ASU
جامعة العلوم التطبيقية
APPLIED SCIENCE UNIVERSITY

London South Bank University

Accredited by the Higher Education Council

COLLEGE OF ENGINEERING

2020-2021

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London South Bank
University

Message from the Dean

Welcome to the College of Engineering at the Applied Science University, a college that is unique in its culture, facilities and environment. Our programmes are distinct as they offer the chance to study an internationally recognised UK degree course here in Bahrain, with work experience and internship opportunities. Upon successfully completing the programme, students will be awarded a degree from London South Bank University in the UK. This will give a competitive advantage in the job market, and will allow to develop lifelong learning skills that are sought after by employers here in Bahrain and internationally.

The College offers two Bachelor degree programmes in Engineering. The programmes started in September 2017 and we welcome applications from outstanding students for:

- Bachelor of Engineering in Architectural Engineering (New Name, AY 2020-2021). Awarded by London South Bank University in the UK and recognised by the Higher Education Council in the Kingdom of Bahrain.

- For continuing students who started prior to the Academic Year 2020-2021, the name of the program is Bachelor of Engineering in Architectural Design Engineering.

- Bachelor of Engineering in Civil Engineering (New Name, AY 2020-2021). Awarded by London South Bank University in the UK and recognised by the Higher Education Council in the Kingdom of Bahrain.

- For continuing students who started prior to the Academic Year 2020-2021, the name of the program is Bachelor of Engineering in Civil and Construction Engineering.

The Bachelor of Engineering in Electrical and Electronic Engineering and the Bachelor of Engineering in Mechanical Engineering will be launched in the near future.

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.

Welcome once again to the exciting world of engineering.

General Information

Awarding Institution	London South Bank University, UK
Teaching Institution	Applied Science University, Kingdom of Bahrain
College	Engineering
Department	Civil and Architectural Engineering
Offered programmes	Bachelor of Engineering in Architectural Engineering Bachelor of Engineering in Civil Engineering
Programmes recognized by	Ministry of Education, Kingdom of Bahrain
Final Qualification	Bachelor Degree
Academic year	2020-2021
Language of study	English
Mode of study	Full-Time
Duration of each programme	4 years

Vision

The vision of Applied Science University is to be one of the leading private universities supporting practical learning and research in Bahrain and the Gulf.

Mission

ASU is committed to offering an education that is accessible to academically competent students of Bahrain, the Gulf and beyond, and to deliver academic programmes of quality that graduate students equipped with knowledge and skills relevant locally and regionally. ASU is further dedicated to the promotion of a culture of learning and scientific research for its students, staff and faculty regionally and globally to engage meaningfully with the community at large.

Values

- **Integrity:** ASU's community values honesty, fairness and academic integrity as fundamental to its vision and mission, and will recognize, affirm and uphold this value in a responsible and committed manner.

- **Collaboration and Team Spirit:** ASU's community recognizes collaboration and team spirit to be at the heart of the institutional culture and will promote these values in a dedicated manner.

- **Loyalty:** ASU's students, faculty and staff cherish loyalty and commitment and recognize 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 intend to engage with them, in a thoughtful, respectful, responsible and meaningful manner.

- **Quality:** ASU's community values, quality as an ideal and standard that should characterize its processes, outcomes, people and partners.

Rationale

The programmes embrace recent industry developments, in particular the ECUK UK Standard for Professional Engineering Competence (UK-SPEC), and give 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 employers require. We hope that by the end of their programmes students will be excited by a blank sheet of paper, an undefined brief and the challenge of developing a rational solution! We seek to educate rather than just train.

Because both civil and architectural engineering are such broad areas, there are many different specialisms for students to consider after graduating and our degrees will give students a solid foundation to enter any of them.

Philosophy of the curriculum the central theme of the programmes is developed around the broad concept of "engineering - design and construction". This is achieved by structuring the programmes around two main strands, namely Engineering Analysis and Engineering Design.

Engineering Analysis Courses This strand of the course develops the fundamental knowledge of engineering, considering the physics of the problems, the theoretical underpinning and problem-solving techniques.

Engineering Design Courses The design capability is developed as a generic capability underpinned by engineering analysis with the objective of developing Civil and Architectural Engineers who approach design problems creatively and who have the technical skills to see ideas through to realization.

Complementary Courses These units further enhance the quality of the Civil and Architectural Engineer by providing general and specialist skills in a range of appropriate computer software and IT packages including CAD and BIM packages. The principles of Building Information Modelling are studied in serval courses and applied in group projects.

Project The final year Project course is an individual submission of an investigation into a specific area of the programme, providing the student with the opportunity to pursue a programme of independent study. The work is expected to be of an investigative nature having an experimental, analytical or fieldwork input.

Laboratory and Studio Work This is a major aspect of the course. Practical work will be contained within this course and will be designed to relate to other courses to provide a holistic approach.

Field Trips and Site Visits

Some modules include field work and site visits, which may be residential or outside the Kingdom of Bahrain. One-day visits to construction sites and other installations are arranged on a regular basis.

Modes of Study

Both programmes are offered on full-time bases requiring the completion of a foundation year in addition to three years of academic study, taught over 8 semesters and a summer semester.

· Minimum Study Period : 4 years

· Maximum Study Period : 8 years

· No. of Modules : 49 Modules

Programmes Management

The two programmes are hosted in the College of Engineering through the Department of Civil and Architectural Engineering. The Department is under the immediate administrative control of a Head of Department.

Academic Advisor

The academic advisor acts as the Personal Tutor providing advice and assistance on a wide range of academic, financial, and personal matters and, if counselling needs arise, will refer students to the University's Student Affairs Unit or other associated services. Students are encouraged to formally see their academic advisors at least once per semester, with a formal appointment.

Module Leader

Each module has a Module Leader who is responsible for:

- The allocation of teaching duties including tutorials, seminars, and practical work within the module.
- Preparing and issuing teaching and coursework schedules.
- Preparing and distributing the module guide.
- Organizing the preparation and checking of examination papers.
- Collating coursework, examination, and module marks.
- Attending modules boards and examination boards in that capacity.
- Revising and updating the module content.

Timetables – Moodle Information

Students are strongly advised to frequently refer to Moodle for class and examination timetables, and room allocation during the academic year.

ASU e-mail address

Electronic communications, between staff and students, will be via the student's ASU e-mail address. Students are strongly advised to check their ASU e-mail regularly.

Assessment Rationale

Throughout the course, assessments will be used to establish that students can understand and apply principles, and the overall aim will be to ensure that the eventual graduates can analyze, synthesize and creatively apply what they have learnt and hence are prepared to become imaginative and thinking individuals.

As the course progresses the assessments will become more intellectually demanding. Students will be encouraged to develop and display strong communication skills in various mediums such as written reports, verbal presentations, videos, drawing, and computer outputs. They will be encouraged to take an academic approach to their work with well-supported arguments, good referencing and relevant bibliographies.

Some assignments will demand group work as the ability to work positively as part of a team is essential in the civil and architectural engineering. In some instances, assessment will be on the individual's performance as part of a team and in other cases a mark for the group's effort will be shared equally by the members of the team.

Assessment Regulations

Relevant regulations are reproduced from current LSBU academic regulations for taught programmes (and is available on the Moodle link). These may be subject to change. Please refer to the module leader for any changes.

Assessment Methods

A module may be assessed either by a combination of examination, midterm and coursework or by course work only.

In the coursework elements, assessment may be a combination of coursework assignments, individual or group projects, and open book or closed book tests.

Assessment Weighting

Information about assessments weighting is module specific, please refer to the module study guide for more details.

Condonement

The Examination Board has the discretion to condone the failed module(s), only in the case of approved extenuating circumstances, and evidence of having met the learning outcomes for the module. The Module mark remains unchanged and the result is recorded as a Pass after Condonement.

Coursework Deadlines

A student who is unable to submit a completed coursework assignment by the specified deadline must formally notify the Module Leader. The student should then submit the work, completed or incomplete, no more than two weeks later than the deadline date.

The student may make a claim for extenuating circumstances. If this claim is supported, no capping of marks will be applied to a completed assignment. Where the work as submitted is incomplete the Award and Progression Examination Board may grant a deferral and allow the student to submit for an uncapped mark at the next scheduled assessment point.

If the claim for extenuating circumstances is not accepted, the work as submitted will be marked on its merits; if the merited mark is above the pass mark it will be capped). If the merited mark is below the pass mark, the Award and Progression Examination Board may award a compensated pass, if eligible, or allow the student to be referred in the assessment.

If there is no submission of the assignment within two weeks of the deadline, a mark of zero will be recorded. In such a case the Award and Progression Examination Board will not permit the student to be referred in the assignment.

Extenuating Circumstances Claim

A student who believes circumstances outside his/her control have affected his/her performance in the assessment of a Module during the academic year, and he/she wishes this to be taken into account by the Examination Board, then he/she MUST complete the form, together with all the appropriate documentary evidence, for consideration by the Extenuating Circumstances Board. The Extenuating Circumstances Board will then decide whether to support or reject the extenuating circumstances claim. The Extenuating Circumstances Form is available from the College Office. The completed form must be handed in to the College Office by the appropriate deadlines.

Calculators

Only calculators approved by the Department will be allowed in the Examination rooms. These are normally noiseless, cordless, not pre-programmed and cannot receive/transmit data remotely. The recommended model is of the type CASIO fx-85WA, or equivalent.

Academic Misconduct

Where there are suspected cases of academic misconduct, like cheating, plagiarism or other forms of unfair advantage, the details of the incident will be brought to the attention of the College Students' Disciplinary Committee, and the University, for any penalty to be imposed.

Resources

Academic and Staff Support

Academic input to the programmes will come from:

- The permanent staff of the College and Department.
- The part-time staff of the College and Department.
- Visiting specialists.

The course management and the academic input is undertaken from within the College. The staff through research, consultancy, staff development and professional experience are fully up to date and at the forefront of their respective disciplines. This expertise is conveyed to students through the series of lectures, tutorials and seminars. Visiting specialist lecturers who are experts in the various fields of professional practice make regular contributions to the lecture programme of several modules in addition to participating in the assessment of seminars and group project work.

General Facilities

The Department will be using the University and College lecture and seminar rooms for most of the teaching.

Laboratories and Studios

The programmes will make use of laboratory and Studios facilities provided by the College in the areas of structures; concrete; materials; hydraulics; geology, soil mechanics and design. Technician support is provided in each of these areas.

Library

All students will be registered to use the e-library and the library on campus. As student centered learning becomes increasing important it is expected that students will make greater use of the library facilities.

Computer Facilities

Students will have open access to well-equipped computer laboratories and will experience a range of hardware and software as tools to assist effective communication. Each student will be allocated a unique username giving access to the university network and to the Internet.

Equal Opportunities

We are strongly committed to equality of opportunity both as an employer and as an educational institution. In implementing this commitment, the University aims to ensure that no applicant for a job or a course receives less favorable treatment on the grounds of gender, age, race, color, nationality, and ethnic or national origin, marital status, home responsibility, disability, and trade union activity, political or religious belief. The University aims to ensure the promotion of good relations among its staff and students and will create conditions that contribute to the full development and potential of all its members. The university will establish and maintain close links with the local community and will seek to extend employment and educational opportunities for local people

with special concern for the needs of women and members of ethnic minority groups. The University seeks to provide a suitable environment for working and studying for people with disabilities.

Student Responsibilities

Please refer to the students' handbook.

Enrolment and Re-enrolment

Students must enroll and/or re-enroll at the beginning of each academic year in accordance with University procedures.

Change of Address

Students who change their permanent or term time address must report the change promptly to the Registration Office, using the relevant form. The University is not liable for any correspondence that is misdirected as result of the student's failure to do so.

Interruption/Withdrawal

Students who wish to interrupt or withdraw from their studies must inform the Deanship of Admission and Registration using the relevant form.

Programme Team-Student Communication

It is the programme team policy that any electronic communication will be via the student's ASU email address, and not their private email accounts. It is the responsibility of the student to check their ASU mails regularly.

The programme team is not liable for any consequences as a result of the student's failure to check their ASU e-mails regularly.

My ASU Web-Link

The ASU website has a very useful My ASU quick link which accesses most of the information, forms and publications, related directly to the student's duration of study at ASU.

Moodle

Via My-ASU, Moodle can be accessed. Programmes and module(s) materials will be uploaded and students must access this site regularly, in order to stay updated with all aspects of programme/module administration, submissions and any other related information.

Bachelor of Engineering in Civil Engineering

Bachelor of Engineering in Architectural Engineering

Bachelor of Engineering in Architectural Engineering

Aims and objectives

The Bachelor of Engineering in Architectural Engineering aims to:

- Develop students' core, personal and employability skills, to help them adapt to the changing labor market.
- Utilize 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 architecture and civil engineering courses, 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.

Source: Bahrain World Trade Centre, URL: https://en.wikipedia.org/wiki/Bahrain_World_Trade_Center,Ja. 2018

Difference between Architecture and Architectural Engineering

	Architecture	Architectural Engineering
What's it all about?	Design, and how this fits within the broader context of society.	Engineering aspects of buildings - their Structural systems.
Who is the course for?	Creative people with strong art and design skills who are interested specifically in the building.	Mathematically-minded and scientific people who are interestedin building physics, the construction process, and design.
What will I study?	Design and making skills, History of architecture, Architectural theory, Structures, Materials, Sustainability, Ethics and Communication skills	Architectural sustainable building design and technology, Building Information Modelling (BIM), 3D Computer Aided Design and visualization, Structural building analysis, Calculus, Building physics and Thermodynamics
What careers are open to me?	Architectural Assistant, or Architect	Architectural Engineer
What does the job Involve?	Working with a client to translate their vision into a design. This could be at the principal design stage or produce detailed construction drawings.	Carrying out design, testing, analysis, and implementation of building structures, as well as analysis of what is under a building, to meet regulations and the demands of the design. They use specialist skills such as building information modelling.

Bachelor of Engineering in Architectural Engineering Study Plan September Start

Year	Semester	Credits	Level	Semester	Credits	Level	
	Semester 1			Semester 2			
1	Mathematics 1	10	S	Engineering Science 2	10	S	Core
	Intermediate English	10	S	Computer Programming for Engineering	10	S	Core
	Principles of Engineering	10	S	Mathematics 2	10	S	Core
	Engineering Science 1	10	S	Constructing the Built Environment	10	S	Core
	Laboratory and Workshop Skills	10	S	Study Skills and Professional Practice	10	S	Core
				Advanced English	10	S	Core
	Human Rights				10	S	Core
	History and Civilization of Bahrain				0	S	HEC requirement
	Arabic Language / Arabic Language for Non-Arabic Speakers				0	S	HEC requirement
	Semester 1			Semester 2			
2	Engineering Practice and Design 1	10	4	Engineering Practice and Design 2	10	4	Core
	Engineering Mathematics 1	10	4	Engineering Mathematics 2	10	4	Core
	Architectural Engineering Design and Structures 1	10	4	Architectural Engineering Design and Structures 2	10	4	Core
	Principles of Engineering Science 1	10	4	Principles of Engineering Science 2	10	4	Core
	CAD Graphics	10	4	Building Technology	10	4	Core

	Integrated Design and Construction	10	4	Building Environment Simulation and Analysis	10	4	Core

Year	Semester	Credits	Level	Semester	Credits	Level	
	Semester 1			Semester 2			
3	Structural Design 1	10	5	Structural Design 2	10	5	Core
	Advanced Engineering Mathematics	10	5	Building Information Modelling	10	5	Core
	Geotechnics 1	10	5	Engineering Ethics	10	5	Core
	Design Procedures for Architecture 1	10	5	Design Procedures for Architecture 2	10	5	Core
	AutoCAD-3D	10	5	Architectural Engineering Field Studies	10	5	Core
	Engineering Management and Economics	10	5	Internship	10	5	Core
	Semester 1			Semester 2			
4	Project 1	10	6	Project 2	10	6	Core
	Structural Design and Analysis 1	10	6	Structural Design and Analysis 2	10	6	Core
	Engineering Research Methods	10	6	Geotechnics 2	10	6	Core
	Energy Conservation in Buildings	10	6	Innovation, Enterprise and Management	10	6	Core
	Thermodynamics for Buildings	10	6	Design project	20	6	Core
	Forensic Engineering and Conservation	10	6				

Programme Outcomes

The course outcomes have been developed with reference to the JBM guidelines, UKSPEC, and the benchmark statement for Engineering (E). They are also summarized in the Output Standards Specification provided for the Joint Board of Moderators.

A. Knowledge and Understanding

Students will have knowledge and understanding of:

Bachelor of Engineering in **Architectural 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 years 2/3/4:

A1 Mathematics as a means of communicating results, concepts, and ideas that are relevant to Architectural Design 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 behavior 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 analyses engineering problems (E).

B2 Analyze 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 course.

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 Organize 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 Analyze 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 Manageprojects 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 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, apply critical analysis and judgement (E).

D8 Learn effectively for the purpose of continuing professional development and in a wider context throughout their career (E).

Teaching and learning strategy

Transferable skills are developed through the teaching and learning programme.

Skill 1 is taught at Level 1 and developed in coursework and presentations.

Skill 2 is taught formally at Level 4 and developed throughout the course.

Skill 3 is supported through the provision of unit guides.

Skill 4 is developed through setting coursework deadlines.

Skill 5 is developed through laboratory experiments, project work, presentations, and individual learning.

Skill 6 is developed in laboratory work, fieldwork, and group project work.

Skill 7 is developed in the technical subject areas of the course.

Although not explicitly taught, other skills are nurtured and developed throughout the course which is structured and delivered in such a way as to promote this.

Assessment

Skill 1 is assessed by coursework exercises, laboratory and field study reports, presentations and oral examinations.

Skill 2 is assessed through unseen written examinations and coursework.

Skill 4 is assessed by applying penalties for failure to meet deadlines.

Skill 5 is formally assessed at Level 4 and further assessed throughout the course where ICT is used.

Skill 6 is assessed in group work projects.

Skill 7 is assessed through unseen written examinations, coursework exercises, design work, and individual and group project work.

The other skills are not formally assessed.

Appendix A: Curriculum Map

This map provides a design aid to help course teams identify where course outcomes are being taught (T), developed (D), assessed (A) within the course. It also provides a checklist for quality assurance purposes and may be used in validation, accreditation and external examining processes. Making the learning outcomes explicit will also help students to monitor their own learning and development as the course progresses.

ModuleTitle	Engineering science1	Engineering science2	Study Skills and Professional Practice	Laboratory and Workshop Skills	Mathematics 1	Mathematics 2	Constructing the Built Environment	Principles of Engineering	Intermediate English	Advanced English	Computer Programming for Engineering	History and Civilization of Bahrain	Human Rights	Arabic Language	Arabic Language for Non-Arabic Speakers
Level	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
PLO	10	10	10	10	10	10	10	10	10	10	10	0	10	0	0
A1	DTA	DTA		DTA	DTA	DTA	DTA	DTA							
A2			DTA				DTA	DTA			DTA				
A3	DTA	DTA	D	DTA			DTA	DTA		DTA	D	D	D		
A4			D	DTA	DT	DT	D	D			DT			D	D
B1			D						D	DT	D			D	D
B2			D	DT	DT	DT	DTA	DTA	D	DT	DTA	D	D		
B3	D	D	DTA				DT	DT			D				
B4	DT	DT					DT	DT	D	D	DTA	D	D		
C1	DT	DT	DTA	DTA			DTA	DT	T	T	T				
C2			DT				DT	DT	T	T	DT				
C3			DTA	DTA			DTA				DT				
C4			DTA	TA			DTA	DTA	T	DTA	DTA	T	T	T	T
C5			DTA	DT	DTA	DTA	DT	DT		DT	DTA	DT	DT		

C6			DTA	DT			DT	DT	D	D	DTA	D	D	D	D
D1	D	D	DTA	DTA	D	D	D	D	D	D	D	D	D	D	D
D2	D	D	DTA				DT	D			DTA		D		
D3			DTA				DTA	D		D	DT	D	D		
D4			DTA				DTA	DT		D	DT				
D5	D	D	DTA		DT	DT	DT	DT	D	D	DT	D	D	D	D
D6			DTA	D			DTA	DT			DT				

	Engineering Mathematics1	Engineering Mathematics 2	Principles of Engineering Science1	Principles of Engineering Science 2	Engineering Practice and Design1	Engineering Practice and Design 2	Architectural Engineering Design And Structures1	Architectural Engineering Design And Structures 2	CAD Graphics	Integrated Designand Construction	Building Technology	Building Environment Simulation And Analysis
Level	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**
PLO	10	10	10	10	10	10	10	10	10	10	10	10
A1	TDA	TDA					TDA	TDA				
A2			TDA	TDA			TDA	TDA	TD	TDA	TDA	TD
A3			TDA	TDA			TDA	TDA	TD	TD	TD	
A4					TDA	TDA	TDA	TDA	TDA	TD	TD	TD
A5					TDA	TDA			TD	TDA		
A6			TDA	TDA							TD	TD
A7					TDA	TDA				TDA		
A8					TDA	TDA				TD		
A9					TDA	TDA				TD	TD	TDA

A10					TDA	TDA				D	D	TD
A11										TDA	TDA	TDA
B1	TDA	TDA	TDA	TDA			DA	DA			DA	DA
B2			TDA	TDA			DA	DA	TDA	TDA	TDA	TD
B3										TD	D	D
B4									TDA	TDA	TDA	TDA
B5									D	TD	D	D
B6									D	D	D	D
C1					TDA	TDA						
C2					TDA	TDA					T	
C3					TDA	TDA					TD	TD
C4					TDA	TDA	DA	DA	TDA	TDA	TDA	TDA
C5					TDA	TDA			TDA	TDA	TDA	TDA
C6					TDA	TDA	TDA	TDA	TDA			
C7					TDA	TDA	DA	DA	TDA	DA	DA	DA
C8					TDA	TDA	DA	DA	TDA	TD	TD	TDA
C9									D		D	
D1					TDA	TDA	D	D	TDA	TDA	TDA	D
D2	TDA	TDA					D	D	D		D	
D3	TDA	TDA	TDA	TDA	TDA	TDA			TDA	TDA	TDA	TDA
D4	TDA	TDA	DA	DA	TDA	TDA	D	D	TDA	TDA	TDA	TDA
D5					TDA	TDA	D	D	TDA	TDA	TD	D
D6					TDA	TDA			D	DT	D	D
D7									TD	TD	TD	TD
D8					TDA	TDA			TD	D	D	D

	Structural Design 1	Structural Design 2	Advanced Engineering Mathematics	Geotechnics1	Design Procedures for Architectural1	Design Procedures for Architectural2	Architectural Engineering Field Studies	AutoCAD-3D	Engineering Management And Economics	Building Information Modelling	Engineering Ethics	Internship
Level	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**
PLO	10	10	10	10	10	10	10	10	10	10	10	10
A1	TDA	TDA	TDA	DA						TD		
A2	TDA	TDA		TDA								
A3	TDA	TDA		TDA								
A4	D	D			TDA	TDA	D	TDA		TDA	TD	
A5	TDA	TDA					D	TDA	D	TD		
A6	TDA	TDA		TDA			TDA					
A7							TDA		TDA		TD	
A8	D	D					TDA		TD		TDA	TDA
A9	D	D			TDA	TDA	TD	D	D		TDA	D
A10	D	D					TD		TDA	D	TD	TD
A11	D	D			TDA	TDA	TDA	D	D	D	TD	TD
B1	TDA	TDA	TDA	DA								
B2	TDA	TDA		T A				TD	D	TD	D	D
B3	TDA	TDA		TDA				TD	D	D		
B4								D	D	DA		
B5	TDA	TDA					D	DA	DA	DA		
B6							DA	DA	DA	DA	DA	DA

C1				TDA							
C2											
C3				TDA				DA		DA		DA
C4				DA	TDA	TDA		TDA	TDA	TDA	D	TDA
C5								TDA	TDA	TDA	D	TDA
C6	TDA	TDA			TDA	TDA	DA	TDA		TDA		D
C7	D	D		D	TDA	TDA	D	D	D	D	D	D
C8	TDA	TDA			TDA	TDA	D	TDA	TD	TDA	D	TDA
C9							TDA	TD	TDA	TD		D
D1	TA	TA		TDA	TDA	TDA		TDA	TDA	TDA	DA	TDA
D2	TDA	TDA		DA					TDA	D		D
D3	D	D		D			D	TDA	TDA	TDA	TDA	TDA
D4	DA	DA		DA			DA	D	D	D	D	D
D5			DA					TDA	TDA	TDA	D	D
D6			D	D	TDA	TDA	TDA	D	D	TDA	D	DA
D7	DA	DA	DA	TDA				DA	D	DA	D	DA
D8	D	D			TDA	TDA	D	D	D	D	D	D

	Project1	Project2	Structural Design and Analysis1	Structural Design and Analysis2	Geotechnics2	Innovation, Enterprise and Management	Design Project	Forensic Engineering and Conservation	Engineering Research Methods	Energy Conservation in Buildings	Thermodynamics For Buildings
Level	**6**	**6**	**6**	**6**	**6**	**6**	**6**	**6**	**6**	**6**	**6**
PLO	10	10	10	10	10	10	20	10	10	10	10
A1	D	D	TDA	TDA	DA			D	TDA	TDA	TDA
A2	D	D	TDA	TDA	TDA			TDA		TDA	TDA
A3	TDA	TDA	TDA	TDA	TDA			TDA		TDA	D
A4	DA	DA	DA	DA		D		D	DA	TDA	TDA
A5	TDA	TDA	DA	DA	TDA		TDA	TDA		TDA	DA
A6	DA	DA	DA	DA	TDA			TDA			DA
A7	D	D				D		D		D	D
A8	D	D	D	D	D			TD		D	D
A9	D	D	D	D	DA		TDA	TD		TDA	DA
A10	DA	DA	D	D	DA	TDA		TDA		D	D
A11	D	D	D	D	D		DA		D	D	D
B1	TDA	TDA	DA	DA	D				DA	DA	DA
B2	DA	DA	TDA	TDA	TDA	D		TDA	DA	TDA	TDA
B3	DA	DA	DA	DA	TDA	DA	TDA	TD	D	DA	DA
B4	TDA	TDA						TDA	D	DA	DA
B5	TDA	TDA	T A	T A	D	TDA		TDA	TDA	DA	DA
B6	DA	DA	TDA	TDA		TDA		TD	TDA	DA	DA

C1	DA	DA	TDA	TDA				D	D	DA	DA
C2	DA	DA	TDA	TDA				D	DA	D	TDA
C3	DA	DA	TDA	TDA				D	TDA	DA	DA
C4	TDA	TDA	DA	DA			DA	DA	TDA	TDA	TDA
C5	DA	DA	DA	DA			A	DA	TDA	DA	DA
C6	DA	DA	DA	DA			DA	D			
C7	D	D	D	D	DA	D	DA	D	D	D	D
C8	D	D	D	D	DA		DA		D	DA	DA
C9									D		
D1	DA	DA			DA		DA	DA	TDA	DA	DA
D2			TDA	TDA	DA			D	DA	TDA	TDA

D3	DA	DA	D	D	D		DA	D	D	DA	DA
D4	DA	DA	D	D	DA	DA		DA	D	D	D
D5	D	D			D	D		D	D	D	D
D6					D		DA		D	D	D
D7	DA	DA	TDA	TDA	DA	TDA	D	TDA	DA	TDA	TDA
D8	DA	DA	D	D	DA	DA	D	TDA	D	D	D

Bachelor of Engineering in Architectural Engineering Modules Brief Descriptions

Mathematics 1

The module is designed to provide students with the mathematical knowledge and skills to support study of engineering and to provide the requirement for entry into the Bachelor of Engineering courses at ASU. It is therefore a preparatory or foundation module building on the knowledge obtained at school.

Intermediate English

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 in order to pursue a more advanced ASU academic English Module and to cope with the literacy demands of specialized Module taught in English.

Principles of Engineering

The Module develops the students' understanding of essential scientific principles for the study of engineering to degree level. It is designed to be accessible to students with a wide range of prior science specialization. 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.

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

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 introduction to design skills and basic engineering drawing.

Engineering Science 2

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

Computer Programming for Engineering

This Module introduces students with 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.

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 tutorial where worked exercises are under taken. 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.

Beside 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.

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 understand how new methods and material can sustain the built environment.

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 It also enables students to develop and use appropriate safe working practices as will be expected in an engineering and industrial environment

Advanced English

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.

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

History and Civilization of Bahrain

The aim of the module is to highlights 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 played by the politically and culturally.

Arabic Language

The module runs for one semester of 15 weeks for three hours per week. The module provides intensive practice in reading, oral presentations, writing, and note-taking.

Arabic Language for Non-Arabic Speakers

The module runs for one semester of 15 weeks for three hours per week. This Arabic Module is required to take by ASU undergraduate Engineering programme. The module provides intensive practice for beginners in reading, oral presentations, writing, and note-taking.

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.

Engineering Mathematics 1

This module consolidates the mathematical skills that underpin the Bachelor of Engineering degrees.

Module Moodle Site

LSBU Library and Online Learning Resources

ASU Library and Online Learning Resources

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.

Principles of Engineering Science 1

This module develops the students' understanding of essential scientific principles for the study of engineering to degree level. It is designed to be accessible to students with a wide range of prior science specialization.

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 introduce the principles of measurement systems, force and moment vector and traditional analysis, and forces in equilibrium.

CAD Graphics

Topics include intermediate CAD operations, editing drawings, constructing Multiview drawings, applying text, font, style commands, dimensioning, hatching, blocks, constructing 3D objects and modifying solid objects.

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.

Engineering Practice and Design 2

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

Engineering Mathematics 2

This module consolidates the mathematical skills that underpin the Bachelor of engineering degrees.

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 to apply these issues on an architectural design problem; Resolution of structural issues, functional requirements, and form generation in one to two story buildings

Principles of Engineering Science 2

This module develops the students' understanding of essential scientific principles for the study of engineering to degree level. It is designed to be accessible to students with a wide range of prior science specialization. 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.

Building Technology

Building services engineers are responsible for the design, installation, and operation and monitoring of 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.

Building Environment Simulation and Analysis

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

Structural Design 1

Introduction to stress and deformation of basic structural materials subjected to axial, torsional, and 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.

Advanced Engineering Mathematics

This module covers advanced undergraduate engineering mathematics.

Geotechnics 1

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

Design Procedures for Architecture 1

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

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.

Engineering management and economics

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

- Detailed study of project planning techniques, including network techniques, with preparation for the students' 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 harmonized standards

· Writing technical business reports, including the importance of acknowledging published sources and the use of formal methods for doing so.

Structural Design 2

This module develops students' practice with structural engineering, provides an introduction to structural concepts, as well as an overview of specific techniques for analyzing determinate structures, trusses, beams, and frames.

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 on coordinating building information models.

Engineering Ethics

This Module introduces the theory and the practice of engineering ethics using a multi-disciplinary and cross-cultural approach. Theory includes ethics and philosophy of engineering. Historical cases are taken primarily from the scholarly literatures on engineering ethics, and hypothetical cases are written by students. Each student will write a story by selecting an ancestor or mythic hero as a substitute for a character in a historical case. Students will compare these cases and recommend action.

Design Procedures for Architecture 2

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

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 emphasizes the link between materials and site geological properties and their relationship with design and execution. There will be a block week devoted to a Constructionarium type activity and others including geological and site visits. Multimedia support will feature in the delivery.

Internship

This Module provides the student with an opportunity to experience the industrial world and be part of a team working on real world project. The University assists each student to find the most suitable industry.

Project 1

To plan, execute, review and report upon a piece of project work related to the Bachelor of Engineering Module being followed by the student. A Module Guide for the project is augmented by 4 lectures.

Structural Design and Analysis 1

This module offers the knowledge and skills of reinforced concrete design to Eurocodes, analysis of structural form and ability in design in both qualitative and quantitative directions.

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 into 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, 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.

Energy Conservation in Building

This Module will provide students with the ability to quantify the energy available from sun, wind, sea or river, or the earth for a given application at a given site. Students will develop the skills to understand and analyses the potential and limitations of the available energy conversion devices and exercise basic engineering judgment in their application.

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.

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 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.

Project 2

To plan, execute, review and report upon a piece of project work related to the Bachelor of Engineering course being followed by the student. A Module Guide for the project is augmented by 4 lectures.

Structural Design and Analysis 2

This module offers the knowledge and skills of steel design to Eurocodes, analysis of structural form and ability in design in both qualitative and quantitative directions.

Geotechnics 2

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

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 demonstrate the commercial viability of their ideas.

One of the assignments will require students – working 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).

Topics students will experience will include intellectual property, market research, market placement, advertising and finance. They will be expected to reflect on what they can contribute towards a group.

Design Project

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

Bachelor of Engineering in Civil Engineering Aims and objectives:

The Bachelor of Engineering in Civil Engineering aims to:

- Produce graduates who are committed to a career in 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. 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 realization.

- Create an educational environment that benefit 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 which equips them to enter advanced postgraduate study thus satisfying an approved course of further learning comprising the full educational base for a Chartered Engineer. Source: SARNASH GROUP, URL:http://www.saranshgroup.org/civil, Jan.2018

Bachelor of Engineering in Civil Engineering Study Plan

Year	Semester	Credits	Level	Semester	Credits	Level	
	Semester 1			Semester 2			
1	Mathematics 1	10	S	Engineering Science 2	10	S	Core
	Intermediate English	10	S	Computer Programming for Engineering	10	S	Core
	Principles of Engineering	10	S	Mathematics 2	10	S	Core
	Engineering Science 1	10	S	Constructing the Built Environment	10	S	Core

	Laboratory and Workshop Skills	10	S	Study Skills and Professional Practice	10	S	Core
				Advanced English	10	S	Core
	Human Rights				10	S	Core
	History and Civilization of Bahrain				0	S	HEC requirement
	Arabic Language / Arabic Language for Non-Arabic Speakers				0	S	HEC requirement
	Semester 1			Semester 2			
2	Engineering Practice and Design1	10	4	Engineering Practice and Design 2	10	4	Core
	Engineering Mathematics 1	10	4	Engineering Mathematics 2	10	4	Core
	Principles of Engineering Science 1	10	4	Principles of Engineering Science 2	10	4	Core
	Surveying and Structures 1	10	4	Surveying and Structures 2	10	4	Core
	Civil Engineering Drawing and Surveying	10	4	Engineering Ethics	10	4	Core
	Structural Design	10	4	Soil Mechanics	10	4	Core

Year	Semester	Credits	Level	Semester			
	Semester 1			Semester 2			
3	Advanced Engineering Mathematics	10	5	Infrastructure and Highway Engineering	10	5	Core
	Design and Construction 1	10	5	Internship	10	5	Core

	Hydraulics	10	5	Design and Construction 2	10	5	Core
	Structural Mechanics	10	5	Advanced Structural Analysis and Design	10	5	Core
	Environmental Engineering	10	5	Theory of Structures	10	5	Core
	Engineering Management and Economics	10	5	Civil Engineering and Construction Field Studies	10	5	Core
	Semester 1			Semester 2			
4	Structural Design and Analysis 1	10	6	Current Topics in Civil and Construction Engineering	10	6	Core
	Civil Engineering Materials	10	6	Geotechnical Engineering	10	6	Core
	Foundations	10	6	Structural Design and Analysis 2	10	6	Core
	Engineering System Design	10	6	Construction Management	10	6	Core
	Engineering Research Methods	10	6				
	Innovation, Enterprise and Management	10	6	Project	20	6	Core

Programme Outcomes

The course outcomes have been developed with reference to the JBM guidelines, UKSPEC, and the benchmark statement for Engineering (E). They are also summarized in the Output Standards Specification provided for the Joint Board of Moderators.

A. Knowledge and Understanding

Students will have knowledge and understanding of:

Course Outcomes

The Bachelor of Engineering in 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 behavior 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 analyze engineering problems **(E)**.

B2 Analyze 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 course.

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 particular technique or methodology.

C2 Evaluate alternative methodologies for an investigation or completing a process.

C3 Organize 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 Analyze 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, apply critical analysis and judgement **(E)**.

D8 Learn effectively for the purpose of continuing 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 analyses engineering problems **(E)**.

B2 Analyze 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 course.

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 Organize 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 Analyze 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:

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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, apply critical analysis and judgement **(E)**.

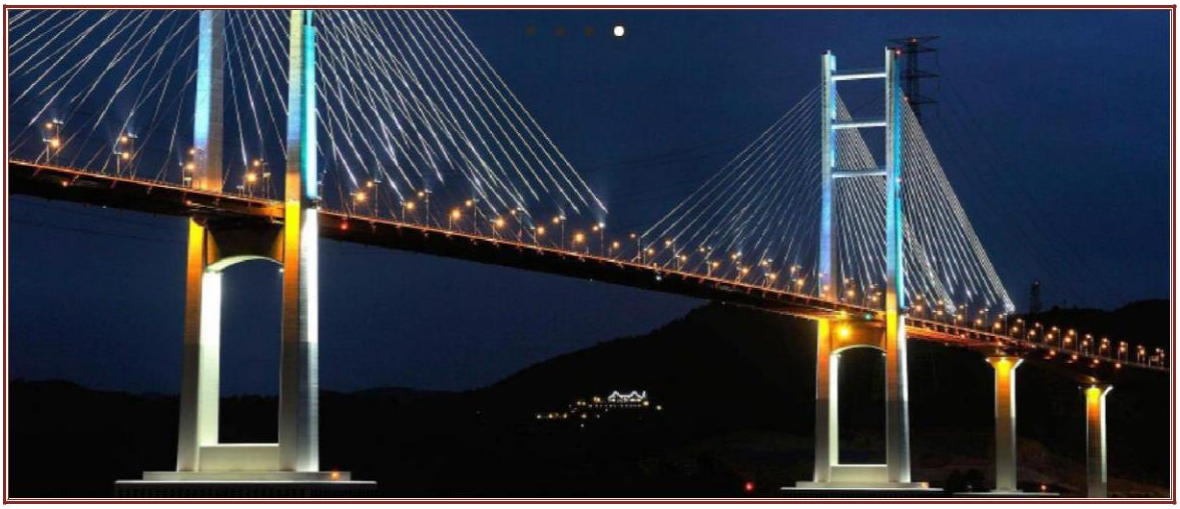
D8 Learn effectively for the purpose of continuing professional development and in a wider context throughout their career **(E)**.

Teaching and learning strategy

Transferable skills are developed through the teaching and learning course. D1 is taught at Level 4 and developed in coursework and presentations. D2 is taught formally at Levels 4 and 5 and developed throughout the course. D3 is supported through the provision of module guides. D4 is developed through setting coursework deadlines. D5 is developed through laboratory experiments, project work, presentations and individual learning. D6 is developed in laboratory work, fieldwork and group project work. D7 is developed in the technical subject areas of the course. Although not explicitly taught, other skills are nurtured and developed throughout the course which is structured and delivered in such a way as to promote this.

Assessment

D1 is assessed by coursework exercises, laboratory and field study reports, presentations and oral examinations. D2 is assessed through unseen written examinations and coursework. D4 is assessed by applying penalties for failure to meet deadlines. D5 is formally assessed in the Engineering Practice and Design module and further assessed throughout the course where ICT is used. D6 is assessed in group work projects. D7 is assessed through unseen written examinations, coursework exercises, design work, and individual and group project work. The other skills are not formally assessed.



Source: SARNASH GROUP, URL: http://www.saranshgroup.org/civil, Jan.2018

Appendix A: Curriculum Map

This map provides a design aid to help course teams identify where course outcomes are being taught (T), developed (D), assessed (A) within the course. It also provides a checklist for quality assurance purposes and may be used in validation, accreditation and external examining processes. Making the learning outcomes explicit will also help students to monitor their own learning and development as the course progresses.

Module Title	Engineering science 1	Engineering science 2	Study Skills and Professional Practice	Laboratory and Workshop Skills	Mathematics1	Mathematics2	Constructing the Built Environment	Principles of Engineering	Intermediate English	Advanced English	Computer Programming for Engineering	History and Civilization of Bahrain	Human Rights	Arabic Language	Arabic Language For Non-Arabic Speakers
Level	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
PLO	10	10	10	10	10	10	10	10	10	10	10	0	10	0	0
A1	DTA	DTA		DTA	DTA	DTA	DTA	DTA							
A2			DTA				DTA	DTA			DTA				
A3	DTA	DTA	D	DTA			DTA	DTA		DTA	D	D	D		
A4			D	DTA	DT	DT	D	D			DT			D	D
B1			D						D	DT	D			D	D
B2			D	DT	DT	DT	DTA	DTA	D	DT	DTA	D	D		
B3	D	D	DTA				DT	DT			D				
B4	DT	DT					DT	DT	D	D	DTA	D	D		
C1	DT	DT	DTA	DTA			DTA	DT	T	T	T				
C2			DT				DT	DT	T	T	DT				
C3			DTA	DTA			DTA				DT				
C4			DTA	TA			DTA	DTA	T	DTA	DTA	T	T	T	T
C5			DTA	DT	DTA	DTA	DT	DT		DT	DTA	DT	DT		
C6			DTA	DT			DT	DT	D	D	DTA	D	D	D	D

D1	D	D	DTA	DTA	D	D	D	D	D	D	D	D	D	D	D
D2	D	D	DTA				DT	D			DTA		D		
D3			DTA				DTA	D		D	DT	D	D		
D4			DTA				DTA	DT		D	DT				
D5	D	D	DTA		DT	DT	DT	DT	D	D	DT	D	D	D	D
D6			DTA	D			DTA	DT			DT				

	Engineering Mathematics 1	Engineering Mathematics 2	Principles of Engineering Science 1	Principles of Engineering Science 2	Engineering Practice and Design 1	Engineering Practice and Design 2	Surveying and Structures 1	Surveying and Structures 2	Soil Mechanics	Civil Engineering Drawing and Surveying	Structural Design	Engineering Ethics
Level	4	4	4	4	4	4	4	4	4	4	4	4
PLO	10	10	10	10	10	10	10	10	10	10	10	10
A1	TDA	TDA					TDA	TDA	DA	TDA	TDA	
A2			TDA	TDA			TDA	TDA	TDA	TDA	TD	D
A3			TDA	TDA			TDA	TDA	TDA	TDA	TDA	
A4					TD	TD				D	TDA	TD
A5					TDA	TDA					TD	D
A6			TDA	TDA					TDA		TDA	D
A7					TD	TD						TD
A8					TD	TD						TDA
A9					TD	TD					D	D
A10					TD	TD				D	TD	TD
A11					D	D				D	D	TD
B1	TDA	TDA	TDA	TDA			DA	DA	DA	DA	TD	
B2			TDA	TDA			TDA	TDA	TA	TDA	TDA	D
B3											TDA	
B4							TDA	TDA	TDA	TDA	TD	
B5											D	
B6												D
B7											DA	
B8												
C1					TDA	TDA			TDA			
C2					TDA	TDA				TDA		
C3					TDA	TDA			TDA	DA		
C4					TDA	TDA			DA	DA	DA	D
C5					TD	TD				D	TD	D
C6					TDA	TDA				DA		
C7					TD	TD			D	D	D	D
C8					TDA	TDA				D	D	D
C9										D		
C10							TDA	TDA		TDA		
D1					TDA	TDA			TDA		DA	DA
D2	DA	DA					DA	DA	DA	DA	DA	
D3	D	D	D	D	TD	TD			D	DA	D	D
D4	DA	DA	DA	DA	DA	DA	DA	DA	DA	DA	D	D
D5					TDA	TDA				D	D	D
D6					D	D	DA	DA	D	DA	D	D
D7									TDA	D	D	D
D8					T	T				D	T	T

	Advanced Engineering Mathematics	Theory of Structures	Hydraulics	Designand Construction1	Designand Construction2	Infrastructure and Highway Engineering	Structural Mechanics	CivilEngineering and Construction Field Study	Advanced Structural Analysis and Design	Engineering Managementand Economics	Environmental Engineering	Internship
Level	5	5	5	5	5	5	5	5	5	5	5	5
PLO	10	10	10	10	10	10	10	10	10	10	10	10
A1	TDA	DA	DA	TDA	TDA		TDA		TDA		DA	
A2		TDA	TDA	TDA	TDA		TD		TD			
A3		TDA	TDA	TDA	TDA		TDA		TDA		TDA	
A4				D	D	D	TDA	D	TDA		D	
A5				TDA	TDA	D	TD	D	TD	D		
A6		T A	TDA	TDA	TDA	TDA	TDA	TDA	TDA			
A7						TDA		TDA		TDA		
A8				D	D	TDA		TDA		TD	D	TDA
A9				D	D	TD	D	TD	D	D	DA	D
A10				D	D	TD	TD	TD	TD	TDA	D	TD
A11				D	D	TDA	D	TDA	D	D	D	TD
B1	TDA	DA	DA	TDA	TDA		TD		TD		D	
B2		TDA	T A	TDA	TDA		TDA		TDA	D	TA	D
B3							TDA		TDA	D		
B4			TDA	TDA	TDA		TD		TD	D	TDA	
B5							D	D	D	DA		

B6								DA		DA		DA
B7				TDA	TDA	D	DA		DA		DA	
B8						DA						
C1		TDA	TDA									
C2		TDA										
C3		TDA	TDA									DA
C4		TDA	DA				DA		DA	TDA		TDA
C5							TD		TD	TDA		TDA
C6				TDA	TDA	DA		DA				D
C7			D	D	D	D	D	D	D	D	D	D
C8				TDA	TDA	D	D	D	D	TD		D
C9								TDA		TDA		TDA
C10												
D1		DA	TDA	TA	TA		DA		DA	TDA	DA	TDA
D2	DA	DA	DA	TDA	TDA		DA		DA	TDA	D	D
D3	D		D	D	D	TD	D	D	D	TDA	D	TDA
D4	DA		DA	DA	DA	TDA	D	DA	D	D	DA	D
D5							D		D	TDA	D	D
D6			D			TDA	D	TDA	D	D		DA
D7		TDA	TDA	DA	DA		D		D	D	DA	DA
D8				D	D	D	T	D	T	D		D

	Project	Structural Design andAnalysis1	Structural Design andAnalysis2	Geotechnical Engineering	Innovation, Enterpriseand Management	Engineering System Design	Civil Engineering Materials	Foundations	Engineering Research Methods	Construction Management	Current Topics in Civil and Construction Engineering
LEVEL	**6**	**6**	**6**	**6**	**6**	**6**	**6**	**6**	**6**	**6**	**6**
PLO	20	10	10	10	10	10	10	10	10	10	10
A1	D	TDA	TDA	DA				TD	TDA		D
A2	D	TDA	TDA	TDA		TDA	TDA	TDA			D
A3	TDA	TDA	TDA	TDA		D		TDA			D
A4	DA	DA	DA		D		D	D	DA	D	TDA
A5	TDA	DA	DA	TDA		TDA					D
A6	DA	DA	DA	TDA			TBA	TD			

A7	D				D					TBA	
A8	D	D	D	D		TDA					TDA
A9	D	D	D	DA		DA	TD	TD		TD	D
A10	DA	D	D	DA	TDA	DA					TDA
A11	D	D	D	D		D	D	D	D		D
B1	TDA	DA	DA	D				TDA	DA		
B2	DA	TDA	TDA	TDA	D	DA			DA		
B3						TDA	TDA	TDA	D		D
B4	DA	DA	DA	TDA	DA	DA	TDA	TDA	D		D
B5	TDA								TDA		D
B6	TDA					DA			TDA		
B7	TDA	T A	T A	D	TDA		TDA	TDA			TD
B8	DA	TDA	TDA		TDA	DA	TD	TD			TD
C1	DA	TDA	TDA			DA			D		
C2	DA	TDA	TDA				TDA		DA		
C3	DA	TDA	TDA				TDA	TDA	TDA		
C4	TDA	TDA	TDA			DA	DA	DA	TDA	DA	TDA
C5	DA	DA	DA				DA	DA	TDA		TDA
C6	DA	DA	DA			DA	DA	DA			

C7	D	D	D	DA	D	D	D	D	D	D	D
C8	D	D	D	DA		D	D	D	D	D	D
C9	TDA					TDA			D		
C10											
D1	DA			DA					TDA	D	D
D2		TDA	TDA	DA				D	DA		
D3	DA	D	D	D			D	D	D		D
D4	TDA	D	D	DA	DA		D	D	D	TDA	D
D5	D			D	D		D	D	D	D	D
D6				D		DA			D	TD	D
D7	DA	TDA	TDA	DA	TDA	D			DA		D
D8	DA	D	D	DA	DA	D	D	D	D	D	D

Bachelor of Engineering in Civil Engineering Modules Brief Descriptions Mathematics 1

The module is designed to provide students with the mathematical knowledge and skills to support study of engineering and to provide the requirement for entry into the Bachelor of Engineering courses at ASU. It is therefore a preparatory or foundation module building on the knowledge obtained at school.

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 which ASU undergraduate students are required to take. The Module provides intensive practice in Upper Intermediate reading, oral presentations, writing, and notetaking. Academic and study skills are embedded in the Module. The Module develops students' English language and analytical skills in order to pursue a more advanced ASU academic English Module and to cope with the literacy demands of specialized Module taught in English.

Principles of Engineering

The Module develops the students' understanding of essential scientific principles for the study of engineering to degree level. It is designed to be accessible to students with a wide range of prior science specialization. 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

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 will be expected in an engineering and industrial environment.

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

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 introduction to design skills and basic engineering drawing

Engineering Science 2

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

Computer Programming for Engineering

This Module introduces students with 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.

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 tutorial where worked exercises are under taken. 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.

Beside 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.

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 understand how new methods and material can sustain the built environment.

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 which 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.

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

History and Civilization of Bahrain

The aim of the module is to highlights 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 played by the politically and culturally.

Arabic Language

The module runs for one semester of 15 weeks for three hours per week. The module provides intensive practice in reading, oral presentations, writing, and note-taking.

Arabic Language for Non-Arabic Speakers

The module runs for one semester of 15 weeks for three hours per week. This Arabic Module is required to take by ASU undergraduate Engineering programme. The module provides intensive practice for beginners in reading, oral presentations, writing, and note-taking.

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.

Structural Design

Introduction to stress and deformation of basic structural materials subjected to axial, torsional, and 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.

Engineering Mathematics 1

This module consolidates the mathematical skills that underpin the Bachelor of Engineering degrees.

Principles of Engineering Science 1

This module develops the students' understanding of essential scientific principles for the study of engineering to degree level. It is designed to be accessible to students with a wide range of prior science specialization.

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 introduce the principles of measurement systems, force and moment vector and traditional analysis, and forces in equilibrium.

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, 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 completion of a practical survey work.

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.

Engineering Practice and Design 2

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

Engineering Mathematics 2

This module consolidates the mathematical skills that underpin the Bachelor of Engineering degrees.

Principles of Engineering Science 2

This module develops the students' understanding of essential scientific principles for the study of engineering to degree level. It is designed to be accessible to students with a wide range of prior science specialization. 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.

Surveying and Structures 2

This module develops students' practice with structural engineering, provides an introduction to structural concepts, as well as an overview of specific techniques for analyzing determinate structures, trusses, beams, and frames.

Engineering Ethics

This Module introduces the theory and the practice of engineering ethics using a multi-disciplinary and cross-cultural approach. Theory includes ethics and philosophy of engineering. Historical cases are taken primarily from the scholarly literatures on engineering ethics, and hypothetical cases are written by students. Each student will write a story by selecting an ancestor or mythic hero as a substitute for a character in a historical case. Students will compare these cases and recommend action.

Soil Mechanics

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

Advanced Engineering Mathematics

This module covers advanced undergraduate engineering mathematics.

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 ability in design in both qualitative and quantitative directions.

Hydraulics

This module develops the fundamental principles of Fluid Mechanics and applies them to practical applications of analysis and design. The student 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. The student will perform simple laboratory tests and prepare a formal report.

Structural Mechanics

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

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 quality, and water and wastewater treatment processes, and consider sustainability issues. The student will develop an understanding of the hydrological cycle and surface hydrology, and apply these principles to the calculation of precipitation and unit hydrograph. The student will also learn basics of groundwater flow, and the problem of contamination in groundwater. The unit also introduces air pollution and noise pollution.

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 emphasizes 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 carried out and bitumen properties derived from the results. Problems to be solved include geometric design, traffic volume, channelization, and hydrology. Lab projects involve roadway designing.

Engineering management and economics

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

- Detailed study of project planning techniques, including network techniques, with preparation for the students' 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 harmonized standards.
- Writing technical business reports, including the importance of acknowledging published sources and the use of formal methods for doing so.

Internship

This Module provides the students with an opportunity to experience the industrial world and be part of a team working on real world project. The University assists each student to find the most suitable industry.

Design and Construction 2

This module offers the knowledge and skills of Marine Structures, analysis and design to Eurocodes, analysis of structural form and ability in design in both qualitative and quantitative directions. Including **Ports and Offshore structures and Dams**

Advanced Structural Analysis and Design

This module develops students' practice with structural engineering, provides an introduction to structural concepts, as well as an overview of specific techniques for analyzing indeterminate structures beams, and frame structures.

Theory of Structures

This Module mainly deals with 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.

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.

Structural Design and Analysis 1

This module offers the knowledge and skills of reinforced concrete design to Eurocodes, analysis of structural form and ability in design in both qualitative and quantitative directions.

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.

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.

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 demonstrate the commercial viability of their ideas.

One of the assignments will require students – working 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).

Topics students will experience will include intellectual property, market research, market placement, advertising and finance. They will be expected to reflect on what they can contribute towards a group.

Engineering System Design

To involve the student with the process of engineering project development from planning to detailed design working with a project team.

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 into 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, 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.

Geotechnical Engineering

This module shows how the soil mechanics theories introduced in Soil Mechanics are applied to the solution of a number of geotechnical analysis and design problems.

Structural Design and Analysis 2

This module offers the knowledge and skills of steel design to Eurocodes, analysis of structural form and ability in design in both qualitative and quantitative directions.

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.

Project

To plan, execute, review and report upon a piece of project work related to the Bachelor of Engineering Module being followed by the student. A Module Guide for the project is augmented by 8 lectures.

ASU

جامعة العلوم التطبيقية

APPLIED SCIENCE UNIVERSITY

Kingdom of Bahrain
P.O.Box 5055

(+973) 177 28 777
(+973) 160 18 888
(+973) 160 18 866

(+973) 666 16 650

(+973) 177 28 915

ASU_BH

ASU_BH

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www.asu.edu.bh