ASU
جامعة العلوم التطبيقية
APPLIED SCIENCE UNIVERSITY

London South Bank University

College of Engineering
2024-2025

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Vision

"A leading university promoting excellence in applied education and research in Bahrain and the region"

Mission

"ASU is dedicated to offering students and staff the opportunity to contribute to the sustainable development of society & community. In addition, ASU strives to be recognised nationally and internationally for its reputation in applied learning and teaching, research and community engagement. Furthermore, ASU is committed to enhancing graduates' employability through innovative approaches and entrepreneurial practices to help them compete in international markets."

Values

- **Integrity:** ASU's community values honesty, fairness and academic integrity as fundamental to its vision and mission and upholds the values in all its endeavours.

- **Collaboration and Team Spirit:** ASU's community places collaboration and team spirit at the heart of its institutional culture and promotes these values consistently.

- **Loyalty:** ASU's students, faculty and staff cherish loyalty and commitment and recognise these values to be inherent in their culture of cooperation and dedication.

- **Social Responsiveness and Community Engagement:** ASU's students, faculty and staff value their partners, networks and communities and engage with them in a thoughtful, respectful, responsible and meaningful manner.

- **Quality:** ASU's community embraces excellent quality in all facets of its operations and interactions.

- **Innovation and creativity**: ASU acknowledges that enabling innovation and creativity is an essential feature of a 21St century University and values the contribution this makes to sustainable community growth and development.

Message from the Dean

Dear Students,

Welcome to the College of Engineering at Applied Science University, a college that is unique in its culture, facilities and environment. The College was established in 2017 and offers four Bachelor Dual-Award Degree Programmes in Engineering: BEng (Hons) Architectural Engineering, BEng (Hons) Civil Engineering, BEng (Hons) Mechanical Engineering and BEng (Hons) Electrical and Electronic Engineering. Our programmes are distinct as they offer the chance to study a UK degree in Bahrain with work experience and internship opportunities. Upon successfully completing the programme, students are awarded a dual degree from London South Bank University (LSBU) in the UK and Applied Science University (ASU) in Bahrain, these awards are recognised by the Higher Education Council in the Kingdom of Bahrain This will give our graduates a competitive advantage in the job market and allow them to develop lifelong learning skills that are sought after by employers here in Bahrain and internationally. The College of Engineering has obtained accreditation from the Chartered Institute of Building (CIOB) for its Architectural Engineering and Civil Engineering undergraduate programmes until 2028. ASU is the only university in Bahrain offering CIOB-accredited programmes.

We strongly believe that the future for engineers is incredibly bright, and the College of Engineering will provide you with excellent career opportunities. Engineering and technology will continue to fuel the pace of change, offering unimaginable options for those with imaginative, creative and open minds.

I welcome you again to the College of Engineering and invite you to visit the college webpage on the ASU website for more information about the offered programmes and the college activities.

Dr. Mohamed Ahmed M Salama
Dean of the College of Engineering

BEng (Hons) Architectural Engineering – Dual Award

This dual-award programme prepares students for a career as an Architectural Engineer. This programme is intended for undergraduate students who wish to study the discipline of Architectural Engineering to Honors degree level and who may wish to achieve professional status later on. This programme is designed to embrace developments in the industry, in particular the ECUK UK Standard for Professional Engineering Competence (UK-SPEC).

The programme has a first year (Level S) that is shared with the other programmes in ASU's College of Engineering and it is designed to bring school leavers in Bahrain and the Gulf region to a standard appropriate for entry into a Level 4 engineering degree programme equivalent to UK approved engineering programmes. The first year is designed to prepare students with the necessary knowledge and skills to continue with their studies at the specialist levels (Years 2/3/4) of the 4-year programme. The first year covers the fundamentals of mathematics and science, and students also learn how to use relevant technology. During the first year, there are three compulsory modules required by the Higher Education Council in Bahrain namely: 'Arabic Language' (or 'Arabic Language for Non-Arabic Speakers'), 'Bahrain Civilisation and History' and Human Rights. These are part of the Kingdom's strategy to strengthen the level of Arabic language and promote Arabic culture. It is important to note that native Arabic speaking students will study the Arabic Language module, whereas students who do not speak Arabic will study the module Arabic Language for Non-Arabic Speakers.

The B.Eng (Hons) Architectural Engineering aims to:

- Develop students' core, personal and employability skills, to help them adapt to the changing labour market.
- Utilise the variety of construction professions, to expose students to a multitude of aspects of the construction process, and prepare them for work in multidisciplinary teams.
- Give students a blend of architectural and civil engineering modules, exploring the form and appearance of buildings, as well as their analysis, design and construction.
- Produce graduates with knowledge, problem-solving skills and practical know-how of the key aspects of architectural and civil engineering, and the creativity and individuality of architecture.
- Produce graduates aware of the whole design process, including design procedures in codes of practice, architectural engineering procedures, project management, quality issues, finance, ethical conduct, environmental issues and health and safety.

- Produce graduates who can work in multidisciplinary design practices and provide a link between engineering and architecture professionals.
- Provide graduates with the necessary academic qualifications, which will provide the full educational base for a successful career in the industry.

General Information

Awarding Institution	London South Bank University and Applied Science University
Teaching Institution	Applied Science University, Kingdom of Bahrain
College	Engineering
Department	Civil and Architectural Engineering
Offered programme	BEng (Hons) Architectural Engineering
Programmes recognised by	Ministry of Education, Kingdom of Bahrain
Final Qualification	Bachelor Degree
Academic year	2024-2025
Language of study	English
Mode of study	Full-Time
Duration of programme	4 years
Programme Coordinator	Dr Ali Sedki Office No: 16036 348 E-mail: ali.ali@asu.edu.bh Room No.112

Programme Intended Learning Outcomes

The programme outcomes have been developed with reference to the JBM guidelines, UK-SPEC, and the QAA subject benchmark statement for Engineering (E). They are also summarised in the Output Standards Specification provided for the Joint Board of Moderators.

BEng (Hons) Architectural Engineering aims to:

a) Students will have **knowledge and understanding** of**:**

In year 1:

A1 Subject knowledge underpinning the major disciplines in the sciences or engineering.
A2 Experimental method and the development and testing of hypotheses.
A3 Methods used in the analysis, evaluation and critical review of evidence in either the sciences or engineering.
A4 Processes and procedures in sampling, data analysis and expressing precision, accuracy and reproducibility.

In years 2/3/4:

A1 Mathematics as a means of communicating results, concepts, and ideas that are relevant to Architectural Engineering (E).
A2 The fundamental concepts, principles, and theories of civil engineering and architecture (E).
A3 The concepts, principles and theories of structural analysis, soil mechanics, and design to an advanced level (E).
A4 Information and Communications Technology relevant to architectural and civil engineering (E).
A5 The general principles of engineering design and construction and the application of specific design techniques to particular elements and systems (E).
A6 The characteristics and behaviour of engineering materials (E).
A7 Management and business practices that are relevant to the construction industry (E).
A8 The role of the engineer in society, including the global and social context of the built environment (E).
A9 Sustainability issues and the importance of architectural engineering to the quality of the environment. (E).
A10 Health and safety issues, risk assessment, quality issues and regulatory frameworks (E).
A11 Context in which engineering knowledge can be applied.

b) Students will develop their **intellectual skills** such that they are able to**:**

In year 1:

B1 Understand the role of rational argument.
B2 Appreciate the key features of a problem and suggest possible means of investigation.
B3 Be aware of the significance of hypotheses, experimental data and rational arguments.
B4 Apply a theory, concept or subject-specific principle to a new context.

In years 2/3/4:

B1 Use mathematical methods to analyse engineering problems (E).
B2 Analyse and solve engineering problems (E).
B3 Design engineering elements and whole systems to meet a need, critically evaluate and make improvements (E).
B4 Apply engineering knowledge and understanding in the solution of problems and the development of designs (E).
B5 Undertake research, obtain and evaluate primary and secondary data (E).
B6 Plan, conduct and report on an individual research.
B7 Be aware of all the relevant frameworks in solving problems and designing systems, taking into account financial aspects, risk analysis and environmental impact (E).
B8 Use creativity and innovation in designing solutions.

c) Students will acquire and develop **practical skills** such that they are able to:

In year 1:

C1Demonstrate safe practices and advise on safety procedures associated with a particular technique or methodology.
C2 Evaluate alternative methodologies for an investigation or completing a process.

C3 Organise and allocate duties, set targets and evaluate progress in achieving a specific technical goal.
C4 Present data in a seminar or lecture.
C5 Demonstrate competence in a range of basic statistical procedures.

C6 Demonstrate competence using word processors, spreadsheets and data presentation packages.

In years 2/3/4:

C1 Carry out safely a series of planned experiments (E).
C2 Use laboratory and field work equipment to generate data (E).
C3 Analyse experimental results and determine their validity and accuracy (E).
C4 Prepare technical reports.
C5 Give technical presentations using a variety of media.
C6 Prepare technical drawings, including the use of CAD and freehand sketching.
C7 Use the library, internet and other sources effectively (E).
C8 Use computer packages (E).
C9 Manage projects efficiently (E).

d) Students will acquire and develop **transferable skills** such that they are able to**:**

In year 1:

D1 Manage and adapt their work schedule and learning strategy.
D2 Adopt skills and techniques to address a particular problem.
D3 Be aware of the full range of sources of information, citing references properly.
D4 Appreciate the need and begin communicating ideas, arguments and concepts rationally and systematically, using various media.
D5 Assume responsibility for their learning and work independently.
D6 Manage and monitor their role within a group working to meet specific targets.

In years 2/3/4:

D1 Communicate effectively - oral presentations, report writing, drawing (E).
D2 Apply mathematical skills.
D3 Work independently.
D4 Manage time and work to deadlines (E).
D5 Use Information and Communications Technology (E).
D6 Work constructively as a member of a group (E).
D7 Manage tasks and solve problems, transfer techniques and solutions from one area to another, and apply critical analysis and judgement (E).
D8 Learn effectively to continue professional development and in a wider context throughout their career (E).

Admission Criteria

To be considered for entry to the programme, applicants will be required to have the following qualifications:

Year 1 entry (full-time)

- Bahraini or GCC Secondary School (Scientific) Certificate, or equivalent, with a minimum of 65% GPA and a 60% in Mathematics and 60% in the English language. In addition,

English competency equivalent to IELTS 4.5 or above is required.

- Candidates with lower GPA may also be admitted subject to a satisfactory interview by the College.

or

- Five GCSE passes, at grade C or above, including Mathematics and English (or another subject that demonstrates an adequate command of English).

Year 2 progression

Progression to the second year of the programme is subject to:

- Demonstrating English language competency equivalent to IELTS 5 or above.

Progression Pathways and Opportunities

Students must study 120 credits each year (Year 1 / Level S also has two additional modules, which are local requirements). Each year consists of 2 semesters of 15 weeks. In each module, the student must achieve an overall mark of 40% for the module and a minimum mark of 30% in any component to pass the module. A student is permitted a maximum of two enrolments with a referral opportunity associated with each enrolment in each module.

ASU is committed to enhancing the competitive advantages of its graduates at all levels. A dedicated team of academics and support staff work together with academic partners and local businesses and industries to ensure appropriate module design and content creation and delivery, emphasising vocational and practical skills needed by engineering employers. Each programme is designed to prepare students for their chosen field of specialisation. To this end, each programme has specific aims and objectives (outlined in the programme specifications) to ensure graduates have the required subject-specific skills and attributes. In addition to these, the graduates from these programmes will have the following generic abilities and skills needed by employers, which will enhance their employability chances:

- Strong problem-solving skills.
- High-level key and transferable skill sets.
- The ability to think creatively and independently.
- The ability to maintain a high-level of subject-specific professional competence; technical knowledge, and competence.
- The ability to conceptualise problems at a high-level (i.e. to see the big picture).
- Diligent and ethical working practices.
- The ability to work both independently and as part of a team.
- Flexibility and the ability to apply their subject-specific knowledge to fields outside their own.
- High-level ability of communication skills (oral and written) and lifelong learning.

Graduation Requirements

The degree programmes leading to the dual-award of BEng are based on the student accumulating 480 CAT credits from the four years of study (120 per level). There are two additional non-CAT-bearing modules, which Bahrain's Higher Education Council requires.

The sequencing of the modules, the pattern of delivery and the mode of study for each module are outlined in the relevant module specification, including:

- All the modules that contribute to the programme.
- The sequencing of the modules in semesters and years.
- The mode of study (NB: these programmes are offered in full-time mode only).

Career Paths

Unleash your potential with our Architectural Engineering Programme and explore a variety of exciting career opportunities. Here is a glimpse into the diverse jobs possibilities that await you in the field of architectural engineering.

1. Junior Architectural Engineer
2. Assistant Architectural Engineer
3. Design Engineer – Architecture
4. Construction Engineer – Architecture
5. Project Coordinator – Architecture
6. Structural Engineer – Architecture
7. Building Services Engineer – Architecture
8. BIM Modeler – Architecture
9. Architectural Technologist
10. Junior Architect
11. BIM Architect
12. Assistant Site Engineer
13. Health and Safety Engineer
14. Environmental Engineer
15. Quality Control Engineer
16. Quantity Surveyor

Programme Structure and Study Plan

The degree programmes leading to the dual-award of BEng (Hons) are based on the student accumulating 480 CAT credits from the four years of study (120 per level). There are two additional non-CAT-bearing modules, which Bahrain's Higher Education Council requires.

BEng (Hons) Architectural Engineering– Dual Award
Study Plan 2024-2025

Year	Semester 1	Module Codes	CAT	Semester 2	Module Codes	CAT	Level	
1	Engineering Science 1	ASU_S_ES1	10	Engineering Science 2	ASU_S_ES2	10	S	Core
	Intermediate English	ASU_S_IEN	10	Advanced English	ASU_S_AEN	10	S	Core
	Mathematics 1	ASU_S_MA1	10	Mathematics 2	ASU_S_MA2	10	S	Core
	Principles of Engineering	ASU_S_POE	10	Constructing the Built Environment	ASU_S_CBE	10	S	Core
	Laboratory and Workshop Skills	ASU_S_LWS	10	Study Skills and Professional Practice	ASU_S_SSP	10	S	Core
				Computer Programming for Engineering	ASU_S_CPE	10	S	Core
Summer	Human Rights				ASU_S_HUR	10	S	Core
	Bahrain Civilisation and History				ASU_S_BCH	-	S	HEC req.
	Arabic Language				ASU_S_ALA	-	S	HEC req.
	Arabic Language for Non-Arabic Speakers				ASU_S_ALN			
Total			**50**			**70**		**120**
2	Engineering Practice and Design 1	ASU_4_EP1	10	Engineering Practice and Design 2	ASU_4_EP2	10	4	Core
	Engineering Mathematics 1	ASU_4_EM1	10	Engineering Mathematics 2	ASU_4_EM2	10	4	Core
	Integrated Design and Construction	ASU_4_IDC	10	Building Technology	ASU_4_BDT	10	4	Core
	Architectural Engineering Design and Structures 1	ASU_4_AE1	10	Architectural Engineering Design and Structures 2	ASU_4_AE2	10	4	Core
	Principles of Engineering Science 1	ASU_4_PE1	10	Principles of Engineering Science 2	ASU_4_PE2	10	4	Core
	CAD Graphics	ASU_4_CAD	10	Building Environment Simulation and Analysis	ASU_4_BSA	10	4	Core
Total			**60**			**60**		**120**
3	Structural Design 1	ASU_5_SD1	10	Structural Design 2	ASU_5_SD2	10	5	Core
	Advanced Engineering Mathematics	ASU_5_AEM	10	Building Information Modelling	ASU_5_BIM	10	5	Core
	Geotechnics 1	ASU_5_GT1	10	Engineering Ethics	ASU_5_EET	10	5	Core
	Design Procedures for Architecture 1	ASU_5_DA1	10	Design Procedures for Architecture 2	ASU_5_DA2	10	5	Core
	AutoCAD-3D	ASU_5_A3D	10	Architectural Engineering Field Studies	ASU_5_AFS	10	5	Core
	Engineering Management and Economics	ASU_5_EME	10	Internship	ASU_5_ITS	10	5	Core
Total			**60**			**60**		**120**
4	Project 1	ASU_6_PR1	10	Project 2	ASU_6_PR2	10	6	Core
	Structural Design and Analysis 1	ASU_6_SA1	10	Structural Design and Analysis 2	ASU_6_SA2	10	6	Core
	Engineering Research Methods	ASU_6_ERM	10	Geotechnics 2	ASU_6_GT2	10	6	Core
	Energy Conservation in Buildings	ASU_6_ECB	10	Innovation, Enterprise and Management	ASU_6_IEM	10	6	Core
	Thermodynamics for Buildings	ASU_6_TDB	10	Design project	ASU_6_DPR	20	6	Core
	Forensic Engineering and Conservation	ASU_6_FEC	10					
Total			**60**			**60**		**120**

Module Descriptions

ASU_S_MA1 Mathematics 1

The module is designed to provide students with the mathematical knowledge and skills to support their engineering study 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.

ASU_S_IEN Intermediate English

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.

ASU_S_POE Principles of Engineering

The module develops the students' understanding of essential scientific principles for studying 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.

ASU_S_ES1 Engineering Science 1

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 the study of engineering.

ASU_S_LWS Laboratory and Workshop Skills

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.

ASU_S_ES2 Engineering Science 2

This module is aimed at extending the science knowledge of engineering students in preparation for continuing their respective engineering degrees. It covers general applied physical principles, including dynamics, statics, fluids, heat and energy.

ASU_S_CPE Computer Programming for Engineering

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.

ASU_S_MA2 Mathematics 2

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.

ASU_S_CBE Constructing the Built Environment

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.

ASU_S_SSP Study Skills and Professional Practice

This module introduces 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.

ASU_S_AEN Advanced English

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.

ASU_S_HUR Human Rights

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:

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 Freedom in the Kingdom of Bahrain

ASU_S_BCH Bahrain Civilisation and History

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.

ASU_S_ALA Arabic Language

The module runs for one semester of 7 weeks (Summer Semester). The module provides intensive practice in reading, oral presentations, writing, and note taking.

ASU_S_ALN Arabic Language for Non-Arabic Speakers

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.

ASU_4_EP1 Engineering Practice and Design 1

This module introduces engineering practice and design. Design activities, sustainable design principles, and transferable skills will be considered.

ASU_4_EM1 Engineering Mathematics 1

This module consolidates the mathematical skills that underpin the BEng engineering degrees.

ASU_4_AE1 Architectural Engineering Design and Structures 1

This module focuses on the principles and elements of Design. The module explains the fundamentals of the design process as an introduction to Architectural Design Engineering. Students are introduced to the principles and elements of design through a series of individual and group design activities through which they experience the implementation of different design elements and learn about different principles of design. This module gives the students a chance to understand and experiment with 2D and 3D compositions with specific design values and simple structures, which will be taken forward in the second part of this module, which is Architectural Engineering Design and Structures 2.

ASU_4_PE1 Principles of Engineering Science 1

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.
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.

ASU_4_CAD CAD Graphics

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.

ASU_4_IDC Integrated Design and Construction

The module provides insight into the design and construction processes based on integration. It is designed specifically to provide an overview of design and construction management skills, competencies and tasks.

ASU_4_EP2 Engineering Practice and Design 2

The module covers practical work, project management, health and safety and risk management, and transferable skills.

ASU_4_EM2. Engineering Mathematics 2

This module consolidates the mathematical skills that underpin the BEng engineering degrees.

ASU_4_AE2 Architectural Engineering Design and Structures 2

The aims of this module are to understand the relationship between the building architectural form; simple structure types, and materials; present the simple environmental issues which should be considered during the design and construction of buildings; and apply these issues to an architectural design problem; resolution of structural issues, functional requirements, and form generation in one to two-story buildings.

ASU_4_PE2 Principles of Engineering Science 2

This module develops the students' understanding of essential scientific principles for studying 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.

ASU_4_BDT Building Technology

Building services engineers are responsible for designing, installing, operating and monitoring the mechanical, electrical and public health systems required for the safe, comfortable and environmentally friendly operation of modern buildings. This module covers all of these services and their management.

ASU_4_BSA Building Environment Simulation and Analysis

This module aims to provide a general understanding and practical experience in computer modelling software systems for simulating and predicting the environmental performance of buildings. A theoretical explanation of the processes simulated in the computer models, such as heat transfer, airflow and lighting, is followed by a description of individual software packages and practical workshops using each package.

ASU_5_SD1 Structural Design 1

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.

ASU_5_AEM Advanced Engineering Mathematics

This module covers advanced undergraduate engineering mathematics.

ASU_5_GT1 Geotechnics 1

This module introduces to the students a number of simple concepts and models, which are used to describe soil and its mechanical behaviour. Standard laboratory tests are carried out, and soil properties are derived from the results.

ASU_5_DA1 Design Procedures for Architecture 1

Personal student architectural design project embracing design studio and technology studio against a defined brief.

ASU_5_A3D AutoCAD-3D

The module 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.

ASU_5_EME Engineering Management and Economics

This module helps to prepare students for their future roles as professional engineers in a number of ways. It includes:

- 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.

ASU_5_SD2 Structural Design 2

This module develops students' practice with structural engineering, introduces structural concepts, and provides an overview of specific techniques for analysing determinate structures, trusses, beams, and frames.

ASU_5_BIM Building Information Modelling

This module introduces the concepts of Building Information Modelling (BIM) through the development of architectural 3D models on industry-standard parametric CAD systems. It covers the practical competence of architectural modelling and provides exposure to coordinating building information models.

ASU_5_EET Engineering Ethics

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 are taken primarily from the scholarly literature 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.

ASU_5_DA2 Design Procedures for Architecture 2

Personal student architectural design project embracing design studio and technology studio against a defined brief.

ASU_5_AFS Architectural Engineering Field Studies

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 construction-type activity and others, including geological and site visits. Multimedia support will feature in the delivery.

ASU_5_ITS Internship

This module provides the student 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.

ASU_6_PR1 Project 1

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 four lectures.

ASU_6_SA1 Structural Design and Analysis 1

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.

ASU_6_ERM Engineering Research Methods

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.

ASU_6_ECB Energy Conservation in Building

This module will provide students with the ability to quantify the energy available from the sun, wind, sea or river, or earth for a given application at a given site. Students 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.

ASU_6_TDB Thermodynamics for Buildings

This module provides students with relevant the principles of heat transfer, fluid flow and thermodynamics for application to buildings and their engineering systems.

ASU_6_FEC Forensic Engineering and Conservation

This module uses mainly case studies to develop the principles design by looking at the influence of failures on the evolution of the professional practice. It teaches students an understanding of holistic design applications, conservation, and the role of regulations. It teaches, develops and assesses observational, deductive, creative and communications skills.

ASU_6_PR2 Project 2

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 four lectures.

ASU_6_SA2 Structural Design and Analysis 2

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.

ASU_6_GT2 Geotechnics 2

This module is intended to provide an understanding of the application of theory to the analysis and design of geotechnical structures.

ASU_6_IEM Innovation, Enterprise and Management

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.

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).

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.

ASU_6_DPR Design Project

Main architectural design project embracing design studio and technology studio against a defined brief.

BEng (Hons) Civil Engineering – Dual Award

This dual-award programme prepares students for a career as a Civil Engineer. The programme embraces recent industry developments, in particular the introduction of ECUK UK Standard for Professional Engineering Competence (UK-SPEC), and gives students the opportunity to achieve the professional status of Chartered Engineer. The curriculum emphasizes the development of traditional engineering numerical strengths coupled with an enquiring creative approach as required by employers. Developing the latter approach is sometimes difficult but it is our aim to get students to eventually approach with relish a blank sheet of paper and an ill-defined, uncertain brief to which they can develop a rational solution. We do seek to educate, rather than to merely train. Because civil engineering is such a broad area, there are lots of different specialisms for students to consider after graduating, but our degree will give students a solid foundation for entering any of them.

The programme has a first year (Level S) that is shared with the other programmes in ASU's College of Engineering that is designed to bring school leavers in Bahrain and the Gulf region to a standard appropriate for entry into a Level 4 engineering degree programme equivalent to UK approved engineering programmes. The first year is designed to prepare students with the necessary knowledge and skills to continue with their studies at the specialist levels (Years 2/3/4) of the 4-year programme. The first year covers the fundamentals of mathematics and science, and students also learn how to use relevant technology. During the first year, there are three compulsory modules required by the Higher Education Council in Bahrain namely: 'Arabic Language' (or 'Arabic Language for Non-Arabic Speakers'), 'Bahain Civilisation and History' and 'Human Rights'. These are part of the Kingdom's strategy to strengthen the level of Arabic language and promote Arabic culture. It is important to note that native Arabic speaking students will study the Arabic Language module, whereas students who do not speak Arabic will study the module Arabic Language for Non-Arabic Speakers.

The B.Eng (Hons) Civil Engineering aims to:

- Produce graduates who are committed to a career in the civil engineering industry with a range of employers in a variety of countries.
- Produce graduates equipped for postgraduate study and to take up responsible professional employment in the construction industry and become lifelong learners with an appreciation of the value to society of an education in civil engineering.
- Produce graduates who have a breadth and depth of knowledge and understanding of the key aspects of civil engineering.
- Allow graduates to acquire and develop analytical and problem-solving skills, and subject-specific skills. In addition, to acquire and develop the ability to

evaluate evidence, arguments and assumptions, to reach sound judgements and communicate effectively.

- Develop graduates who approach design problems creatively and who have the technical skills to see their ideas through to realisation.
- Create an educational environment that benefits from practical experience.
- Provide an engineering education, centered within the built environment that recognizes the important roles of other professions in the development of the built environment and cultivates interaction and teamwork with these other professionals.
- Provide graduates with the necessary academic qualification to enter advanced postgraduate studies as well as providing the necessary educational base to become a Chartered Engineer.

General Information

Awarding Institution	London South Bank University and Applied Science University
Teaching Institution	Applied Science University, Kingdom of Bahrain
College	Engineering
Department	Civil and Architectural Engineering
Offered programme	BEng (Hons) Civil Engineering
Programmes recognised by	Ministry of Education, Kingdom of Bahrain
Final Qualification	Bachelor Degree
Academic year	2024-2025
Language of study	English
Mode of study	Full-Time
Duration of programme	4 years
Programme Coordinator	Dr Hamdy AlSayed Office No: 16036 158 E-mail: hamdy.mohamed@asu.edu.bh Room No. 110

Programme Intended Learning Outcomes

The programme outcomes have been developed with reference to the JBM guidelines, UK-SPEC, and the QAA subject benchmark statement for Engineering (E). They are also summarised in the Output Standards Specification provided for the Joint Board of Moderators.

BEng (Hons) Civil Engineering aims to:

a) Students will have **knowledge and understanding** of**:**

In year 1:

A1 Subject knowledge underpinning the major disciplines in either the sciences or engineering.
A2 Experimental method and the development and testing of hypotheses.
A3 Methods used in the analysis, evaluation and critical review of evidence in either the sciences or engineering.

A4 Processes and procedures in sampling, data analysis and expressing precision, accuracy and reproducibility.

In years2/3/4:

A1 Mathematics as a means of communicating results, concepts, and ideas that are relevant to civil engineering (E).
A2 The fundamental concepts, principles, and theories of civil and structural engineering (E).
A3 The concepts, principles and theories of structural analysis, geotechnics, hydraulics, and design to an advanced level (E).
A4 Information and Communications Technology relevant to civil engineering (E).
A5 The general principles of engineering design and construction and the application of specific design techniques to particular elements and systems (E).
A6 The characteristics and behaviour of engineering materials (E).
A7 Management and business practices that are relevant to the construction industry (E).
A8 The role of the civil engineer in society, including the global and social context of the built environment (E).
A9 Sustainability issues and the importance of civil engineering to the quality of the environment. (E).
A10 Health and safety issues, risk assessment, quality issues and regulatory frameworks (E).
A11 Context in which engineering knowledge can be applied.

b) Students will develop their **intellectual skills** such that they are able to**:**

In year 1:

B1 Understand the role of rational argument.
B2 Appreciate the key features of a problem and suggest possible means of investigation. B3 Be aware of the significance of hypotheses, experimental data and rational arguments.
B4 Apply a theory, concept or subject-specific principle to a new context.

In years 2/3/4:

B1 Use mathematical methods to analyse engineering problems (E).
B2 Analyse and solve engineering problems (E).
B3 Design engineering elements and whole systems to meet a need critically evaluate, and make improvements (E).
B4 Apply engineering knowledge and understanding in the solution of problems and the development of designs (E).
B5 Undertake research, obtain and evaluate primary and secondary data (E).
B6 Plan, conduct and report on an individual research.
B7 Be aware of all the relevant frameworks in solving problems and designing systems, taking into account financial aspects, risk analysis and environmental impact (E).
B8 Use creativity and innovation in designing solutions.

c) Students will acquire and develop **practical skills** such that they are able to**:**

In year 1:

C1 Demonstrate safe practices and advise on safety procedures associated with a particular technique or methodology.
C2 Evaluate alternative methodologies for an investigation or completing a process.
C3 Organise and allocate duties, set targets and evaluate progress in achieving a specific technical goal.
C4 Present data in a seminar or lecture.
C5 Demonstrate competence in a range of basic statistical procedures.
C6 Demonstrate competence in the use of word processors, spreadsheets and data presentation packages.

In years 2/3/4:

C1 Carry out safely a series of planned experiments (E).
C2 Use laboratory and field work equipment to generate data (E).
C3 Analyse experimental results and determine their validity and accuracy (E).
C4 Prepare technical reports.
C5 Give technical presentations using a variety of media.
C6 Prepare technical drawings, including the use of CAD and freehand sketching.
C7 Use the library, internet and other sources effectively (E).
C8 Use computer packages (E).
C9 Manage projects efficiently (E).
C10 Use surveying equipment.

d) Students will acquire and develop **transferable skills** such that they are able to:

In year 1:

D1 Manage and adapt their work schedule and learning strategy.
D2 Adopt skills and techniques to address a particular problem.
D3 Be aware of the full range of sources of information, citing references properly.
D4 Appreciate the need and begin to communicate ideas, arguments and concepts in a rational and systematic way, using a variety of media.
D5 Assume responsibility for their own learning and work independently.
D6 Manage and monitor their role within a group working to meet specific targets.

In years 2/3/4:

D1 Communicate effectively - oral presentations, report writing, drawing (E).
D2 Apply mathematical skills.
D3 Work independently.
D4 Manage time and work to deadlines (E).
D5 Use Information and Communications Technology (E).
D6 Work constructively as a member of a group (E).
D7 Manage tasks and solve problems, transfer techniques and solutions from one area to another, and apply critical analysis and judgement (E).
D8 Learn effectively to continue professional development and in a wider context throughout their career (E).

In year 1:

B1 Understand the role of rational argument.
B2 Appreciate the key features of a problem and suggest possible means of investigation.
B3 Be aware of the significance of hypotheses, experimental data and rational arguments.
B4 Apply a theory, concept or subject-specific principle to a new context.

In years 2/3/4:

B1 Use mathematical methods to analyse engineering problems (E).
B2 Analyse and solve engineering problems (E).
B3 Design engineering elements and whole systems to meet a need critically evaluated, and make improvements (E).
B4 Apply engineering knowledge and understanding in the solution of problems and the development of designs (E).
B5 Undertake research, obtain and evaluate primary and secondary data (E).
B6 Plan, conduct and report on an individual research.
B7 Be aware of all the relevant frameworks in solving problems and designing systems, taking into account financial aspects, risk analysis and environmental impact (E).
B8 Use creativity and innovation in designing solutions.

Admission Criteria

In order to be considered for entry to the programme, applicants will be required to have the following qualifications:

Year 1 entry (full-time)

- Bahraini or GCC Secondary School (Scientific) Certificate, or equivalent, with a minimum of 65% GPA and a 60% in Mathematics and 60% in the English language. In addition, English language competency equivalent to IELTS 4.5 or above is required.
- Candidates with lower GPA may also be admitted subject to a satisfactory interview by the College.

or

- Five GCSE passes, at grade C or above, including Mathematics and English (or another subject that demonstrates an adequate command of English).

Year 2 progression

Progression to the second year of the programme is subject to:

- Demonstrating English language competency equivalent to IELTS 5 or above.

Progression Pathways and Opportunities

Students must study 120 credits each year (Year 1 / Level S also has two additional modules, which are local requirements). Each year consists of 2 semesters of 15 weeks. In each module, the student must achieve an overall mark of 40% for the module and a minimum mark of 30% in any component to pass the module. A student is permitted a maximum of two enrolments with a referral opportunity associated with each enrolment in each module.

ASU is committed to enhancing the competitive advantages of its graduates at all levels. A dedicated team of academics and support staff work with academic partners and local businesses and industries to ensure appropriate module design and content creation and delivery, emphasising vocational and practical skills needed by engineering employers. Each programme is designed to prepare students for their chosen field of specialisation. To this end, each programme has specific aims and objectives (outlined in the programme specifications) to ensure graduates have the required subject-specific skills and attributes. In addition to these, the graduates from these programmes will have the following generic abilities and skills needed by employers, which will enhance their employability chances:

- Strong problem-solving skills
- High-level key and transferable skill sets
- The ability to think creatively and independently
- The ability to maintain a high-level of subject-specific professional competence, technical knowledge, and competence
- The ability to conceptualise problems at a high-level (i.e. see the big picture)
- Diligent and ethical working practices
- The ability to work both independently and as part of a team
- Flexibility and the ability to apply their subject-specific knowledge to fields outside their own
- High-level ability of communication skills (oral and written) and life-long learning

Graduation Requirements

The degree programmes leading to the dual-award of BEng are based on the student accumulating 480 CAT credits from the four years of study (120 per level). There are two additional non-CAT-bearing modules which are required by Bahrain's Higher Education Council.

The sequencing of the modules, the pattern of delivery and the mode of study for each module are outlined in the relevant module specification, including:

- All the modules that contribute to the programme
- The sequencing of the modules in semesters and years
- The mode of study (NB: these programmes are offered in full-time mode only)

Career Paths

Unleash your potential with our Civil Engineering Programme and explore a variety of exciting career opportunities. Here is a glimpse into the diverse jobs possibilities that await you in the field of civil engineering.

1. Assistant Site Engineer
2. Construction Engineer
3. Structural Engineer
4. Project Engineer
5. Estimation Engineer
6. Site Supervisor
7. Quality Control Engineer

8. Planning Engineer
9. Quantity Surveyor
10. Building Services Engineer
11. Geotechnical Engineer
12. Highway Engineer
13. Environmental Engineer
14. Contracts Engineer
15. Health and Safety Engineer
16. BIM Engineer
17. Materials Engineer
18. Surveying Engineer
19. Structural Design Engineer
20. Transportation Engineer
21. Water Resources Engineer
22. Bridge Engineer
23. Geotechnical Engineer

Programme Structure and Study Plan

The degree programmes leading to the dual-award of BEng (Hons) are based on the student accumulating 480 CAT credits from the four years of study (120 per level). There are two additional non-CAT-bearing modules which are required by Bahrain's Higher Education Council.

BEng (Hons) Civil Engineering – Dual Award
Study Plan 2024- 2025

Year	Semester 1	Module Codes	CAT	Semester 2	Module Codes	CAT	Level	
1	Engineering Science 1	ASU_S_ES1	10	Engineering Science 2	ASU_S_ES2	10	S	Core
	Intermediate English	ASU_S_IEN	10	Advanced English	ASU_S_AEN	10	S	Core
	Mathematics 1	ASU_S_MA1	10	Mathematics 2	ASU_S_MA2	10	S	Core
	Principles of Engineering	ASU_S_POE	10	Constructing the Built Environment	ASU_S_CBE	10	S	Core
	Laboratory and Workshop Skills	ASU_S_LWS	10	Study Skills and Professional Practice	ASU_S_SSP	10	S	Core
				Computer Programming for Engineering	ASU_S_CPE	10	S	Core
Summer	Human Rights				ASU_S_HUR	10	S	Core
	Bahrain Civilisation and History				ASU_S_BCH	-	S	HEC req.
	Arabic Language				ASU_S_ALA	-	S	HEC req.
	Arabic Language for Non-Arabic Speakers				ASU_S_ALN			
Total			**50**			**70**		**120**
2	Engineering Practice and Design 1	ASU_4_EP1	10	Engineering Practice and Design 2	ASU_4_EP2	10	4	Core
	Engineering Mathematics 1	ASU_4_EM1	10	Engineering Mathematics2	ASU_4_EM2	10	4	Core
	Principles of Engineering Science 1	ASU_4_PE1	10	Principles of Engineering Science 2	ASU_4_PE2	10	4	Core
	Surveying and Structures 1	ASU_4_SS1	10	Surveying and Structures 2	ASU_4_SS2	10	4	Core
	Civil Engineering Drawing and Surveying	ASU_4_CDS	10	Engineering Ethics	ASU_4_EET	10	4	Core
	Structural Design	ASU_4_SDG	10	Soil Mechanics	ASU_4_SME	10	4	Core
Total			**60**			**60**		**120**
3	Advanced Engineering Mathematics	ASU_5_AEM	10	Infrastructure and Highway Engineering	ASU_5_IHE	10	5	Core
	Design and Construction 1	ASU_5_DC1	10	Internship	ASU_5_ITS	10	5	Core
	Hydraulics	ASU_5_HYD	10	Design and Construction 2	ASU_5_DC2	10	5	Core
	Structural Mechanics	ASU_5_STM	10	Advanced Structural Analysis and Design	ASU_5_ASD	10	5	Core
	Environmental Engineering	ASU_5_EEG	10	Theory of Structures	ASU_5_THS	10	5	Core
	Engineering Management and Economics	ASU_5_EME	10	Civil Engineering and Construction Field Studies	ASU_5_CCF	10	5	Core
Total			**60**			**60**		**120**
4	Structural Design and Analysis 1	ASU_6_SA1	10	Current Topics in Civil and Construction Engineering	ASU_6_CTC	10	6	Core
	Civil Engineering Materials	ASU_6_CEM	10	Geotechnical Engineering	ASU_6_GTE	10	6	Core
	Foundations	ASU_6_FDS	10	Structural Design and Analysis 2	ASU_6_SA2	10	6	Core
	Engineering System Design	ASU_6_ESD	10	Construction Management	ASU_6_CMG	10	6	Core
	Engineering Research Methods	ASU_6_ERM	10	Project	ASU_6_PRJ	20	6	Core
	Innovation, Enterprise and Management	ASU_6_IEM	10					
Total			**60**			**60**		**120**

Module Descriptions

ASU_S_MA1 Mathematics 1
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.

ASU_S_IEN Intermediate English
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.

ASU_S_POE Principles of Engineering
The 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.

ASU_S_SSP Study Skills and Professional Practice
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.

ASU_S_ES1 Engineering Science 1
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.

ASU_S_LWS Laboratory and Workshop Skills
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.

ASU_S_ES2 Engineering Science 2
This module is aims to extend the 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.

ASU_S_CPE Computer Programming for Engineering
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.

ASU_S_MA2 Mathematics 2
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.

ASU_S_CBE Constructing the Built Environment
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.

ASU_S_AEN Advanced English
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.

ASU_S_HUR Human Rights
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:

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 Organization of Public Rights and
g. Freedom in the Kingdom of Bahrain

ASU_S_BCH Bahrain Civilisation and History
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.

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

ASU_S_ALN Arabic Language for Non-Arabic Speakers
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.

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

ASU_4_SDG Structural Design
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.

ASU_4_EM1 Engineering Mathematics 1
This module consolidates the mathematical skills that underpin the Bachelor of Engineering Degrees.

ASU_4_PE1 Principles of Engineering Science 1
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.
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.

ASU_4_SS1 Surveying and Structures 1
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.

ASU_4_CDS Civil Engineering Drawing and Surveying
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.

ASU_4_EP2 Engineering Practice and Design 2
The module covers practical work, project management, health and safety and risk management, and transferable skills.

ASU_4_EM2 Engineering Mathematics 2
This module consolidates the mathematical skills that underpin the Bachelor of Engineering Degrees.

ASU_4_PE2 Principles of Engineering Science 2
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.

ASU_4_SS2 Surveying and Structures 2
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.

ASU_4_EET Engineering Ethics
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.

ASU_4_SME Soil Mechanics
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.

ASU_5_AEM Advanced Engineering Mathematics
This module covers advanced undergraduate engineering mathematics.

ASU_5_DC1 Design and Construction 1
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.

ASU_5_HYD Hydraulics
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.

ASU_5_STM Structural Mechanics
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, analyses, design beams, and columns. They compare computer results to hand calculations results, obtained using load take-down methods and design formulae.

ASU_5_EEG Environmental Engineering
This module takes the principles of environmental engineering and applies them to practical applications of analysis and design. The student 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.

ASU_5_IHE Infrastructure and Highway Engineering
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.

ASU_5_EME Engineering Management and Economics
This module helps to prepare students for their future roles as professional engineers in a number of ways. It includes:

- 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.

ASU_5_ITS Internship
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.

ASU_5_DC2 Design and Construction 2
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.

ASU_5_ASD Advanced Structural Analysis and Design
This module develops students' practice with structural engineering, provides an introduction to structural concepts, and provides an overview of specific techniques for analysing indeterminate structures, beams and frame structures.

ASU_5_THS Theory of Structures
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.
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.
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.

ASU_5_CCF Civil Engineering and Construction Field Study
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.

ASU_6_SA1 Structural Design and Analysis 1
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.

ASU_6_CEM _Civil Engineering Materials
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.

ASU_6_FDS Foundations
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.

ASU_6_IEM Innovation, Enterprise and Management
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.
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).
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.

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

ASU_6_ERM Engineering Research Methods
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.

ASU_6_CTC Current Topics in Civil and Construction Engineering
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

ASU_6_GTE Geotechnical Engineering
This module shows how the soil mechanics theories introduced in Soil Mechanics w applied to the solution of a number of geotechnical analyses and design problems.

ASU_6_SA2 Structural Design and Analysis 2
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.

ASU_6_CMG Construction Management
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.

ASU_6_PRJ Project
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.

BEng (Hons) Mechanical Engineering – Dual Award

This dual-award programme prepares students for a career as a Mechanical Engineer. The programme embraces recent industry developments, in particular, the introduction of ECUK UK Standard for Professional Engineering Competence (UK-SPEC) and gives students the opportunity to achieve the professional status of Chartered Engineer. The curriculum emphasises the development of traditional engineering numerical strengths coupled with an enquiring creative approach as required by employers. Developing the latter approach is sometimes difficult, but it is our aim to get students to eventually approach with relish a blank sheet of paper and an ill-defined, uncertain brief to which they can develop a rational solution. We do seek to educate, rather than to merely train. Because mechanical engineering is such a broad area, there are lots of different specialisms for students to consider after graduating, but our degree will give students a solid foundation for entering any of them.

The programme has a first year (Level S) that is shared with the other programmes in the College of Engineering. It is designed to bring school leavers in Bahrain and the Gulf region to a standard acceptable for progression to a Level 4 engineering degree programme equivalent to UK approved engineering programmes. The first year is designed to prepare students with the necessary knowledge and skills to continue with their studies at the specialist levels (Years 2/3/4) of the 4-year programme. The first year covers the fundamentals of mathematics and science, and students also learn how to use relevant technology. During the first year, there are three compulsory modules required by the Higher Education Council in Bahrain namely: 'Arabic Language' (or 'Arabic Language for Non-Arabic Speakers'), 'Bahrain Civilisation and History', and 'Human Rights'. These are part of the Kingdom's strategy to strengthen the level of Arabic language and promote the Arabic culture.

The BEng (Hons) Mechanical Engineering programme aims to provide broad education and specialist training in the field of mechanical engineering in order to producing graduates capable of pursuing professional careers in industry underpinned by the mechanical engineering discipline. Students on this programme will develop characteristics focused on the role of the engineer as a problem solver applying knowledge, skill and technical know-how within economic, legal and ethical constraints. The knowledge provided throughout the programme is based on an understanding of scientific and mathematical principles and their applications, and skills development includes communications, time management and teamwork. In addition, design, sustainability and environmental considerations form coherent themes throughout the degree programme.

The BEng (Hons) Mechanical Engineering promotes:

1. Continual Professional Development (CPD) skills including critical self-awareness, reflection, independent judgement, responsibility for decisions, original thinking, managing own learning and making use of scholarly reviews and primary sources.
2. A systematic and broad understanding of the key topics within Mechanical Engineering together with the skills needed to update, extend and deepen in further study and future career development.
3. An understanding of a cognitive map of topics within the Mechanical Engineering subject area incorporating knowledge and understanding of core Mechanical

Engineering topics such as Dynamics, Thermofluids, Mechanics of Solids, and Manufacturing and Materials underpinned by an understanding of relevant science and engineering topics such as Mathematics, Electrical and Electronic Engineering, Computing and Control Systems.

4. The ability to analyse Mechanical Engineering components and systems from first principles, through to advanced simulation techniques and understand the advantages and disadvantages of different analysis approaches and be able to select an appropriate method.
5. Competent practical skills including basic manufacturing and measurement skills, awareness of advanced manufacturing and instrumentation techniques to inform design choices.
6. The ability to set up projects and manage them, approach design problems with creativity and see all tasks to successful completion underpinned by an understanding of innovation and enterprise.

General Information

Awarding Institution	London South Bank University and Applied Science University
Teaching Institution	Applied Science University, Kingdom of Bahrain
College	Engineering
Department	Electrical and Mechanical Engineering
Offered programme	BEng (Hons) Mechanical Engineering
Programmes recognised by	Ministry of Education, Kingdom of Bahrain
Final Qualification	Bachelor Degree
Academic year	2024-2025
Language of study	English
Mode of study	Full-Time
Duration of programme	4 years
Programme Coordinator	TBA Office No: TBA E-mail: TBA@asu.edu.bh Room No. TBA

Programme Intended Learning Outcomes

The programme outcomes have been developed with reference to the JBM guidelines, UK-SPEC, and the QAA subject benchmark statement for Engineering (E). They are also summarised in the Output Standards Specification provided for the Joint Board of Moderators.

B.Eng (Hons) Mechanical Engineering aims to:

A) Students will have **knowledge and understanding** of**:**

A.1. The fundamental principles of mathematics, modelling and numerical techniques as applied to a mechanical engineering analysis.

A.2. The fundamental concepts of engineering science (solid mechanics, dynamics, thermodynamics, fluid mechanics, control, electrical engineering and electronics) as it relates to the analysis of mechanical systems.

A.3. The characteristics and behaviour of engineering materials and manufacturing methods.
A.4. The design process includes factors, such as part production, assembly and disassembly, market needs, technical feasibility, serviceability and lifecycle considerations, innovation and enterprise.
A.5. The fundamentals of management, including the legal framework within commercial engineering practice, the implications of economic theory and project management.
A.6. Health and safety, risk, and sustainability issues, together with the social, environmental, and ethical considerations affecting their engineering judgement

B) Students will develop their **intellectual skills** such that they are able to**:**
B.1. Select and apply appropriate mathematical methods to the analysis of engineering problems – analyse mechanical engineering components and systems from first principles to advanced simulation methods.
B.1. Recognise the relevant field of mechanical engineering and apply the principles of engineering science to the solution of engineering problems.
B.2. Work with attention to detail and recognise the differences between theory and practice whilst retaining an overview of the mechanical engineering discipline.
B.3. Demonstrate a capacity for seeking innovative and creative solutions to engineering design problems.

C) Students will acquire and develop **practical skills** such that they are able to**:**
C.1. Use test and measurement equipment to obtain, analyse and interpret data from a wide range of experimental laboratory-based systems.
C.2. Use workshop machinery safely to manufacture an engineering component and demonstrate competence in the use of hand tools and manual machines, and understanding of the function of CNC machines, rapid prototyping techniques and inspection techniques.
C.3. Use computer software and mathematical techniques to identify, model, and simulate complex mechanical systems.

D) Students will acquire and develop **transferable skills** such that they are able to**:**
D.1. Prepare documents and reports, and deliver presentations to a professional level, with effective use of IT software and referencing of literature.
D.2. Work effectively in a team, recognising the roles played by different team members and the limits of own personal knowledge and skills. Be able to lead a team to appropriate tasks.
D.3. Be able to select appropriate methods for problem-solving and be able to determine the necessary steps to solve a problem.
D.4. Manage time effectively and recognise that this skill is essential for continual professional development and lifelong learning.

Admission Criteria

To be considered for entry to the programme, applicants will be required to have the following qualifications:

Year 1 entry

- Bahraini or GCC Secondary School (Scientific) Certificate, or equivalent, with a minimum of 65% GPA and a 60% in Mathematics and 60% in the English language. In addition, English language competency equivalent to IELTS 4.5 or above is required.
- Candidates with lower GPA may also be admitted subject to a satisfactory interview by the College.

or

- Five GCSE passes, at grade C or above, including Mathematics and English (or another subject that demonstrates an adequate command of English).

Year 2 progression

Progression to the second year of the programme is subject to:

- Demonstrating English language competency equivalent to IELTS 5 or above.

Progression Pathways and Opportunities

Students must study 120 credits each year (Year 1 / Level S also has two additional modules, which are local requirements). Each year consists of 2 semesters of 15 weeks. In each module, the student must achieve an overall mark of 40% for the module and a minimum mark of 30% in any component to pass the module. A student is permitted a maximum of two enrolments with a referral opportunity associated with each enrolment in each module.

ASU is committed to enhancing the competitive advantages of its graduates at all levels. A dedicated team of academics and support staff work together with academic partners and local businesses and industries to ensure appropriate module design and content creation and delivery with emphasis on vocational and practical skills needed by engineering employers. Each programme is designed to prepare students for their chosen field of specialisation. To this end, each programme has specific aims and objectives (outlined in the programme specifications) to ensure graduates have the required subject-specific skills and attributes. In addition to these, the graduates from these programmes will have the following generic abilities and skills needed by employers, which will enhance their employability chances:

- Strong problem-solving skills.
- High-level key and transferable skill sets.
- The ability to think creatively and independently.
- The ability to maintain a high-level of subject-specific professional competence, technical knowledge, and competence.
- The ability to conceptualise problems at a high-level (i.e. see the big picture).
- Diligent and ethical working practices.
- The ability to work both independently and as part of a team.
- Flexibility and the ability to apply their subject-specific knowledge to fields outside their own.
- High-level ability of communication skills (oral and written) and life-long learning.

Graduation Requirements

The degree programmes leading to the dual-award of BEng are based on the student accumulating 480 CAT credits from the four years of study (120 per level). There are two additional non-CAT-bearing modules which are required by Bahrain's Higher Education Council.

The sequencing of the modules, the pattern of delivery and the mode of study for each module are outlined in the relevant module specification, including:

- All the modules that contribute to the programme.
- The sequencing of the modules in semesters and years.

The mode of study (NB: these programmes are offered in full-time mode only).

Career Paths

Unleash your potential with our Mechanical Engineering Programme and explore a variety of exciting career opportunities. Here is a glimpse into the diverse jobs possibilities that await you in the field of mechanical engineering.

1. Pipeline Engineer
2. Facilities Engineer - Oil and Gas
3. Mechanical Engineer - Oil and Gas
4. Safety Engineer - Oil and Gas
5. Instrumentation Engineer - Oil and Gas
6. Mechanical Design Engineer
7. Manufacturing Engineer
8. Project Engineer
9. HVAC Engineer (Heating, Ventilation, and Air Conditioning)
10. Aerospace Engineer
11. Automotive Engineer
12. Robotics Engineer
13. Materials Engineer
14. Quality Assurance Engineer
15. Process Engineer
16. Energy Systems Engineer
17. Structural Engineer
18. Research and Development Engineer
19. Systems Engineer
20. Controls Engineer
21. Maintenance Engineer
22. Thermal Engineer
23. Product Development Engineer

Programme Structure and Study Plan

The degree programmes leading to the dual-award of BEng (Hons) are based on the student accumulating 480 CAT credits from the four years of study (120 per level). There are two additional non-CAT-bearing modules which are required by Bahrain's Higher Education Council.

BEng (Hons) Mechanical Engineering – Dual Award
Study Plan 2024-2025

Year	Semester 1	Module Codes	CAT	Semester 2	Module Codes	CAT	Level	
1	Engineering Science 1	ASU_S_ES1	10	Engineering Science 2	ASU_S_ES2	10	S	Core
	Intermediate English	ASU_S_IEN	10	Advanced English	ASU_S_AEN	10	S	Core
	Mathematics 1	ASU_S_MA1	10	Mathematics 2	ASU_S_MA2	10	S	Core
	Scientific Principles of Engineering	ASU_S_SPE	10	Engineering Design and Modelling	ASU_S_EDM	10	S	Core
	Laboratory and Workshop Skills	ASU_S_LWS	10	Study Skills and Professional Practice	ASU_S_SSP	10	S	Core
				Computer Programming for Engineering	ASU_S_CPE	10	S	Core
Summer	Human Rights				ASU_S_HUR	**10**	S	Core
	Bahrain Civilisation and History				ASU_S_BCH	-	S	HEC req.
	Arabic Language / Arabic Language for Non-Arabic Speakers				ASU_S_ALA	-	S	HEC req.
	Total		**50**			**70**		120
2	Design and Practice	ASU_4_DAP	20	Engineering Computing	ASU_4_ENC	20	4	Core
	Engineering Mathematics and Modelling	ASU_4_EMM	20	Thermofluids and Dynamics	ASU_4_TAD	20	4	Core
	Introduction to Mechanical Engineering	ASU_4_IME	20	Introduction to Electrical and Electronic Engineering	ASU_4_IEE	20	4	Core
Total			**60**			**60**		120
3	Advanced Engineering Mathematics and Modelling	ASU_5_AMM	20	Dynamics and Control	ASU_5_DAC	20	5	Core
	Solid Mechanics and Finite Element Analysis (FEA)	ASU_5_FEA	20	Thermofluids and Sustainable Energy	ASU_5_TSE	20	5	Core
	Machine Drives and Mechatronics	ASU_5_MDM	20	Engineering Design	ASU_5_END	10	5	Core
				Internship	ASU_5_INT	10	5	Core
Total			**60**			**60**		120
4	Dynamics and System Modelling	ASU_6_DSM	20	Innovation and Enterprise	ASU_6_IAE	20	6	Core
	Project*	ASU_6_PRO	40	Thermofluids and Turbo machinery	ASU_6_TTM	20	6	Core
				Manufacturing Systems and Materials Technologies	ASU_6_MMT	20	6	Core
	Total		**60**			**60**		120

Module Descriptions

ASU_S_MA1 Mathematics 1
The module is designed to provide students with the mathematical knowledge and skills to support the study of engineering and to provide 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.

ASU_S_ES1 Engineering Science 1
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 the study of engineering.

ASU_S_IEN Intermediate English
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.

ASU_S_SPE Scientific Principles of Engineering
The module develops the students' understanding of essential physics and chemistry principles for the study of engineering. It is designed to be accessible to students with a wide range of prior science specialisations. The module introduces the fundamentals of statics, dynamics and the electrical and mechanical properties of materials.

ASU_S_LWS Laboratory and Workshop Skills
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.

ASU_S_MA2 Mathematics 2
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 practice the mathematical concepts they learn during the lectures and solve extra problems.

ASU_S_ES2 Engineering Science 2
This module is aimed at extending the science knowledge of engineering students in preparation for continuing their respective engineering degrees. It covers general applied physical principles, including dynamics, statics, fluids, heat and energy.

ASU_S_AEN Advanced English
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.

ASU_S_EDM Engineering Design and Modelling
This module provides an introduction to engineering design, including the basics of the design process, machining and fabrication and hand and computer engineering drawings. The module will also highlight the role of engineering design within the engineering industry. The module will be taught in a mechanical workshop where students are expected to use model-making tools.

ASU_S_SSP Study Skills and Professional Practice
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.

ASU_S_CPE Computer Programming for Engineering
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.

ASU_S_HUR Human Rights
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:

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

ASU_S_BCH Bahrain Civilisation and History
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.

ASU_S_ALA Arabic Language
This module of 10 CAT's runs for one semester of 7 weeks (Summer Semester). The module provides intensive practice in reading, oral presentations, writing, and note-taking.

ASU_S_ALN Arabic Language for Non-Arabic Speakers
This module of 10 CAT's 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.

ASU_4_DAP Design and Practice
This module provides an introduction to engineering practice and design, including hand and computer-aided drawings, design activities, sustainable design principles, project management, group work and health and safety issues. The module will have a lab component where students will apply the theoretical concepts.

ASU_4_EMM Engineering Mathematics and Modelling
This module consolidates the mathematical skills that underpin the BEng Engineering Degrees. The module contents include Differentiation and Integration Complex Numbers, Linear Algebra, Statistics, Elementary Probability, and Probability Distributions with Applications to Engineering Problems. The module includes a practical component where students use mathematical software packages (Matlab and Excel) to apply the theoretical concepts learnt in class.

ASU_4_IME Introduction to Mechanical Engineering
This module provides an introduction to the concepts of mechanical engineering, which include the properties and limitations of engineering materials, engineering mechanics, such as statics, strength of the material, dynamics and material science. The module will include a practical component where students will conduct appropriate practical laboratory experiments to equip students with practical skills related to the mechanical engineering profession.

ASU_4_ENC Engineering Computing
This is an introductory module to Object-Oriented Programming (OOP) using Python programming language, which will address programming knowledge and skills. It will enable students to acquire computer programming skills needed for developing software used in engineering design and simulation.

ASU_4_TAD Thermofluids and Dynamics
This module provides an introductory study of Thermofluids, including heat transfer, fluid mechanics and thermodynamics, which enable students to analyse simple engineering systems and processes. The module will include a practical component where students acquire practical skills through conducting experiments on thermodynamics and fluid mechanics in the Thermofluids lab.

ASU_4_IEE Introduction to Electrical and Electronic Engineering
This module covers the fundamentals of both electrical and electronic engineering. The module starts with the basic concepts of Voltage, Current, Power and Energy and the basic laws that govern electrical circuits, such as Ohm's Law and Kirchhoff's Law and more advanced circuit analysis techniques such as Node Voltage and Mesh Current methods, DC responses of RC, RL, RLC circuits, and AC sinusoidal circuit theory. Then, the module will cover the basics of

semiconductors (Diodes, BJTs and Op-Amps). The module includes a practical component where students perform experiments to apply the theoretical concepts and gain practical skills in circuits and electronics.

ASU_5_AMM Advanced Engineering Mathematics and Modelling
This module covers advanced engineering mathematical techniques used for solving engineering problems, including Computational Techniques in Engineering, Vectors, Differential equations, Selected Numerical and Computational methods, Advanced Matrix computation techniques, and Advanced Computational Optimisation and advanced Statistical techniques, including Permutations and combinations. Binomial, Poisson and normal distributions.

ASU_5_FEA Solid Mechanics and Finite Element Analysis (FEA)
This module discusses concepts in the deformation of materials building based on knowledge gained in L3 and L4 modules, where the fundamental principles of solid mechanics are applied to more complex systems. The module will provide basic principles of the finite element analysis (FEA) techniques and their application in structural and stress analysis. The module involves a practical component where students use FEA software to implement the theoretical concepts.

ASU_5_MDM Machine Drives and Mechatronics
This module provides the fundamentals of mechanical drives, power transmission systems, microcontrollers and electrical actuation systems. The module has a lab component where students will conduct experiments on mechanical and mechatronic control systems in advanced engineering applications.

ASU_5_DAC Dynamics and Control
The module covers dynamics and classical theory. It extends the treatment of dynamics from point masses to rigid bodies and covers a wider scope of applications of the principles of mechanics. The module also deals with applying various mathematical techniques to the study of dynamics and feedback problems. Additionally, various methods of classical control, such as Bode, Nyquist and Root Locus, will be analysed. The module includes a practical component where students conduct experiments in teams, analyse data, and communicate experimental results in written technical reports to improve their knowledge and understanding of basic concepts of automatic control.

ASU_5_TSE Thermofluids and Sustainable Energy
This module provides further study of heat transfer, fluid mechanics and thermodynamics over the L4 module on Thermodynamics, where the theory needed to allow an industrial-level analysis of processes is presented. The topics include Steam cycles, Air standard cycles, Refrigeration cycles, Turbulence, Combustion and Heat Transfer, heat equation conduction resistance networks, applications, convection and radiation.

ASU_5_END Engineering Design
The first half of this module is designed to extend the student's understanding and ability to appropriately select and then apply a range of design methodologies, computer-aided design tools, and techniques to the solution of engineering design problems. A wide range of problem-solving techniques will be introduced to reinforce the need for a structured approach to engineering design.

"Hands-on" experience is offered to the student, including further 2D design work software, with a strong emphasis on 3D parametric modelling and the associated tools widely used in industry.

ASU_5_INT Internship
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.

ASU_6_DSM Dynamics and System Modelling
To provide participants with an appropriate way of visualising the complex interrelationships between various parts of real-world problems; problems that continually change over time and are resistant to corrective action. Therefore, the module provides a solid foundation for developing strategies and managing problems for which conventional reductionist ways of thinking are ineffective. The module is subsequently designed to provide the understanding of the following:

- System dynamics and why use it
- The modelling approach/ processes
- The basic feedback structures
- How to develop a system dynamics model.

Therefore, this module introduces the concepts of system dynamics modelling, including the modelling process, fundamental modes of dynamic behaviour, and the stock-flow-feedback structures that generate them, system mapping tools, and modelling human behaviour. Emphasis will be on examples from the energy and water sectors and aquaculture management, but students will have the opportunity to engage with their real-world problems.

ASU_6_PRO Project
The project is a learning experience that enables students to do independent research and bring together many of the concepts they have learned. 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, including information generally on how to plan the project, milestones, important dates, and deliverables. The module will spread over the first and second semesters of Year 4.

ASU_6_IAE Innovation and Enterprise
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. Topics include project management skills which help determine the critical path of a proposed business, such as intellectual property, market research, market placement, advertising and finance. Students will be expected to reflect on what they can contribute to a group.

ASU_6_TTM Thermofluids and Turbo Machinery
This module provides a further study of heat transfer, fluid mechanics and thermodynamics, exploring in-depth internal combustion engines, fluid mechanics governing equations, the performance of various types of pumps and turbines, and application of heat transfer to extended surfaces and heat exchangers. The module involves experiments in teams; on condensation

apparatus, boiling heat transfer apparatus, central heating system, refrigeration cycle apparatus, weather station, and four-stroke spark-ignition engine.

ASU_6_MMT Manufacturing Systems and Materials Technologies

This module provides an advanced study on stress analysis, materials behaviours, and process selection. The module also introduces the core concepts of manufacturing systems, manufacturing and operations strategies, manufacturing automation, manufacturing process planning, material handling storage and retrieval. Students will also develop an understanding of the role of robotics in manufacturing and the principles of operations management.

BEng (Hons) Electrical and Electronic Engineering– Dual Award

This dual-award programme is intended for undergraduate students who wish to study the discipline of Electrical and Electronic Engineering to Honours degree level and who may wish to achieve professional status later on. This programme is designed to embrace industry developments, particularly the ECUK UK Standard for Professional Engineering Competence (UK-SPEC).

The programme has a first-year (Level S) that is shared with the other programmes in the College of Engineering. It is designed to bring school leavers in Bahrain and the Gulf region to a standard acceptable for progression to a Level 4 engineering degree programme equivalent to UK approved engineering programmes. The first year is designed to prepare students with the necessary knowledge and skills to continue with their studies at the specialist levels (Years 2/3/4) of the 4-year programme. The first year covers the fundamentals of mathematics and science, and students also learn how to use relevant technology. During the first year, three compulsory modules are required by the Higher Education Council in Bahrain: 'Arabic Language' (or 'Arabic Language for Non-Arabic Speakers'), 'Bahrain Civilisation and History', and 'Human Rights'. These are part of the Kingdom's strategy to strengthen the level of the Arabic language and promote the Arabic culture.

The BEng (Hons) Electrical and Electronic Engineering (ASU) aims to:

Produce engineering graduates who have demonstrated:

1. Understanding of key aspects of Electrical and Electronic Engineering, including the acquisition of coherent and detailed knowledge, at least some of which is at, or informed by, the forefront of defined aspects of a discipline.
2. A broad base of active knowledge in Electrical and Electronic engineering and the skills necessary to update, extend and deepen it for career development or further study. This includes: 1) Appropriate mathematics and circuit theory, 2) Digital, analogue and particularly hybrid electronic systems, at all levels, 3) Computer hardware and software at all levels, and 4) The theory and applications of control engineering.
3. The ability to apply the methods and techniques that they have learned to review, consolidate, extend and apply their knowledge and understanding, and to initiate and carry out design projects.
4. The ability to analyse electrical and electronic engineering components and systems from first principles through to advanced simulation techniques, understand the advantages and disadvantages of different analysis approaches and be able to select an appropriate method.
5. Practical skills, including basic design and measurement skills, awareness of advanced software and hardware tools and techniques to inform design choices.
6. The ability to critically evaluate arguments, assumptions, abstract concepts and data (that may be incomplete), to make judgments, and frame appropriate questions to achieve a solution – or identify a range of solutions – to a problem.
7. Skills in managing their own learning and making use of scholarly reviews and primary sources (for example, refereed research articles and/or original materials appropriate to the discipline).
8. Qualities and transferable skills necessary for employment such as the exercise of initiative and personal responsibility, the decisions making in complex and unpredictable contexts, and the learning ability needed to undertake appropriate further training of a professional or equivalent nature.
9. Appreciation of the importance of developing their professional skills and being able to apply a professional engineering approach in their activities, including innovation and

enterprise.

General Information

Awarding Institution	London South Bank University and Applied Science University
Teaching Institution	Applied Science University, Kingdom of Bahrain
College	Engineering
Department	Electrical and Mechanical Engineering
Offered programme	BEng (Hons) Electrical and Electronic Engineering
Programmes recognised by	Ministry of Education, Kingdom of Bahrain
Final Qualification	Bachelor Degree
Academic year	2024-2025
Language of study	English
Mode of study	Full-Time
Duration of programme	4 years
Programme Coordinator	Dr Mohd Ahmad Office No: 16036 224 E-mail: mohd.ahmad@asu.edu.bh Room No.220

Programme Intended Learning Outcomes

The programme outcomes have been developed with reference to the JBM guidelines, UK-SPEC, and the QAA subject benchmark statement for Engineering (E). They are also summarised in the Output Standards Specification provided for the Joint Board of Moderators.

B.Eng (Hons) Electrical and Electronic Engineering aims to:

A) Students will have **knowledge and understanding** of**:**

A.1. The fundamental principles of mathematics, modelling and numerical techniques as applied to electrical and electronic engineering analysis.
A.2. The fundamental concepts of engineering science as it relates to the analysis of electrical systems.
A.3. The fundamental concepts of electrical and electronic engineering (analogue and digital circuits, systems, digital electronics, control systems, machines and power systems)
A.4. The fundamentals of management, including the legal framework within commercial engineering practice, the implications of economic theory and project management.
A.5. Health and safety, risk, and sustainability issues together with the social, environmental, and ethical considerations affecting their engineering judgement.

B) Students will develop their **intellectual skills** such that they are able to**:**

B.1. Select and apply appropriate mathematical methods to the analysis of engineering problems – analyse electrical engineering components and systems from first principles to advanced simulation methods.
B.2. Apply the principles of engineering science to the solution of engineering problems.
B.3. Select appropriate methods for problem-solving and be able to determine the necessary steps to solve a problem.

B.4. Design a system, component, or circuit to meet desired needs within realistic constraints, such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
B.5. Demonstrate a capacity for seeking innovative and creative solutions to engineering design problems.

C) Students will acquire and develop **practical skills** such that they are able to:

C.1. Use test and measurement equipment to obtain, analyse and interpret data from a wide range of experimental laboratory-based systems.
C.2. Use workshop equipment safely to design and implement engineering components and systems and demonstrate competence using hand tools and manual machines.
C.3. Use computer software and mathematical techniques to identify, model, and simulate complex electrical and electronic systems.
C.4. Implement design solutions and evaluate their effectiveness. This includes the ability to ensure that the application of the design results in the appropriate practical outcome, take account of critical constraints, determine the criteria for evaluating the design solutions, evaluate the outcome against the original specification, and actively learn from feedback on results to improve future design solutions and build best practice.

D) Students will acquire and develop **transferable skills** such that they are able to:

D.1. Communicate in English with others at all levels, including preparing documents and reports, and delivering presentations to a professional level, with effective use of IT software and referencing of literature.
D.2. Work effectively in a team, recognising the roles played by different team members and the limits of own personal knowledge and skills. Be able to lead a team to appropriate tasks.
D.3. Manage time effectively and recognise that this skill is essential for continual professional development and lifelong learning.
D.4. Demonstrate personal and social skills, including the ability to create, maintain and enhance productive working relationships, resolve conflicts, Identify, agree and lead work towards collective goals and Know and manage own emotions, strengths and weaknesses.

Admission Criteria

In order to be considered for entry to the programme, applicants will be required to have the following qualifications:

Year 1 entry (full-time)

- Bahraini or GCC Secondary School (Scientific) Certificate, or equivalent, with a minimum of 65% GPA and a 60% in Mathematics and 60% in the English language. In addition, English language competency equivalent to IELTS 4.5 or above is required.
- Candidates with lower GPA may also be admitted subject to a satisfactory interview by the College.

or

- Five GCSE passes, at grade C or above, including Mathematics and English (or another

subject that demonstrates an adequate command of English).

Year 2 progression

Progression to the second year of the programme is subject to:

- Demonstrating English language competency equivalent to IELTS 5 or above.

Progression Pathways and Opportunities

Students must study 120 credits each year (Year 1 / Level S also has two additional modules, which are local requirements). Each year consists of 2 semesters of 15 weeks. In each module, the student must achieve an overall mark of 40% for the module and a minimum mark of 30% in any component to pass the module. A student is permitted a maximum of two enrolments with a referral opportunity associated with each enrolment in each module.

ASU is committed to enhancing the competitive advantages of its graduates at all levels. A dedicated team of academics and support staff work together with academic partners and local businesses and industries to ensure appropriate module design and content creation and delivery with emphasis on vocational and practical skills needed by engineering employers. Each programme is designed to prepare students for their chosen field of specialisation. To this end, each programme has specific aims and objectives (outlined in the programme specifications) to ensure graduates have the required subject-specific skills and attributes. In addition to these, the graduates from these programmes will have the following generic abilities and skills needed by employers, which will enhance their employability chances:

- Strong problem-solving skills.
- High-level key and transferable skill sets.
- The ability to think creatively and independently.
- The ability to maintain a high-level of subject-specific professional competence; technical knowledge, and competence.
- The ability to conceptualise problems at a high-level (i.e. see the big picture)
- Diligent and ethical working practices.
- The ability to work both independently and as part of a team.
- Flexibility and the ability to apply their subject-specific knowledge to fields outside their own.
- High-level ability of communication skills (oral and written) and life-long learning.

Graduation Requirements:

The degree programmes leading to the dual-award of BEng are based on the student accumulating 480 CAT credits from the four years of study (120 per level). There are two additional non-CAT-bearing modules, which are required by Bahrain's Higher Education Council.

The sequencing of the modules, the pattern of delivery and the mode of study for each module are outlined in the relevant module specification, including:

- All the modules that contribute to the programme.

- The sequencing of the modules in semesters and years.
- The mode of study (NB: these programmes are offered in full-time mode only).

Career Paths

Unleash your potential with our Electrical and Electronic Engineering Programme and explore a variety of exciting career opportunities. Here is a glimpse into the diverse jobs possibilities that await you in the field of electrical and electronic engineering.

1. Field Service Engineer
2. Analog Design Engineer
3. Operations Manager
4. Automation Engineer
5. Commissioning Engineer
6. Physical Design Engineer
7. Process Engineer
8. Product Engineer
9. Controls Engineer
10. Quality Engineer
11. ASIC Design Engineer
12. Design Verification Engineer
13. Radio-frequency (RF) Engineer
14. Radio-frequency (RF) Design Engineer
15. Digital Design Engineer
16. Electromagnetic Compatibility (EMC) Engineer
17. Reliability Engineer
18. Electrical Engineer
19. Signal Integrity Engineer
20. Signal Processing Engineer
21. Electrical Estimator
22. Systems Integration Engineer
23. Telecommunications Engineer
24. Test Engineer
25. Validation Engineer
26. Equipment Engineer
27. Field Programmable Gate Array (FPGA) engineer

Programme Structure and Study Plan

The degree programmes leading to the dual-award of BEng (Hons) are based on the student accumulating 480 CAT credits from the four years of study (120 per level). There are two additional non-CAT-bearing modules, which are required by Bahrain's Higher Education Council.

BEng (Hons) Electrical and Electronic Engineering – Dual Award
Study Plan 2024- 2025

Year	Semester 1	Module Codes	CAT	Semester 2	Module Codes	CAT	Level	
1	Engineering Science 1	ASU_S_ES1	10	Engineering Science 2	ASU_S_ES2	10	S	Core
	Intermediate English	ASU_S_IEN	10	Advanced English	ASU_S_AEN	10	S	Core
	Mathematics 1	ASU_S_MA1	10	Mathematics 2	ASU_S_MA2	10	S	Core
	Scientific Principles of Engineering	ASU_S_SPE	10	Practical Electronics	ASU_S_PRE	10	S	Core
	Laboratory and Workshop Skills	ASU_S_LWS	10	Study Skills and Professional Practice	ASU_S_SSP	10	S	Core
				Computer Programming for Engineering	ASU_S_CPE	10	S	Core
Summer	Human Rights				ASU_S_HUR	10	S	Core
	Bahrain Civilisation and History				ASU_S_BCH	-	S	HEC req.
	Arabic Language / Arabic Language for Non-Arabic Speakers				ASU_S_ALA	-	S	HEC req.
	Total		**50**			**70**		**120**
2	Design and Practice	ASU_4_DAP	20	Engineering Computing	ASU_4_ENC	20	4	Core
	Engineering Principles	ASU_4_EPR	20	Introduction to Electrical and Electronic Engineering	ASU_4_IEE	20	4	Core
	Engineering Mathematics and Modelling	ASU_4_EMM	20	Introduction to Digital Electronics	ASU_4_IDE	20	4	Core
	Total		**60**			**60**		**120**
3	Advanced Engineering Mathematics and Modelling	ASU_5_AMM	20	Team Design Project	ASU_5_TDP	10	5	Core
	Circuits, Signals and Systems	ASU_5_CSS	20	Electrical machines and power electronics	ASU_5_EPE	20	5	Core
	Principles of Control	ASU_5_POC	20	Analogue and Digital Circuit Design	ASU_5_ADC	20	5	Core
				Internship	ASU_5_INT	10	5	
	Total		**60**			**60**		**120**
4	Digital Systems Design	ASU_6_DSD	20	Advanced Analogue and RF Electronics	ASU_6_AAE	20	6	Core
	Project*	ASU_6_PRO	40	Innovation and Enterprise	ASU_6_IAE	20	6	Core
				Control Engineering	ASU_6_CEN	20	6	Core
	Total		**60**			**60**		**120**

Module Descriptions

ASU_S_MA1 Mathematics 1
The module is designed to provide students with the mathematical knowledge and skills to support the study of engineering and to provide 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.

ASU_S_ES1 Engineering Science 1
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 the study of engineering.

ASU_S_IEN Intermediate English
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.

ASU_S_SPE Scientific Principles of Engineering
The module develops the students' understanding of essential physics and chemistry principles for the study of engineering. It is designed to be accessible to students with a wide range of prior science specialisations. The module introduces the fundamentals of statics, dynamics and the electrical and mechanical properties of materials.

ASU_S_LWS Laboratory and Workshop Skills
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.

ASU_S_MA2 Mathematics 2
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 practice the mathematical concepts they learn during the lectures and solve extra problems.

ASU_S_ES2 Engineering Science 2
This module is aimed at extending the 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.

ASU_S_AEN Advanced English

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.

ASU_S_PRE Practical Electronics

This module discusses electrical measurement equipment and practical circuit design and construction techniques. The module is a mixture of theory and practical components where students will become familiar with the basics of electrical and electronic engineering and the relating practical aspects, especially awareness of safe working practices in electronics.

ASU_S_SSP Study Skills and Professional Practice

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.

ASU_S_CPE Computer Programming for Engineering

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.

ASU_S_HUR Human Rights

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:

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

ASU_S_BCH Bahrain Civilisation and History

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.

ASU_S_ALA Arabic Language
This module of 10 CAT's runs for one semester of 7 weeks (Summer Semester). The module provides intensive practice in reading, oral presentations, writing, and note-taking.

ASU_S_ALN Arabic Language for Non-Arabic Speakers
This module of 10 CAT's 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.

ASU_4_DAP Design and Practice
This module provides an introduction to engineering practice and design, including hand and computer-aided drawings, design activities, sustainable design principles, project management, group work and health and safety issues. The module will have a lab component where students will apply the theoretical concepts.

ASU_4_EMM Engineering Mathematics and Modelling
This module consolidates the mathematical skills that underpin the BEng Engineering Degrees. The module contents include Differentiation and Integration Complex Numbers, Linear Algebra, Statistics, Elementary probability, and Probability Distributions with Applications to Engineering Problems. The module includes a practical component where students use mathematical software packages (Matlab and Excel) to apply the theoretical concepts learnt in class.

ASU_4_EPR Engineering Principles
The 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 introduces the principles of measurement systems and units, thermal physics, mechanical and electrical principles, and engineering materials and their properties.

ASU_4_ENC Engineering Computing
This is an introductory module to Object-Oriented Programming (OOP) using Python programming language, which will address programming knowledge and skills. It will enable students to acquire computer programming skills needed for developing software used in engineering design and simulation.

ASU_4_IEE Introduction to Electrical and Electronic Engineering
This module covers the fundamentals of both electrical and electronic engineering. The module starts with the basic concepts of Voltage, Current, Power and Energy and the basic laws that govern electrical circuits, such as Ohm's Law and Kirchhoff's Law and more advanced circuit analysis techniques, such as Node Voltage and Mesh Current methods, DC responses of RC, RL, RLC circuits and AC sinusoidal circuit theory. Then, the module will cover the basics of semiconductors (Diodes, BJTs and Op-Amps). The module includes a practical component where students perform experiments to apply the theoretical concepts and gain practical
skills in circuits and electronics.

ASU_4_IDE Introduction to Digital Electronics

This module aims to teach students introductory material that an electronic engineer should know before proceeding with any digital design. The material in this module is divided into two parts. The first part will cover the analysis and implementation of Boolean Logic circuits and the modelling using a proprietary CAD and VHDL (VHSIC Hardware Description Language). The second part of the module will focus on the analysis and implementation of Sequential Logic circuits, their modelling and implementation using Programmable Logic Devices. The module includes a practical component where students perform experiments to apply the theoretical concepts and gain practical skills in digital electronics.

ASU_5_AMM Advanced Engineering Mathematics and Modelling

This module covers advanced engineering mathematical techniques used for solving engineering problems, including Computational Techniques in Engineering, Vectors, Differential equations, Selected Numerical and Computational methods, Advanced Matrix computation techniques, and Advanced Computational Optimisation and advanced Statistical techniques, including Permutations and combinations. Binomial, Poisson and normal distributions.

ASU_5_CSS Circuits, Signals and Systems

In practical engineering, it is very common to assume, at least initially, that the system to be analysed or designed is linear and time-invariant. Linear, time-invariant systems provide potentially good approximations of the behaviour of many systems in their normal operating region. The advantage of linear, time-invariant systems is that they can generally be analysed. On the other hand, Nonlinear systems cannot generally be analysed, and one is forced to resort to approximate analysis based on simulation. This module offers an introduction to the analysis of linear, time-invariant systems. Ideally, the analysis of a system involves the determination as mathematical functions of time of all of the signals associated with the system. Accordingly, it is impossible to provide an analysis procedure for systems without a preliminary discussion of signals. Specifically, the module introduces and explains the mathematical ideas, which underpin the very important concept of the frequency content of a signal. The module covers the mathematics required to undertake a study of dynamics, communication theory, signal processing, advanced circuit theory, partial differential equations and control theory, with engineering examples. The module also provides advanced techniques for the solution of linear, constant coefficient, and ordinary differential equations. The module includes a practical component where students perform Matlab/Simulink experiments to apply the theoretical concepts and gain practical skills in the design of linear systems.

ASU_5_POC Principles of Control

The module is an introduction to the theory and practice of continuous-time feedback control systems to enable the design and implementation of control systems for applications, such as robotics, automobiles, aircraft, automatic machinery, and chemical processes. It provides an analytical approach to the modelling of dynamical systems and their analysis by applying engineering mathematics. The module includes a practical component where students perform experiments to apply the theoretical concepts and gain practical skills in control systems.

ASU_5_TDP Team Design Project

This module aims at developing students' skills in engineering design, including identifying and meeting requirements for new products (tangible product, process, or system), such as

consideration of regulatory, professional and standards requirements. The module develops students' abilities in working as part of a team, handling information, project planning and management, and report-writing and presentation skills.

ASU_5_EPE Electrical Machines and Power Electronics
The module discusses the design of modern electrical drives, with consideration of the machine, power electronics and control requirements. Comparisons are made between drive types and typical applications considered. Magnetic and electric loadings; thermal design; winding design, choice of pole number, phase number, field and armature location. Permanent magnet machines; induction machines; switched reluctance machines; vector control of ac machines; applications characteristic of ac drives; comparative evaluation of different drives. Use of commercially available software to perform machine analysis and design. The module includes a practical component where students perform experiments to apply theoretical concepts and gain practical skills in electrical machines and power electronics.

ASU_5_ADC Analogue and Digital Circuit Design
This module provides students with the knowledge of analogue, mixed-signal and digital circuits and also experience with both the practical issues of device-level design and system-level performance requirements. A key feature is a balanced approach to both analogue and digital IC design. The module includes a practical component where students perform experiments to apply the theoretical concepts and gain practical skills in analogue and digital circuit design.

ASU_5_INT Internship
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.

ASU_6_DSD Digital Systems Design
This module covers the design and analysis of modern digital systems utilising finite state machines. Comparison between the use of CPLDs and microcontrollers in typical embedded systems will be made, and appropriate hardware and software methods for a successful design will be considered. Synchronous and asynchronous designs will be covered along with a consideration of the principles of 'design for testability' and JTAG technologies. CAD tools will be used to design and simulate integrated circuits on the silicon workspace. The module also covers further programming methods using HDLs and HLL programming of MCUs. The module includes a practical component where students perform lab experiments to apply the theoretical concepts and gain practical skills in designing and testing digital electronic systems.

ASU_6_PRO Project
The Individual Project is a learning experience that enables students to do independent research and bring together many of the concepts they have learned. 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, milestones, important dates, and deliverables. The module will spread over the first and second semesters of year 4.

ASU_6_IAE Innovation and Enterprise

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 business strategies, risk assessments and scenario testing so that they demonstrate the commercial viability of their ideas. Topics include project management skills, which help determine the critical path of a proposed business, such as intellectual property, market research, market placement, advertising and finance. Students will be expected to reflect on what they can contribute to a group.

ASU_6_CEN Control Engineering

This module builds on the Level 5 module Principles of Control. It introduces a range of Analogue and Digital Control methods to estimate system dynamics and improve system stability, servo tracking and regulation of system outputs against unknown disturbances. Implementation of these methods in a laboratory will closely support the theory. The application-oriented part of the module will use case studies and laboratory work relating specifically to the individual disciplines. The module includes a practical component where students perform experiments to apply the theoretical concepts and gain practical skills in control engineering.

ASU_6_AAE Advanced Analogue and RF Electronics

This module covers the design and analysis of radio frequency systems from early design to modern digital systems. Noise measurement, reduction, shielding, grounding and general issues of EMC are covered. RF terminology and wave propagation are explained, along with a look at modulation/demodulation techniques and the circuits needed to carry them out, such as mixers, oscillators, amplifiers, etc. The module includes a practical component where students perform experiments to apply the theoretical concepts and gain practical skills in analogue and RF electronics.