

Course Descriptions

Credit	Lab. Hrs.	Lecture Hrs.	Course Title	Course Code
3	2	2	Engineering Mathematics 1	GSE212
<p>The course consolidates the mathematical skills that underpin the BEng engineering degrees. In particular, it aims to:</p> <ul style="list-style-type: none"> • To consolidate the student's knowledge and understanding of a broad range of mathematical techniques appropriate for engineering courses. • To provide the knowledge and skills that enables the student to use computer software and programming as a support for his/her engineering studies. <p>On completion of the course, students will:</p> <ul style="list-style-type: none"> • be able to understand and perform a range of algebraic operations including operations on complex numbers in various forms; • be able to differentiate and integrate functions of one real variable using a variety of techniques; understand how calculus is used to model changes in engineering systems; 				
3	0	3	Engineering Mathematics 2	GSE222
<p>The course continues to consolidate the mathematical skill that required for a BEng degree.</p> <p>On completion the course, students will:</p> <ul style="list-style-type: none"> • be able to sketch the elementary functions; • be able to apply quantitative methods and computer software relevant to engineering. • be able to sketch piecewise functions and rational functions; • understand how calculus is used to model changes in engineering systems including applications involving partial derivatives. 				
3	2	2	Principles of Engineering Science 1	GSE213
<p>The course develops the students' understanding of essential scientific principles for the study of engineering to degree level. It is designed to be accessible to students with a wide range of prior science specialisation. The course comprises two blocks of study. These blocks are common to all engineering disciplines and introduce the principles of measurement systems and units, thermal physics, mechanical and electrical principles, and engineering materials and their properties.</p> <p>On successful completion of this course, students will be able to understand the fundamental principles of:</p> <ul style="list-style-type: none"> • Thermal physics including: phase transitions and gas laws; different modes of heat transfer • Basic concepts of optics, electricity and electromagnetism 				
3	2	2	Principle of Engineering Science 2	GSE221
<p>The course develops the students' understanding of essential scientific principles for the study of engineering to degree level. It is designed to be accessible to students with a wide range of prior science specialisation. The course comprises two blocks of study. These blocks are common to all engineering disciplines and introduce the principles of measurement systems and units, thermal physics, mechanical and electrical principles, and engineering materials and their properties.</p> <p>On successful completion of this course, students will be able to understand the fundamental principles of:</p> <ul style="list-style-type: none"> • How the properties of materials can be used in the design of engineering applications and devices • How the properties of a material are controlled by its internal structure and how this can be controlled by composition and processing 				

Students will know and understand more advanced aspects of one of: thermodynamics and fluid mechanics; electrical and electronic systems; fluid mechanics and structural engineering				
3	0	3	Engineering Practice and Design1	GSE210
<p>The course covers practical work, design activities, sustainable development principles, project management, health and safety and risk management, and transferable skills.</p> <p>Its overall aim is for students to begin their engagement with engineering design and to undertake practical engineering work.</p> <p>Part A: <i>Practical work</i> - provides skills designing, prototyping and model building, Health and safety, project management and group work.</p> <p>Part B: <i>Design and drawing</i> - provides skills in design and drawing, design methods and constraints, creative thinking and problem solving techniques.</p>				
3	2	2	Engineering System Design	CivEng413
<p>The principal aim of this course is to introduce the concept of engineering systems design. Other aims include the development of self-directed study skills, research skills, team-working and problem solving skills. Topics covered include:</p> <ul style="list-style-type: none"> • Introduction to mechanical and electrical systems. • Construction and testing of electromechanical systems. • Sensors and measurement. • Basic electronics for instrumentation and actuators • Control software and its implementation. • Simple project planning and management. • Basic technical documentation and/or presentation skills. 				
3	0	3	Structural Design and Analysis 1	CivEng410
<p>The aim of this course is to introduce students to the design of simple beams and columns to the relevant codes of practice. Topics covered include:</p> <ul style="list-style-type: none"> • Loading - dead, imposed and wind, characteristic and design load, partial safety factors; • Philosophy of Limit State Design - ultimate limit state (ULS) of collapse, serviceability limit state (SLS) of deformation, partial safety factors; • Reinforced concrete - strength, durability, fire resistance, cover, anchorage, lapping; Reinforced concrete axially loaded rectangular short column design and analysis; Reinforced concrete rectangular beam design and analysis; 				
3	2	2	Structural Design and Analysis 2	CivEng410
<p>This course follows Structural Design and Analysis 1. The aim of this course is to introduce students to the design of simple beams and columns to the relevant codes of practice. Topics covered include:</p> <ul style="list-style-type: none"> • Reinforced concrete rectangular beam design and analysis; • Structural steel beam design - laterally restrained beams, flexural and shear strength, plastic moment capacity, deflection; • Structural steel column design - concept of buckling, effective length, slenderness, use of strut tables, columns in simple construction; • Use of Eurocodes for reinforced concrete and steel design. 				
3	0	3	Engineering Ethics	GSE324
<p>This course introduces the theory and the practice of engineering ethics using a multi-disciplinary and cross-cultural approach. Theory includes ethics and philosophy of engineering. Historical cases are taken primarily from the scholarly literatures on engineering ethics, and hypothetical cases are written by students. Each</p>				

student will write a story by selecting an ancestor or mythic hero as a substitute for a character in a historical case. Students will compare these cases and recommend action.				
3	0	3	Surveying and Structures 1	CivEng215
This course aims to introduce you to the principles of professional building surveying and the work undertaken by building surveyors within a wide arena of professional practice. You will initially develop an appreciation of the nature and structure of the property and construction industries and gain an understanding of the role of the building surveyor within that industry. The course is delivered by a series of lectures and workshops supported by short site visits. It is assessed by in-class tests and a report or essay.				
3	0	3	Surveying and Structures 2	CivEng221
This course continues on from Surveying and Structures 1 where we will review key stages of the building process, analysing the roles and responsibilities of building surveyors and their interrelationships with other construction professionals. The course is delivered by a series of lectures and workshops supported by short site visits. It is assessed by in-class tests and a report or essay.				
3	0	3	Soil Mechanics	CivEng226
This course provides an introduction to the principles of soil mechanics – how soil behaves when subject to engineering loads and construction processes. It also provides knowledge of simple analysis methods that are appropriate for assessment of geotechnical structures – foundations, slopes and retaining walls – and groundwater control problems. At the end of the course the students should be able to understand soil behaviour and apply their knowledge to straightforward engineering structures. The course provides a foundation for more detailed analysis of geotechnical structures.				
3	2	2	Hydraulic	CivEng312
This course continues to develop the fundamental themes on fluid mechanics introduced in the course "Thermofluids" and applies them to the study of incompressible fluids in adiabatic conditions. It will focus on problems associated with water flowing in closed conduits (e.g. pipes) and open channels (e.g. rivers). The material that will be taught includes a good balance between theoretical principles (i.e. mass, momentum and energy conservation principles) and their application to real problems in hydraulic engineering. In dealing with closed conduit flows students will learn how to use these principles to find ways of delivering a required flow rate to some chosen locations under prescribed conditions. When studying open channel flows, students will learn how to predict water levels for a given channel geometry, bed condition (i.e. bed roughness and slope) and flow rate.				
3	0	3	Theory of Structures	CivEng321
Advanced theory of structures is a nine week course taken by Senior Sophister Civil Engineering students. The course concentrates on advanced theory and applications of elasticity and dynamics to structural engineering. The course structure is based on theory of elasticity, theory of plates, nonlinear structural analysis and structural dynamics. The students are also introduced to the area of finite element computational analysis in structural engineering. The student gains enough knowledge to be able to analyse non-linear structural systems under static loading and linear structural systems under dynamic loading.				
3	0	3	Environmental Engineering	CivEng211
This course provides an introduction to the role of the civil and environmental engineer in environmental management. Specific topics include Flood hydrology, Water and wastewater treatment, and Waste management. The course gives an overview of these topics and a foundation of methods of design and analysis underlying current practice.				
3	0	3	Advanced Structural Analysis and Design	CivEng329
Yield line and strip theory, dynamics of multi degree of freedom systems, analysis of buildings for earthquake loads, Analysis of buildings for wind loads, detailing for ductility, tall buildings and approximate analysis of tall structures.				
3	0	3	Geothermal Engineering	CivEng421

This course includes a study of the energy processes involved in the use of solar and geothermal energy; an evaluation of solar and geothermal heating, daylighting, and solar electricity generating technology.				
6	12	0	Design Project	CivEng422
<p>The Individual Project is a learning experience that enables students to do independent research and bring together many of the concepts they have been learning over the last few years. The work calls for careful planning, critical judgment, engineering competence, and communication skills. Further details are provided in the Individual Project Guide for Students. This Guide may be updated from time to time, and include information generally on how to plan the project, and on milestones, important dates, and deliverables.</p> <p>The aims of this course are therefore:</p> <ul style="list-style-type: none"> • To integrate previously learnt and taught knowledge and skills • To provide an opportunity for students to pursue extended independent research into an aspect of engineering/environmental science in which they may have developed a special interest, and provide experience of the way subject areas actually progress. • To develop a basic ability to define a research question, plan and execute an investigation to answer that question • To encourage students to develop a systematic and critical approach to enquiry through the planning, execution and presentation of a piece of work which involves the application of research techniques. • To develop students' independence, initiative and critical thinking • To develop a wide range of transferable skills including problem solving, planning and meeting your own deadlines; selecting, gathering, evaluating and synthesizing information from a range of sources; using information and communication technology to acquire, collate, process and analyse data and information implementation; designing and testing skills; preparing, processing, interpreting and presenting data, using appropriate qualitative and quantitative techniques and ICT packages and communicating ideas and arguments effectively in a variety of written formats • To understand the structure and elements of a research project in preparation for undertaking relevant research at work. 				
3	0	3	Structural Design	CivEng219
<p>You will learn the fundamental principles of mechanics relevant to Civil Engineers which underlie subsequent course in Structural Analysis, Fluid Mechanics and Geotechnics, and teach the basis of Structural and Stress Analysis.</p> <p>Topics include:</p> <ul style="list-style-type: none"> • Statics - the definition of equilibrium, forces, stresses and strains; the Mohr's circle of stress; the concept of Elasticity and plasticity; Hookes law, and the behaviour of simple spring systems. • Resolution and addition of forces, analysis of pin-jointed frames. • Bending moments and shear forces - Gallileo's analysis of a beam, illustrated with BM and SF diagrams. • Centroids of area, the neutral axis and second moments areaStress and strain in bending beams. • Virtual work. Unit Load Method Applied to Trusses. • Deflection of Symmetrical Section Beams. Double Integration Method. Macauley's Method. • Combined Bending and Axial Load. Core of a Rectangular Section. • Shear Stress Distribution in Symmetrical Section Beams. • Torsion of Circular Solid and Hollow Section Bars. • Statically Indeterminate Bars under Torsion. • Suspension Cables. Maximum Tension. Forces on Towers. Three-Pinned Arches. Symmetrical Three-Pinned Parabolic Arch Carrying a Uniformly Distributed Load. Bending Moment Diagram for an Arch. • Determinate Moment Frames. 				

3	2	2	Civil Engineering Materials	CivEng411
<p>Materials: General civil engineering material performance requirements: strength, stiffness, durability, appearance. Concrete: mix design, effects of constituent composition and proportions on fluid state and hardened state properties, concrete placement and curing.</p> <p>Steel: production and properties of steel, steel grades, effect of alloys, protection from corrosion and fire. Timber: properties of timber, defects, durability, grading. Asphalt cements: production and distillation, testing, modifications for particular applications, road tars, durability.</p> <p>Geo-synthetics: overview of available materials, geotextile functions and mechanisms, designing with geotextiles.</p> <p>Stresses in materials: review of axial stress and strain; Young's modulus; normal stresses; Poisson's ratio; elastic and plastic section moduli. Composite beams. Shear stress and strain.</p> <p>Biaxial stress systems: Mohr's circle of stress; Mohr's circle of strain, thin-walled vessels; three-dimensional stress and strain; combined stresses due to combined loading; and torsion in circular sections.</p>				
3	2	2	Civil Engineering Drawing and Surveying	CivEng315
<p>Civil Engineering Drawing - Rationale, Documentation, standards, Use of CAD or BIM software to produce structural engineering drawings in concrete and steel. Interpret Civil Engineering Drawings for structures, roads and drainage. Civil Engineering Survey - Theory and practice in the use of surveying instruments as applied to Civil Engineering and Construction projects. Calculations and Survey techniques.</p>				
3	2	2	Structural Mechanics	CivEng313
<p>Students will learn: Shear stresses in beams; Shear centre; Combined stresses; Torsion in non-circular sections; Unsymmetrical beam bending; Stress transformations; Introduction to Tension Analysis using stress and strain tensors; Failure theories; Deformation analysis; Approximate analysis of statically indeterminate structures</p>				
3	0	3	Design and Construction 1	CivEng310
<p>This course is in two parts: The first deals with Professional and Technical Skills: Philosophy of Engineering, Creative Thinking, Leadership & Management, Design & its Interaction with Construction, Design and Construction of Bridges, Environmental Considerations in design and construction, Construction Techniques for structures.</p>				
3	0	3	Design and Construction 2	CivEng320
<p>This is a continuation of Design and Construction 1 where it deals with Construction Contracts: Bill of Quantities & Standard Method of Measurement. Methods of Estimating, Specifications in Civil Engineering, Case Studies.</p>				
3	0	3	Construction Management	CivEng424
<p>Management. Planning, safety, estimation and Case studies.</p>				
3	0	3	Foundations	CivEng412
<p>Shallow foundations design. Bearing capacities of soils, safe, net and ultimate; factor of safety; mass concrete footings; footing resisting lift; column type footings. Two-way footing concentrically or eccentrically loaded; AS 3600 code requirements; design loads; critical section for shear; punching shear and bending shear, anchor bolts. Combined footings; design of strap or cantilever footings. Design of mat foundations. Design of retaining walls. Design of reinforced retaining walls. Sheet pile walls design. Residential footings design.</p>				
3	0	3	Arabic Language	ARB 101
<p>This course deals with issues related to the Arabic grammar and literature. It studies some basic linguistic issues in the vocabulary, morphology, syntax, and semantics of Arabic. It also studies stylistic and literary features through analyzing and discussing some selected texts from the holy Quran and other literary masterpieces.</p>				
3	0	3	History and Civilization of Bahrain	HBH 105

This course deals with the history of Bahrain from 1500-1800. It studies the stages of the Portuguese invasion of this part of the world and the international power struggle that erupted after the invasion. It also deals with the ruling of Al-Utuub Tribe of Bahrain and the reign of Al Khalifa thereafter.				
3	0	3	Human Rights	HR 106
<p>This course discusses the basic principles of human rights. It acquaints the students with the nature of human rights; their realms and sources, paying special attention to the international legal provisions concerning human rights included in the following documents:</p> <ul style="list-style-type: none"> • United Nations Charter. • International Declaration of Human Rights. • International Accord on Civil & Political Rights. • International Accord on Social & Economic Rights. • International agreement against torture and inhumane, disrespectful punishment. <p>Protection mechanisms and constitutional organization of public rights and freedoms in the Kingdom of Bahrain.</p>				
3	0	3	Intermediate English	ENG111
<p>ENG 111 is a skill-building course, which enables students to speak with ease and confidence, communicate with different types of people, discuss academic, social and professional matters, listen to news in English, read newspapers, magazines and references, write personal and business letters, write reports and articles, etc.</p>				
3	0	3	Civil and Construction Engineering Field Studies	ArchEng322
<p>This is substantially a project based learning course. It seeks to bring together construction and materials needed for design, surveying for execution, and some geology. It emphasises the link between materials and site geological properties and their relationship with design and execution. There will be a block week devoted to a Constructionarium type activity and others including geological and site visits. Multimedia support will feature in the delivery.</p> <p>It aims:</p> <ul style="list-style-type: none"> • To develop management, team safety and leadership skills • To explain the selection of plant, construction processes and products including materials selection for efficient and sustainable design and execution. To introduce geological influences. 				
3	0	3	Advanced English	ENG122
<p>ENG 112 is a three-credit-hour course that runs for one semester (or term) of 15 weeks. It is the second of two credit English language courses which all incoming students are required to take during their study at the University. The course is skill-building which enables students to speak with ease and confidence, communicate with different types of people, discuss academic, social and professional matters, listen to news in English, watch TV programmes, read newspapers, magazines and references, write personal and business letters, write reports and articles, etc. It fulfills a high level of proficiency in English as a prerequisite for academic, social and professional success.</p>				
3	0	3	Engineering Management and Economics	GSE329
<p>Introduction to engineering management. Types and characteristics of production systems. Forecasting methods and techniques. Product design. Capacity planning. Aggregate planning. Inventory planning and materials management. Short term scheduling. Quality management and quality control. Job design and work methods. Project planning and scheduling.</p>				
3	2	2	Engineering Science 1	GSE114
<p>This course covers scientific principles of physics and chemistry at a level between secondary school level and Advanced Level. It serves as a preparatory course for students intending to undertake engineering</p>				

undergraduate degree courses in the University and introduces students to a range of skills required for the study of engineering.

The course aims are:

- To introduce the elementary principles of chemistry and physics, necessary for subsequent studies.
- To develop appropriate skills required in these subject areas, including information skills and examination techniques

3	0	3	Mathematics 1	GSE111
----------	----------	----------	----------------------	---------------

This course provides a foundation in Mathematics, covering all the topics subsequently used in an Engineering degree.

3	2	2	Laboratory and Workshop Skills	GSE128
----------	----------	----------	---------------------------------------	---------------

This course is a mixture of workshop exercises and practical experiments and projects. Students work in small groups of 2-5 people depending on the task. The course also provide students with introduction to design skills and basic engineering drawing. It aims to provide students with an appreciation of engineering workshop environment and with skills of taking measurement and collecting data. Students will also learn how to analyse data and presented in a written form. They will also learn how to combine experimental data and practical skills with theoretical knowledge in solving engineering problems.

3	2	2	Principles of Engineering	GSE112
----------	----------	----------	----------------------------------	---------------

This course introduces the elementary principles of physics and chemistry and transferable skills necessary for the study of subsequent units

3	0	3	Mathematics 2	GSE124
----------	----------	----------	----------------------	---------------

This course aims to provide students with the mathematical knowledge and skills necessary for the rest of the course. The course will emphasise themes which are central to the field of engineering in general.

3	2	2	Engineering Science 2	GSE125
----------	----------	----------	------------------------------	---------------

This course is aimed at extending the science knowledge of engineering students in preparation for continuing on their respective engineering degree. It covers general applied physical principles, including dynamics, statics, fluids, heat and energy. The course aims to prepare students for entry into the BEng degree courses by providing an advanced level of knowledge and understanding of applied physics, and basic mechanical and thermodynamics principles.

3	0	3	Study Skills and Professional Practice	GSE113
----------	----------	----------	---	---------------

This course provides an introduction to both Study and professional Skills and practice.

The course introduces study skills considering both individual and team-working skills, it covers exam preparation, revision and question answering techniques. It introduces students to their own Personal Development Planning processes.

It also enables students to develop and use appropriate safe working practices as will be expected in an engineering and industrial environment. It aims to lay the foundation for development of personal and inter-personal learning and communication skills that students will require during their studies. It also aims to provide students with understanding of safety issues and engineering practices and to enable students to develop confidence in in their problem solving techniques.

3	4	1	Computer Programming for Engineering	GSE127
----------	----------	----------	---	---------------

This course introduce students with concepts of programming. This include conditional, alternatives, iterations and block structure. Structure programming and data-types will also be introduced and illustrated on a typical but simple engineering problems.

3	0	3	Engineering Practice and Design 2	GSE220
----------	----------	----------	--	---------------

This will build on Engineering Practice and Design 1, in particular:

Elements of practical work will include: Materials laboratories, Applied mechanics, Thermofluids laboratories, Flow rates laboratories, Electric circuits laboratories, Electronics workshops and Electrical workshops

Elements of design work will include: Design case studies, Specification and materials selection Design methodology for construction, manufacture and assembly, Conceptual and detailed design and Construction project management techniques and software tools.				
3	0	3	Constructing the Built Environment	CivEng121
<p>The course aims to</p> <ul style="list-style-type: none"> • explore the factors that influence the design process • be introduced to different design principles and use them to create a realistic design for a specific building structure • use hand tools and construction equipment safely to undertake basic operations • explore traditional and modern construction methods • understand the best ways to use new materials and methods to help sustain the built environment • recognise the visual and social impact of the built environment • understand the need for building maintenance and the importance of good design and workmanship • be introduced to the different career opportunities available in the design and creation of the built environment. 				
3	2	2	Infrastructure and Highway Engineering	GSE329
<p>This is substantially a project based course. It brings together construction, design, contractual, planning, management and safety processes. It emphasises the link between materials and site geological properties and their relationship with design and execution. Highway engineering will occupy half the contact time and this will include geometric and structural design aspects which will integrate some geology, earthwork and drainage. The course will also include site visits.</p> <p>It aims:</p> <ul style="list-style-type: none"> • To develop competency in project planning, safety and management, and to introduce contractual, financial and procurement principles. • To illustrate the role of materials and geology into the integrated design and construction process. • To develop competency in route location, selection, and a roads and junctions hierarchy. • To produce by project work knowledge of both the geometric and structural design of highways. • To study in an integrated way highways materials, earthworks and drainage and to link these to the rest of the course. • Understand the highway geometrical and structural design procedures. • Have knowledge of earthworks and drainage. • Understand geological properties and foundation design. • Understand safety and contractual approaches • Understand planning processes. 				
3	0	3	Advanced Engineering Mathematics	CivEng311
<p>This course covers advanced undergraduate engineering mathematics. It aims to</p> <ul style="list-style-type: none"> • To develop the student's knowledge and understanding of engineering mathematics, • To provide the student with key skills that are required for the identification, classification and description of the performance of engineering systems through the use of analytical methods. <p>Upon successful completion of this course, the student should be able to:</p> <ul style="list-style-type: none"> • Classify differential equations according to their order, linearity and homogeneity, • Understand how differential equations are used for modelling engineering systems, • Know how to apply various numerical methods (for example Newton Raphson and Runge Kutta) to engineering problems. 				

3	6	0	Internship	CivEng323
This course provides the students with an opportunity to experience the industrial world and be part of a team working on real world project. The University assists each students to find the most suitable industry.				
3	0	3	Current Topic in Civil and Construction Engineering	CivEng226 & 423
This courses cover current and recent development on the subject. The aim of which is to keep the whole programme up-to-date.				
3	0	3	Innovation, enterprise and Management	CivEng414
<p>The course emphasizes on the definitions of creativity, innovation and enterprise Consideration of the range of tools and techniques used in organisations to encourage creativity, Characteristics of the innovative organisation, and how to create an appropriate environment for creativity, Consideration of barriers to creativity and how to overcome them and the planning process of a new product/service development within enterprising organisations.</p> <p>On completing the course, student should be able to:</p> <ul style="list-style-type: none"> • Comprehend the role of creativity and innovation in enterprising organisations. • Comprehend the tools and techniques of creative and innovation management. • Examine the barriers to creativity and how successful organisations overcome these challenges. • Evaluate the process of planning from creativity to the implementation of innovation in enterprising organisations - in private, public and the voluntary sectors. 				
3	0	3	Engineering Research Methods	CivEng415
The aim of this course is to develop the undergraduate's research skill to a postgraduate level, such that the student is equipped to perform a postgraduate technical research project. In addition to develop and enhance their critical thinking abilities which will have a wider use beyond (post-) graduate studies.				

