

**College of Engineering 2023-2024
BEng (Hons) Civil Engineering
Module Descriptors**

Module Title & Code	Mathematics 1 ASU_S_MA1
Description	The module is designed to provide students with the mathematical knowledge and skills to support the study of engineering and the requirement for entry into the BEng programmes at ASU. Therefore, it is a preparatory or foundation module building on the knowledge obtained at school.
Module Title & Code	Intermediate English ASU_S_IEN
Description	A 10 CAT module which runs for one semester of 15 weeks for three hours per week. It is the first credit English module that ASU undergraduate students are required to take. The module provides intensive practice in upper-intermediate reading, oral presentations, writing, and note-taking. Academic and study skills are embedded in the module. The module develops students' English language and analytical skills to pursue a more advanced ASU academic English module and cope with the literacy demands of specialised modules taught in English.
Module Title & Code	Principles of Engineering ASU_S_POE
Description	This module develops the students' understanding of essential scientific principles for the study of engineering to the degree level. It is designed to be accessible to students with a wide range of prior science specialisations. The module 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.
Module Title & Code	Study Skills and Professional Practice ASU_S_SSP
Description	This module provides an introduction to both study and professional skills and practice. The module 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 expected in an engineering and industrial environment.

Module Title & Code	Engineering Science 1 ASU_S_ES1
Description	This module covers scientific principles of physics and chemistry at a level between secondary school level and Advanced Level. It serves as a preparatory module for students intending to undertake engineering undergraduate degree programmes at the University and introduces students to a range of skills required for studying engineering.
Module Title & Code	Laboratory and Workshop Skills ASU_S_LWS
Description	This module 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 module also provides students with an introduction to design skills and basic engineering drawing.
Module Title & Code	Engineering Science 2 ASU_S_ES2
Description	This module aims to extend engineering students' science knowledge in preparation for continuing their respective engineering degrees. It covers general applied physical principles, including dynamics, statics, fluids, heat and energy.
Module Title & Code	Computer Programming for Engineering ASU_S_CPE
Description	This module introduces students to concepts of programming. This includes conditional, iterations and block structure. Structure programming and data-types will also be introduced and illustrated on typical and simple engineering problems.
Module Title & Code	Mathematics 2 ASU_S_MA2
Description	The module is designed to provide students with the mathematical knowledge and skills necessary for transition to Level 4 study of engineering subjects. Students will attend lectures and tutorials where mathematical exercises are undertaken. Where possible, the statistical content will introduce the use of statistical packages and the presentation of real-life data sets. All students will keep a logbook of the problems tackled. Besides the 36 contact hours, students are encouraged to spend some time on their own to practise the mathematical concepts they learn during the lectures and solve extra problems.

Module Title & Code	Constructing the Built Environment ASU_S_CBE
Description	This module introduces students to design principles and processes specific to constructing the built environment. It will explore traditional and modern construction methods, and students will understand how new methods and materials can sustain the built environment.

Module Title & Code	Advanced English ASU_S_AEN
Description	A 10 CAT module which runs for one semester of 15 weeks for three hours per week. It is the second credit English module that ASU undergraduate students are required to take. The module provides intensive practice in advanced level reading, oral presentations, writing, and listening. Academic and study skills are embedded in the module. This module aims to enhance students' English and analytical skills as a prerequisite for academic and professional success.

Module Title & Code	Human Rights ASU_S_HUR
Description	<p>This module deals with the basic principles of human rights in terms of the definition of human rights and its scope and source, focusing on the provisions of the international law of human rights, which include the following international documents:</p> <ol style="list-style-type: none"> a. Charter of the United Nations b. The Universal Declaration of Human Rights c. The International Covenant on Civil and Political Rights d. The International Covenant on Economic, Social and Cultural Rights e. Convention against Torture and Cruel, Inhumane Punishments. f. Protection Mechanisms and Constitutional Organisation of Public Rights and g. Freedom in the Kingdom of Bahrain

Module Title & Code	Bahrain Civilisation and History ASU_S_BCH
Description	The aim of the module is to highlight the role of the Kingdom of Bahrain in its local, regional and international levels through various historical eras, beginning with the Old Ages through the Islamic era to the modern era. The module demonstrates the Arab and Islamic identity of the Kingdom of Bahrain and the vital role they play politically and culturally.

Module Title & Code	Arabic Language ASU_S_ALA
Description	The module runs for one semester of 7 weeks (Summer Semester). The module provides intensive practice in reading, oral presentations, writing, and note-taking.

Module Title & Code	Arabic Language for Non-Arabic Speakers ASU_S_ALN.
Description	The module runs for one semester of 7 weeks (Summer Semester). This Arabic module is required to be taken by non-Arabic speaking students in ASU undergraduate Engineering programmes. The module provides intensive practice for beginners in reading, oral presentations, writing, and note-taking.

Module Title & Code	Engineering Practice and Design 1 ASU_4_EP1
Description	This module provides an introduction to engineering practice and design. Design activities, sustainable design principles, and transferable skills will be considered.

Module Title & Code	Structural Design ASU_4_SDG
Description	Introduction to stress and deformation of basic structural materials subjected to axial, torsional, bending, and pressure loads. Plane stress, plane strain, and stress-strain laws. Applications of stress and deformation analysis to members subjected to centric, torsional, flexural, and combined loading. Introduction to theories of failure.

Module Title & Code	Engineering Mathematics 1 ASU_4_EM1
Description	This module consolidates the mathematical skills that underpin the BEng Engineering Degrees.

Module Title & Code	Principles of Engineering Science 1 ASU_4_PE1
Description	<p>This module develops the students' understanding of essential scientific principles for the study of engineering to the degree level. It is designed to be accessible to students with a wide range of prior science specialisations.</p> <p>This module develops the students' understanding of methods for quantifying the forces between bodies. Forces that are responsible for maintaining equilibrium. This module is common to all engineering disciplines and introduces the principles of measurement systems, force and moment vector and traditional analysis, and forces in equilibrium.</p>

Module Title & Code	Surveying and Structures 1 ASU_4_SS1
Description	This module introduces students to principles of surveying and Setting out, including distance and angular measurements, levelling, volume and curve calculation, dimensional control and positioning. The students will use various surveying instruments, including tapes, levels, and Theodolite/Total Stations. The students are also introduced to modern advances in surveying technology, such as GPS and LASERS and their uses in civil engineering and construction. Knowledge is acquired through computational exercises and the completion of practical survey work.
Module Title & Code	Civil Engineering Drawing and Surveying ASU_4_CDS
Description	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.
Module Title & Code	Engineering Practice and Design 2 ASU_4_EP2
Description	The module covers practical work, project management, health and safety and risk management, and transferable skills.
Module Title & Code	Engineering Mathematics 2 ASU_4_EM2
Description	This module consolidates the mathematical skills that underpin the BEng Engineering Degrees.
Module Title & Code	Principles of Engineering Science 2 ASU_4_PE2
Description	This module develops the students' understanding of essential scientific principles for the study of engineering to the degree level. It is designed to be accessible to students with a wide range of prior science specialisations. The module comprises two blocks of study. These blocks are common to all engineering disciplines and introduce mechanical and electrical principles and engineering materials and their properties.

Module Title & Code	Surveying and Structures 2 ASU_4_SS2
Description	This module develops students' practice with structural engineering, provides an introduction to structural concepts, and provides an overview of specific techniques for analysing determinate structures, trusses, beams, and frames.

Module Title & Code	Engineering Ethics ASU_4_EET
Description	This module introduces the theory and the practice of engineering ethics using a multi-disciplinary and cross-cultural approach. The theory includes ethics and the philosophy of engineering. Historical cases that were taken primarily from the scholarly literature on engineering ethics and hypothetical cases were examined and critically evaluated by students linking to the codes of engineering ethics set by different professional bodies. Students will compare these cases and recommend action.

Module Title & Code	Soil Mechanics ASU_4_SME
Description	This module introduces a number of simple models which were used to describe soil and its mechanical behaviour. Standard laboratory tests were carried out, and soil properties were derived from the results.

Module Title & Code	Advanced Engineering Mathematics ASU_5_AEM
Description	This module covers advanced undergraduate engineering mathematics.

Module Title & Code	Design and Construction 1 ASU_5_DC1
Description	This module offers the knowledge and skills of masonry and reinforced masonry structure design to Eurocodes, analysis of structural form and the ability to design in both qualitative and quantitative directions.

Module Title & Code	Hydraulics ASU_5_HYD
Description	This module develops the fundamental principles of Fluid Mechanics and applies them to practical applications of analysis and design. Students will develop a greater understanding of the flow of ideal and real fluids and will apply these principles to the analysis and design of pipes and open channels. Students will perform simple laboratory tests and prepare a formal report.

Module Title & Code	Structural Mechanics ASU_5_STM
Description	This module introduces Building Information Modelling (BIM) and explains how BIM has changed the construction industry worldwide. Case studies of projects where BIM improved sustainability and reduced cost were studied. Students model typical multi-storey framed steel and concrete buildings in Autodesk Revit and apply appropriate variable actions on the floors. They transfer the building model to the Autodesk Robot Structural Analysis programme and analyse design beams and columns. They compare computer results to hand calculations results, obtained using load take-down methods and design formulae.

Module Title & Code	Environmental Engineering ASU_5_EEG
Description	This module takes the principles of environmental engineering and applies them to practical applications of analysis and design. Students will be introduced to the principles of water, water quality, and wastewater treatment processes and to consider sustainability issues. Students will develop an understanding of the hydrological cycle and surface hydrology, and apply these principles to the calculation of precipitation and unit hydrograph. Students will also learn the basics of groundwater flow and the problem of contamination in groundwater. The unit also introduces air pollution and noise pollution.

Module Title & Code	Infrastructure and Highway Engineering ASU_5_IHE
Description	This is substantially a theory and project-based module. 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 module will also include site visits. Standard laboratory tests were carried out, and bitumen properties were derived from the results. Problems to be solved include geometric design, traffic volume, channelisation, and hydrology. Lab projects involve roadway designing.

Module Title & Code	Engineering Management and Economics ASU_5_EME
Description	<p>This module helps to prepare students for their future roles as professional engineers in a number of ways. It includes:</p> <ul style="list-style-type: none"> • detailed study of project planning techniques, including network techniques, with preparation for the student's individual projects • an overview of the business functions which interact with engineering • an introduction to Systems Thinking. A formal method for studying systems will be introduced. • An introduction to recruitment, retention and equal opportunities in employment • the use of published Standards in engineering • use of the BSI website to access national and international standards • an introduction to statistics and their use in managing engineering processes • an introduction to Quality Management, with particular reference to the ISO 9000 series • An introduction to European Directives and harmonised standards • Writing technical business reports, including the importance of acknowledging published sources and the use of formal methods for doing so

Module Title & Code	Internship ASU_5_ITS
Description	<p>This module provides the students with an opportunity to experience the industrial world and be part of a team working on real-world projects. The University assists each student in finding the most suitable industry.</p>

Module Title & Code	Design and Construction 2 ASU_5_DC2
Description	<p>This module offers the knowledge and skills of marine structures, analysis and design of Eurocodes, analysis of structural form and the ability to design in both qualitative and quantitative directions - including ports and offshore structures and dams.</p>

Module Title & Code	Advanced Structural Analysis and Design ASU_5_ASD
Description	<p>This module develops students' practice with structural engineering, introduces structural concepts, and provides an overview of specific techniques for analysing indeterminate structures beams, and frame structures.</p>

Module Title & Code	Theory of Structures ASU_5_THS
Description	<p>This module mainly deals with the matrix-stiffness analysis of structures. It begins with a review of the basic concepts of structural analysis and matrix algebra and shows how the latter provides a mathematical framework for the former.</p> <p>This is followed by detailed descriptions and demonstrations through many examples of how matrix methods can be applied to linear static analysis of skeletal structures (plane and space trusses; beams and grids; plane and space frames) by the stiffness method.</p> <p>Also, it is shown how simple structures can be conveniently solved using a reduced stiffness formulation, involving far less computational effort. Finally, the Finite Element Analysis is discussed.</p>
Module Title & Code	Civil Engineering and Construction Field Study ASU_5_CCF
Description	<p>The module introduces students to the practical side of the civil and construction engineering industry. It gives them the opportunity to visit sites. It ensures that students are aware of real-life situations in projects. Students will be able to critically appraise and evaluate construction management situations and report on them.</p>
Module Title & Code	Structural Design and Analysis 1 ASU_6_SA1
Description	<p>This module offers the knowledge and skills of reinforced concrete design to Eurocodes, analysis of structural form and the ability to design in both qualitative and quantitative directions.</p>
Module Title & Code	Civil Engineering Materials ASU_6_CEM
Description	<p>The module provides an overview of general civil engineering material performance requirements and properties: strength, stiffness, durability, and appearance. This will include concrete, steel, and timber. The module will provide an overview of available materials, geotextile functions and mechanisms, designing with geotextiles, stresses in materials and biaxial stress systems.</p>

Module Title & Code	Foundations ASU_6_FDS
Description	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.

Module Title & Code	Innovation, Enterprise and Management ASU_6_IEM
Description	<p>The module is intended to be practical, with students developing some appropriate ideas of their own in such a way that they become practical, profitable propositions. Students will practice ways of finding ideas, testing those ideas and developing them, and will write their own business strategies, risk assessments and scenario testing so that they demonstrate the commercial viability of their ideas.</p> <p>One of the assignments will require students to work in groups, typically to adopt a concept and develop it such that it could be commercially viable and sustainable. This might be a product or a service (such as consultancy or contract management).</p> <p>Students will experience topics addressing intellectual property, market research, market placement, advertising and finance. They will be expected to reflect on what they can contribute to a group.</p>

Module Title & Code	Engineering System Design ASU_6_ESD
Description	To involve the student in the process of engineering project development from planning to detailed design and working with a project team.

Module Title & Code	Engineering Research Methods ASU_6_ERM
Description	The module studies the scope and significance of engineering research. It introduces students to the various aspects of engineering research; its types, tools and methods and students will learn how to apply research techniques to real-world situations. The module covers topics such as the identification of a topic by the student, proposition of hypothesis, formulation of research inquiries, development of literature review, and select research design and methodologies. Additionally, students will learn data collection techniques; primary and secondary data with application to specific problems, scaling and research instrument design and sampling design.
Module Title & Code	Current Topics in Civil and Construction Engineering ASU_6_CTC
Description	The module introduces students to new issues, ideas and trends in the civil and construction engineering industry. It ensures that students are kept up-to-date with developments. Students will experience topics addressing Building Information Modelling, 3D Printing, Smart analyses of Buildings and Smart Cities, Modular Construction, Plastic Roads, Sustainability issues, and other related matters.
Module Title & Code	Geotechnical Engineering ASU_6_GTE
Description	This module shows how the soil mechanics theories introduced in <i>Soil Mechanics</i> are applied to the solution of a number of geotechnical analyses and design problems.
Module Title & Code	Structural Design and Analysis 2 ASU_6_SA2
Description	This module offers the knowledge and skills of steel design to Eurocodes, analysis of structural form and the ability to design in both qualitative and quantitative directions.
Module Title & Code	Construction Management ASU_6_CMG
Description	This module prepares students with the ability to critically appraise and evaluate the performance of the construction industry and shed light on the role of construction management.
Module Title & Code	Project ASU_6_PRJ
Description	To plan, execute, review and report upon a piece of project work related to the BEng programme being followed by the student. A Module Guide for the project is augmented by eight lectures.