

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. 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	ArchEng221
<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 <p>Students will know and understand more advanced aspects of one of: thermodynamics and fluid mechanics; electrical and electronic systems; fluid mechanics and structural engineering.</p>				

3	0	3	Integrated Design and Construction	ArchEng215
<p>Part A: 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> <p>Part B: Construction Contracts: Bill of Quantities & Standard Method of Measurement. Methods of Estimating, Specifications in Civil Engineering, Case Studies.</p>				
3	2	2	Engineering Practice and Design 1	GSE210
<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	Innovation, enterprise and Management	ArchEng424
<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	2	2	Structural Design 1	ArchEng314
<p>To teach 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 area. 				
3	0	3	Geotechnic II	ArchEng426
<p>This course will provide a deep analysis to the engineering properties of soils and their relevance to geotechnical design. Topics will include, the role of geotechnical engineering and relevance of engineering soil parameters to geotechnical design; total and effective stress; pore pressure; geostatic stresses; stress-strain</p>				

characteristics; shear strength; seepage; flow nets; primary consolidation. Teaching of Geotechnics is supported by laboratory testing of soils.				
3	0	3	Forensic Engineering and Conservation	ArchEng411
<p>Topics covered include:</p> <ul style="list-style-type: none"> • Material behaviour: corrosion, creep, fatigue, fracture, ageing, weathering, protection systems, soil failures, effects of ground water. • Structural Considerations: Loading effects, climatic conditions, construction procedures, temporary works. • Investigations: Site investigation, collecting and gathering evidence, lab testing, modelling failures, safety considerations during investigations. • Reporting: Presenting data, findings, conclusions and recommendations orally and through written reports, Expert witness presentations, court proceedings, codes of practice, legal consequences. 				
3	0	3	Design Procedure for Architecture 1	ArchEng312
<p>This course aims to introduce students to the issues involved in being an architect within the context of the construction industry. It is designed to develop students understanding of the profession of architecture, the role of the architect in society, and the regulations and procedures involved in translating design concepts into buildings and integrating plans into overall planning.</p> <p>The course is based around the ARB/RIBA syllabus for practice, management and law and covers the five required subject areas: professionalism, clients, users and delivery of services; legal framework and processes, practice and management and Building procurement. We will discuss details of these subjects and their ramification in practice.</p>				
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 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.</p>				
3	0	3	Energy Conservation in Building	ArchEng412
<p>Complementing the skills developed in evaluating building performance this course will provide you with the ability to quantify the energy available from sun, wind, sea or river, or the earth for a given application at a given site. You will develop the skills to understand and analyse the potential and limitations of the available energy conversion devices and exercise basic engineering judgment in their application.</p>				
3	0	3	Building Technology	ArchEng223
<p>This course teaches you the principle functions of the tectonic elements of buildings. Through the course you will learn to appreciate hierarchy and interrelationship of fabric, services and structure in common building types. Understanding will be developed in the effect of these on the architectural form, thermal, day-lighting, solar paneling, A/C and energy efficiency of buildings.</p>				
3	2	2	Buildings Services	ArchEng413
<p>Building services engineers are responsible for the design, installation, operation and monitoring of the mechanical, electrical and public health systems required for the safe, comfortable and environmentally friendly operation of modern buildings. This course covers all of these services and their management.</p>				
3	2	2	Building Environment Simulation and Analysis	ArchEng225
<p>This course aims to provide a general understanding of, and practical experience in computer modelling software systems which are used for simulating and predicting the environmental performance of buildings. A theoretical explanation of the processes simulated in the computer models; such as heat transfer, air flow and</p>				

lighting; is followed by a description of individual software packages and practical workshops using each package.				
3	2	2	Design Procedures for Architecture 2	ArchEng323
The course is designed to introduce some of the key elements of the discipline of project management including planning and scheduling, the allocation of resources projects, risk assessment, and mechanisms for monitoring, controlling, evaluating and terminating projects. At the same time the course well develop an aware of the importance of human resource management for successful delivery of projects in practice, including recruitment, organisation, team working, performance measurement and appraisal of human resources as well as developing an understanding of the theories of worker motivation and leadership. Through a series of parallel running lectures in these two areas, the course will provide a working knowledge of how they impinge on engineering practice. There will be a heavy emphasis on group working, report writing and presentation as part of the assessment supplemented by online exercises and an individual portfolio.				
3	4	1	AutoCAD-3D	ArchEng313
The course covers key command revision, 3D viewing, viewports and coordinate systems, wire frame modelling, surface modelling and meshing, solid modelling, studio effects, materials and lighting, and Boolean operators.				
3	2	2	Parametric Modelling	ArchEng311
Parametric 3D CAD solid and surface models are the principal means of communicating design ideas and developing new products and systems. 3D parametric modelling facilitates visual thinking and the design process, and represents a welcome addition to the traditional three R's of reading, writing and arithmetic. It stimulates students to use their imagination and problem solving skills and helps them to become more technologically literate. Worldwide, parametric modelling systems are part of a technology education reform movement that seeks to improve critical thinking and multidimensional problem-solving skills, while also inspiring and preparing a growing number of students to become the engineers, designers and technologists of tomorrow.				
3	2	2	CAD Graphics	ArchEng214
Topics include intermediate CAD operations, editing drawings, constructing multi-view drawings, applying text, font, style commands, dimensioning, hatching, blocks, constructing 3D objects and modifying solid objects.				
3	6	0	Internship	ArchEng325
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	Arabic Language	ARB 101
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.				
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
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:				
<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.

Protection mechanisms and constitutional organization of public rights and freedoms in the Kingdom of Bahrain.

3	0	3	Intermediate English	ENG111
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.				
3	0	3	Advanced English	ENG112
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.				
3	0	3	Engineering Management and Economics	GSE329
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.				
3	0	3	Architectural Engineering Field Studies	ArchEng321
This is substantially a project based learning module. 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.				
It aims:				
<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	2	2	Building Information Modelling	ArchEng320
This course will cover geometric and semantic aspects of Building Information Modelling (BIM) and the integrated management of BIM-related data, including:				
<ul style="list-style-type: none"> • How to capture 3D data for a BIM (both new building and retro-fit) – data acquisition methods. • The principle of surveying – building up integrated BIM geometry from multiple capture sources. • Data processing and Feature extraction. • The management of BIM data – Information theory, adding semantic information, storing and sharing BIM data in an interoperable fashion. • The bigger picture – Integrating CAD, BIM and 3D GIS. • Along with the focus on the geometric and semantic aspects of BIM, the course will be embedded into the wider organizational and legislative context and the students introduced to real-world applications of BIM, along with leading edge 3D GIS and BIM-related research. 				
6	12	0	Design Project	ArchEng422

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.

The aims of this course are therefore:

- 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	Geotechnic I	ArchEng310
<p>This course will provide an introduction to the engineering properties of soils and their relevance to geotechnical design. Students will perform laboratory practical in soil testing and undertake a desk study exercise. It aims to introduce:</p> <ul style="list-style-type: none"> • The role of Geotechnical Engineering in Civil Engineering Construction. • The engineering properties of soil and their relationship with Geotechnical design. • The awareness of the different methods of analysis in Geotechnical Engineering. 				
3	0	3	Engineering Research Methods	ArchEng410
<p>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.</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 undergraduate degree courses in the University and introduces students to a range of skills required for the study of engineering.</p> <p>The course aims are:</p> <ul style="list-style-type: none"> • 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	ArchTech112
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	0	3	Constructing the Built Environment	ArchEng126
The course aims to: <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	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	2	2	Architectural Engineering Design and Structures 2	ArchEng224
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This course focuses on three areas of work: Design Principles, Basic CAD and the Structural Analysis. It explains fundamentals of mechanics of structures. Numerous worked examples are used to complement the understanding of mechanics. Students are introduced to structural elements and associated load types, the various support types and the calculation of structural section properties. Also covered are the axial, shear, bending and torque load distributions in simple determinate structures.

The course aims:

- To examine the course of architectural development over the 20th century, the legacy of great pioneer practitioners and the future of architectural form in the 21st century.
- Preparation of 3-D drawings using a CAD system, and the ability to convert measurement and data into architectural models and construction drawings using CAD.
- To develop an appreciation and deeper understanding of the mechanics of structures.

3	0	3	Advanced Engineering Mathematics	ArchEng315
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This course covers advanced undergraduate engineering mathematics. It aims to

- 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.

Upon successful completion of this course, the student should be able to:

- 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	2	2	Architectural Engineering Design and Structures 1	ArchEng218
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This course focuses on three areas of work: CAD and the advanced Structural Analysis. It explains fundamentals of mechanics of structures. The course aims:

- To examine the course of architectural development over the 19th centuries, the legacy of great pioneer practitioners and the future of architectural form in the 21st century.
- To know the relevant standards and design guidelines, to understand the purpose of architectural, engineering and constructional drawings.
- Preparation of 2-D drawings using a CAD system, and the ability to convert measurement and data into architectural models and construction drawings using CAD.

3	0	3	Structural Design 2	ArchEng322
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To continue on Structural Design 1 where 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.

Topics include:

- Stress 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.

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Structural Design and Analysis 1**Arch414**

This course builds on the previous studies in structures. The moment distribution method for beams and frames is introduced. The plastic analysis of beams, frames and slabs is covered. The matrix stiffness method is outlined using computer software. There is a brief introduction to dynamic analysis of structures.

The course therefore aims to develop students' knowledge of analysis methods for indeterminate structures and of their limitations and applicability.

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Structural Design and Analysis 2**ArchEng425**

The course extends the students' knowledge of material use, analysis of structural form, and ability to design in both qualitative and quantitative directions. Problems are selected so that students can develop their analytical confidence to choose appropriate structural forms and materials and support their choice in critical peer review.

The course therefore aims to acquaint the students with the design of prestressed concrete and composite structures. To make them aware of the need for stability, robustness and fitness for purpose, to develop computer modelling, and to familiarise them with the process for selecting structural form and materials for civil and building structures. To investigate structural failures and the lessons to be learnt from them.

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Project 1 & 2**ArchEng415 &
ArchEng420**

The course aims:

- To plan and execute an individual piece of project work which is related to the course being followed by the student.
- To demonstrate in-depth technical understanding and knowledge of a chosen technical subject related to the course being followed by the student.
- To demonstrate competence in personal planning and management skills.

Students will be able to:

- Analyse a problem or need, develop a project brief and form a plan of work to deliver the required project outputs.
- Apply and integrate a range of engineering knowledge and skills acquired in the course being followed to real engineering problems or to models / simulations of real problems.
- Demonstrate an enhanced technical understanding of the particular technical subject of the project.
- Show knowledge and skills in the areas of project planning and management (definition / specification, planning tools, feasibility, organisation, budgeting, implementation, analysis, reporting).
- Make use of technical information initially available about the project subject matter, then identify and search for additional data, using judgement to develop and implement concepts on the basis of limited (or even contradictory) information.
- Critically review and as appropriate test the project outputs, for example for functionality, viability, safety, etc., and suggest improvements.

- Present the results of the study using such media as text, drawings, data sheets, computer code or model.
- Project management, by delivering outputs against constraints of time, resource, safety, etc.

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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.