Plan of Study: Diploma in Civil Engineering

Year I		
Fall Semester		**16 Credits**
Code	**Course Title**	**Credit Hours**
ENGL 101	Basic Academic English I	3
MATH 199	Calculus I	3
PHYS 170	Fundamentals of Physics I	3
PHYS 170L	Introductory Physics Laboratory	1
ENGR 100	Introduction to Engineering	3
ENGR 110	Engineering Workshop	1
ENGR 105	Engineering Graphics	2
Spring Semester		**16 Credits**
Code	**Course Title**	**Credit Hours**
ENGL 102E	English for Engineering and Sciences I	3
MATH 200	Calculus II	3
CMPS 100B	Introduction to Technical Programming	3
CHEM 130	Chemical Principles I	3
CHEM 130L	Introductory Chemistry Laboratory	1
CIVE 210	Statics	3
Summer Semester		**9 Credits**
Code	**Course Title**	**Credit Hours**
ENGL 203E	English for Engineering and Sciences II	3
MATH 205	Calculus III	3
SOCS 102	Omani Society	3

Year II		
Fall Semester		**17 Credits**
Code	**Course Title**	**Credit Hours**
MECH 270	Properties of Materials	3
ENTR 200	Entrepreneurship: Innovation and Creativity	3
PHYS 210	Fundamentals of Physics II	3
PHYS 210L	Physics Laboratory II	1
CIVE 265	Surveying & GPS	3
CIVE 265L	Surveying & GPS Laboratory	1
CIVE 213	Strength of Materials	3
Spring Semester		**17 Credits**
Code	**Course Title**	**Credit Hours**
EECE 210	Electric Circuits I	3
CIVE 230	Geotechnical Engineering	3
CIVE 230L	Geotechnical Engineering Laboratory	1
CIVE 221	Construction Materials	3
CIVE 221L	Construction Materials Laboratory	1
CIVE 250	Structural Analysis I	3
CIVE 241	Fluid Mechanics	3

Summer Semester		0 Credits
Code	**Course Title**	**Credit Hours**
CIVE 299	Practical Training for Diploma Students	0

Course Description

CIVE 210 Statics (3 crs)

This course covers the following topics: force vector, 2-D system of vectors, moment, couple, resultants, static equilibrium of 2-D forces and moments, centroid, truss, friction. Prerequisite: ENGR 100, PHYS 170, Pre/Co-requisite MATH 199.

CIVE 213 Strength of Materials (3 crs)

This course covers the different types of stress and strain induced by different types of loading: axial loading, torsion, pure bending: shear force and bending moment diagrams; stress concentration; analysis and design of beams in bending; shearing stresses in beams and thin-walled members; deflection of beams. Prerequisite: CIVE 210.

CIVE 221 Construction Materials (3 crs)

This course covers the composition and properties of engineering construction materials through hands-on laboratory experiments. The course introduces students to developments in construction equipment and technologies and Includes field demonstrations. Prerequisite: CIVE 213.

CIVE 230 Geotechnical Engineering (3 crs)

A course on engineering geology, soil classification and index properties; soil structure and moisture; compaction; seepage; effective stress concept; compressibility and consolidation; stress and settlement analysis; shear strength. Laboratory tests are conducted to familiarize students with soil characterization and the engineering behavior of soils. Co-requisite: CIVE 213.

CIVE 241 Fluid Mechanics (3 crs)

This course covers the basic concepts of fluid mechanics: properties of fluids, pressure and fluid statics, hydrostatic forces, fluid kinematics, conservation of mass, conservation of energy, fluids in rigid body translational and rotational motions, Bernoulli's equation, momentum analysis of flow systems. Prerequisite: CIVE 210 and MATH 200.

CIVE 250 Structural Analysis I (3 crs)

This is an introductory course covering influence lines; deflection of beams and frames by double integration method, moment-area theorems, and conjugate beam; introduction to indeterminate structures; approximate analysis of building frames. Prerequisite: CIVE 210.

CIVE 265 Surveying & GPS (3 crs)

This course deals with the theory of measurements and errors; linear measurements; surveying instruments; leveling; angles, bearings, and azimuths; stadia measurements; traversing–field aspects; traverse computations and adjustment; topographic surveying; triangulation. Prerequisite: MATH 200.

CIVE 299 Practical Training (Diploma Students) (0 crs)

An 8-weeks professional training course in Civil Engineering.

CIVE 325 Concrete I (3 crs)

This course covers the mechanical properties of concrete materials; ultimate strength theory of flexure and shear; flexural and shear design of beams; service load behavior; bond properties of reinforcing bars; design of solid and ribbed one-way slabs. Prerequisite: CIVE 250 and CIVE 221.

CIVE 331 Steel Design (3 crs)

This is an introductory course to design steel structures using the LRFD method. Topics covered include tension members; compression members; beam design; serviceability requirements; beam-column design; bolted and welded connections. Prerequisite: CIVE 250 and CIVE 221.

CIVE 340 Engineering Hydrology (3 crs)

This course focuses on hydrologic principles, rainfall-runoff analysis, flood routing, frequency analysis, and ground water hydrology. Prerequisite: CIVE 241.

CIVE 350 Environmental Engineering (3 crs)

This course introduces the fundamentals of environmental engineering. A screening course of major topics in environmental engineering including water and wastewater, environmental hydrology, environmental hydraulics and pneumatics, air, solid waste, noise, environmental modeling, and hazardous waste. Prerequisite: CIVE 451.

CIVE 361 Transportation Engineering (3 crs)

This course introduces the field of transportation engineering through a presentation of the basics of traffic engineering, traffic flow theory, and pavement design. Prerequisite: CIVE 265.

CIVE 400 Practical Training (BS Students) (0 crs)

This is an 8-week practical training course in Civil Engineering.

CIVE 401 Final Year Project I (0 crs)

A chosen design topic and preparation of a detailed execution program for CIVE 402, through comprehensive research with the guidance and approval of the faculty. Fourth Year Level.

CIVE 402 Final Year Project II (3 crs)

A supervised project in groups of normally three students aimed at providing practical design experience in a civil and environmental engineering application. Prerequisite: CIVE 401.

CIVE 420 Concrete II (3 crs)

A course that builds upon Concrete I and covers continuous beams; short columns, slender columns, and biaxially bent columns; wall footings, concentrically and eccentrically loaded single column footings, and combined footings; staircases; bearing walls; shear walls; two-way slabs. Prerequisite: CIVE 325.

CIVE 451 Water and Wastewater Treatment (3 crs)

This course examines the quality and treatment methods of water and wastewater; testing for physical, chemical, and biological parameters. Prerequisite: CHEM 130 and CIVE 241.

CIVE 480 Construction Management (3 crs)

A course on organizing construction projects; pre-construction activities; bidding and contracts; fundamentals of construction planning, monitoring, and control; application of construction control tools: CPM, materials management, operations analysis, and quality control. Prerequisite: CIVE 221 and CIVE 325.

CIVE 485 Specifications and Cost Estimation (3 crs)

This course deals with the structure of construction documents and their interrelationships; bidding requirements; general and particular contract conditions; administrative and procedural requirements for construction; technical specifications; construction cost estimations process; unit rates determination. Prerequisite: CIVE 221 and CIVE 325.

CIVE 570 Introduction to Geographic Information Systems (3 crs)

This is an introductory course on Geographic Information Systems (GIS) and their applications in the planning and engineering fields, alternatives in computer-based graphics, date concepts and tools, network data management and planning applications, and implementation issues. Prerequisite: CIVE 265.

CIVE 410 Structural Analysis II (3 crs)

This course covers stability and determinacy of structures; energy theorems and applications to trusses, beams, and frames; solution of statically indeterminate structures by flexibility (force) and stiffness methods; introduction to the direct stiffness method; influence lines for indeterminate structures. Prerequisite: CIVE 250.

CIVE 510 Bridges (3 crs)

This course discusses the types of bridges; influence lines; loads and their distribution on bridges; serviceability of bridges; methods of design of bridge deck, superstructure, and substructure. Prerequisites: CIVE 410, CIVE 420, and CIVE 331.

CIVE 511 Advanced Structural Analysis (3 crs)

This course offers a review of matrix algebra; basic principles of structural analysis: stiffness, flexibility, and energy methods; direct stiffness method for plane and space trusses and frames; linear and nonlinear problems; special

problems; computer programming. Prerequisite: CIVE 410.

CIVE 520 Plain Concrete (3 crs)

This course examines Portland cements; aggregates; fly ash and silica fume; admixtures for concrete; proportioning normal concrete mixtures; pumping concrete; consolidating, finishing, and curing concrete; durability; testing hardened concrete; high-strength concrete; light and heavy weight concretes; hot and cold weather concreting. Prerequisites: CIVE 221.

CIVE 522 Pre-stressed Concrete (3 crs)

This course covers material characteristics; pre-stress losses; working strength design procedures; composite construction; ultimate flexural strength and behavior; shear design; continuous pre-stressed concrete members. Prerequisite: CIVE 420.

CIVE 430 Foundation Engineering (3 crs)

A course that covers site investigations; evaluation of data from field and laboratory tests; estimation of stresses in soil masses; applications of principles of soil mechanics to determination of bearing capacity and settlement of spread footings, mats, single piles, and pile groups. Prerequisite: CIVE 230.

CIVE 530 Applied Foundation Engineering (3 crs)

A course on braced excavations, retaining structures, deep foundations, slope stability, and computer applications. Prerequisite: CIVE 430.

CIVE 532 Soil and Site Improvement (3 crs)

This course covers compaction, admixture stabilization, foundation soil treatment, reinforced soil and composite materials, and material sites reclamation. Prerequisite: advanced standing level. CIVE 230.

CIVE 460 Highway Engineering (3 crs)

A course that examines road vehicle performance; principles of geometric design and highways; horizontal and vertical alignment; earthwork; intersections and interchanges; parking facilities; basic traffic models; queuing theory and traffic analysis; travel demand forecasting. Prerequisite: CIVE 361.

CIVE 560 Pavement Design (3 crs)

A course examining highway and airport pavement design; flexible and rigid pavement types and wheel loads; stresses in flexible and rigid pavements; pavement behavior under moving loads; soil stabilization. Prerequisite: CIVE 361.

CIVE 561 Urban Transportation Planning I (3 crs)

This introductory course covers methods and models used in transportation planning with emphasis on the urban context. Prerequisite: CIVE 361.

CIVE 562 Traffic Engineering (3 crs)

This course outlines traffic engineering studies; traffic control of signalized and un-signalized intersections; signal control hardware and maintenance; arterial performance and operations; network optimization. Prerequisite: CIVE 361.

CIVE 440 Hydraulics + Laboratory (3 crs)

This lab deals with flow in conduits, flow in open channels, flow measurements, and laboratory experiments. Prerequisite: CIVE 241 and CIVE 241L.

CIVE 540 Hydraulic Structures (3 crs)

This course covers closed conduit flow, water distribution systems, transient analysis, open channel flow, flood control, culvert hydraulics, design of various hydraulic structures. Prerequisite: CIVE 440.

CIVE 541 Surface Water Hydrology (3 crs)

This course covers design storm, rainfall-runoff modeling, overland flow, flood routing, reservoir routing, simulation models, hydrologic design, urban hydrology, and stochastic hydrology. Prerequisite: CIVE 340.

CIVE 542 Ground water Hydrology (3 crs)

A course that deals with properties of groundwater, groundwater movement, general flow equations, steady – state well hydraulics, seepage forces, unsteady well hydraulics, infiltration, and groundwater modeling. Prerequisite: CIVE 340.

CIVE 550 Methods of Environmental Sampling and Analysis (3 crs)

A course on sampling techniques and instrumental methods in environmental sciences; determination of pollutants in water, air and soil; analytical techniques and adaptation of procedures to specific matrices; case studies. Prerequisite: CIVE 350 and CIVE 450

CIVE 553 Water and Sewage Works Design (3 crs)

A course that examines the design of water and water schemes, including design reports and a literature search on the development of conventional treatment processes. Prerequisite: CIVE 350and CIVE 450

CIVE 554 Solid Waste Management I (3 crs)

A course on nature and effects of solid wastes including hazardous wastes; engineering management principles, practices, and techniques for management of solid wastes administration; solid waste generation, storage, collection and transport, processing, resource recovery, and disposal; trip to a local facility. Prerequisite: CIVE 350.

CIVE 221L Construction Materials Laboratory (1 crs)

The Construction Materials Laboratory is established to train students to carry out tests on common construction materials such as concrete, steel, wood, and masonry. The tests are conducted to determine the engineering properties in terms of strength, strain, fatigue, creep, elasticity, stiffness durability, and workability. Co-requisite: CIVE 221.

CIVE 230L Geotechnical Engineering Laboratory (1 crs)

The lab is meant to consolidate the course CIVE 230. Experiments will include: water content, organic content, specific gravity, grain size analysis, hydraulic conductivity (permeability), consolidation, direct shear, unconfined compression, triaxial shear. Co-requisite: CIVE 230.

CIVE 241L Fluid Mechanics Laboratory (1 crs)

This laboratory covers different experiments that may include: measurement of flow rate, Bernoulli's theorem, centre of pressure, floatation characteristics, centrifugal pumps, cavitations in centrifugal pumps, characteristics of two pumps in series, pipe friction losses, friction in bends and fittings, momentum of flow, Pelton turbine, hydraulic Ram Pump, free and forced vortices. Co-requisite: CIVE 241.

CIVE 265L Surveying & GPS Laboratory (1 crs)

In the Surveying Laboratory, students learn how to conduct distance measurements, transits and theodolites, vertical control, directions, angular measurement, topographic surveys, area and volume of earthworks, curve setting out, planimetric adjustment, GPS observable; basic principles of GPS operations; GPS error analysis; field procedures; data collection, processing; applications.
Co-requisite: CIVE 265.

CIVE 361L Transportation Engineering Laboratory (1 crs)

This laboratory will be used to collect and analyze data needed for the study and development of different types of transportation systems used on streets to major freeways. Experiments will include traffic counting and analysis, asphalt content of hot-mix asphalt by ignition method, Marshall Test, traffic impact studies, etc. Co-requisite: CIVE 361.

CIVE 451L Water and Wastewater Treatment Laboratory (1 crs)

This laboratory will cover experiments related to the following topics: water supply and wastewater collection systems. Water transmission mains, water distribution systems, pumping, storm sewers, and sanitary sewer systems, wastewater collection and wastewater treatment. Co-requisite: CIVE 450.