped fields and the technology to manage this balance. In the irrigation part, the student gains insights and skills necessary for calculating the irrigation water needs of crops and the amount of water in function of different irrigation methods. For the part of the drainage plans for subsurface drainage equations are derived and the drainage criteria determined. Also, the choice and installation of drainage systems is explained.

ENEN461 Solid Waste Management (3 CH)

This course introduces students with the basics of nature and environmental effects of solid wastes and sludge including hazardous wastes. Topics covered are, Engineering management principles, practices, and techniques for management of solid and sludge wastes. Solid waste generation, storage, collection and transport processing, resource recovery, and disposal. Administration of solid waste management and health and safety considerations.

WATE322 Wastewater Treatment (3 CH)

The course is designed to introduce a theoretical and practical foundation within wastewater treatment. This also includes sludge treatment. An overview of typical wastewater characteristics, how this may affect relevant treatment processes, will be given, in addition to treatment and effluent requirements. The course will cover the theoretical foundation, and practical configurations, design and operation of relevant wastewater treatment processes, including physical-, chemical- and biological processes.

WATE323 Pump Station Design (3 CH)

This course provides students guidance and criteria for the design of high lift and water booster pumping stations in potable water distribution systems. Criteria are provided for pumping units operating as components in distribution systems. Guidance is provided for sizing and selection of pumps and pump drives, piping, control valves, flow metering, pump station structures, and operational features.

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 modelling. It also covers topics such as urban storm-water drainage, flood damage mitigation, and seawater intrusion in coastal aquifers.

WATE411 Capstone Design Project I (3 CH)

This course deals with a design project of a water engineering system that involves more than one civil specialization. Students work in groups under close supervision of faculty members. The course involves planning, design, production of construction drawings and presentation.

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.

ENEN582 Desalination Engineering (3 CH)

This course aims to improve the understanding of the underlying basic governing principles of desalination technologies design and operation. The course topics include raw water quality, membrane processes (reverse osmosis, electrodialysis) design and operation, evaporative processes (multi-stage flash and multiple effects), fouling and pre-treatment (scaling/plugging and their amelioration; cleaning), calculation of membrane design and operational parameters.

WATE414 Hydraulic Structures (3 CH)

This course is designed to provide students with the basic knowledge about the different types of hydraulic structures such as, dams, spillways, siphons, culverts, storages and others.

CVEN554 Hydrogeology & 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.

WATE423 Capstone Design Project II (3 CH)

The aim of this course is to prepare the student for professional civil engineering work. This course is a continuation of the course WATE411.

WATE413 Water Laws & Legislation (3 CH)

This course provides students with fundamental and basics of water law and policy, in a context of historical development and evolving recognition of issues related to human and ecological needs for water.

University Electives (Choose three courses of 9 CH)

0 Advanced Wastewater Treatment (3 CH)

This 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 design of facilities for the treatment and disposal of sludge is also discussed.

CVEN564 Coastal Engineering (3 CH)

The course aim to provide fundamental concepts of coastal engineering to solve problems encountered in coastal area and determine sea parameters like wave height, wave period, and water levels. In addition, it helps to understand wave properties, how they differ in the coastal zones and how sediments are transported with the influence of waves and current

WATE422 Groundwater Remediation (3 CH)

This course deals with the theoretical principles and practical engineering methodologies associated with the remediation of contaminated groundwater. Topics to be considered are as follows: Industrial and agricultural contamination of groundwater. Potential hazards to human health and the environment. Site investigation: preliminary, exploratory, detailed and monitoring.

WATE423 Advanced Technology in Desalination (3 CH)

This course is to provide students with the theoretical and practical knowledge on the design and operation of reverse osmosis systems applied in desalination of seawater and brackish water. Specific topics such as membrane fouling, scaling, and cleaning are dealt with in detail, including pre-treatment options and the latest developments in monitoring and controlling fouling will be delivered to students.

WATE424 Arid Zone Hydrology (3 CH)

This course provides students with the fundamental of arid zone hydrology and emphasis on key hydrological processes in arid zone such as, evaporation, storm water runoff, infiltration, and recharges to groundwater. Hydraulics of major hydrological features in Oman such as wadis, a flag, springs, and aquifers will be taught. In addition, key aspects of agricultural water management and agro forestry management in arid regions will be also discussed.

WATE425 Nano-technology in Water Applications (3 CH)

This course provides students with introduction to nanoscience and nanotechnology. Atomic structure and its nano-size, challenges of nanotechnology and nanoscience will be also provided. Application of water nanotechnology and nanomaterial as well as biological nano-materials will be provided.

WATE426 Water-Borne Diseases (3 CH)

This course provides students with essential and elementary tools for waterborne diseases generation. Pathogenic microbes that are transferred to water, sort of disease, and detection for waterborne diseases and control strategy will be also provided.

WATE427 Special Topics in Water Engineering (3 CH)

The aim of this course is to prepare the student for the assessment for sustainability with regard to social, environmental and economic impacts for water and wastewater systems including pipe networks and treatments plants.

WATE428 Water Pollution Control (3 CH)

This course provides students with basics of water pollution and their effects on water quality. Using engineering approach to detect and control water pollution will also be provided. In addition, studying the enormous range of contaminants that released into the water from domestic and industry will also be discussed.

WATE429 Design & Management of Irrigation Systems (3 CH)

This course is designed to provide students with techniques, calculation procedures and software packages which are helpful for the proper design, operation and management of irrigation schemes, and this for conditions of unlimited and limited water supply. A proper operation can, given the constraints of the physical infrastructure, results in a saving of considerable volumes of irrigation water and an overall improvement of the performance and water productivity of the system (more crops per drop).

OJTR 406 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)