

Bachelor of Engineering in Environmental Engineering

2020 – 2021

Awarding Institution	A'Sharqiyah University		
College / Centre	College of Engineering		
Program Title	Environmental Engineering		
Final Award	Bachelor of Engineering in Environmental Engineering (BEng)		
Credit hours	137		
Mode of Study	Full time - Part Time - Special Part Time		
Language of Study	English		
Benchmarks			
Entry requirements	<p>A student</p> <ul style="list-style-type: none"> - should have successfully completed the courses of all subjects of the general education diploma or equivalent; - should achieve the standards set for the subjects of the General Foundation Program; - should have studied subjects which qualify him/her to be enrolled in programs in the College of engineering, - Must be medically fit. 		
Minimum period of registration	FULL-TIME: 9 semesters	PART-TIME: Semesters	13
Maximum period of registration	FULL-TIME: 18 Semesters	PART-TIME: Semesters	22
Date specification produced	September 2013 (first version)		
Date specification last reviewed	(July 2018)		

1 THE COLLEGE OF Engineering

The College of Engineering at A'Sharqiyah University (ASU) opened in 2011 and has grown quickly to a current enrollment of over 300 students. The College will continue to grow at this rapid pace in order to accommodate over 1000 students in new classrooms and laboratories located in the new College of Engineering building that was completed in September 2017. With a first-rate building and state-of-the-art laboratories, the ASU Engineering College will continue to draw community members and prospective students to the growing campus. The College of Engineering at present offers undergraduate academic programs at Diploma/Degree levels in Civil Engineering, Environmental Engineering, Electronics and Communications Engineering and Construction Project Management.

The mission of the College is to educate creative professional engineers, technologists and technicians and to equip them to serve society in a globalized knowledge economy. Working in partnership with its stakeholders, the College is committed to the creation and transfer of new knowledge and technologies through the efforts of faculty, staff and students. The College vision is to achieve national and international stature as a College of Engineering through excellence in engineering education, research and innovation, outreach and external community engagement whilst contributing to the competitiveness, social and economic development and prosperity of the Sultanate of Oman

2 PROGRAM OUTLINE

The ASU Environmental Engineering Program teaches students about the technology and tools required to practice Professional Environmental Engineering during the engineering and design of structures, transportation systems, buildings, roads, and many other major facilities. The Environmental Engineering program is designed to fulfill industry's need for licensed professional environmental engineers. Emphasis of the ASU Environmental Engineering Program is placed on engineering, scientific, and technical courses so that the requirements for professional-engineering licensure are met. The curriculum was chosen to concentrate on the application of environmental engineering principles to the solution of real world environmental-engineering problems.

3 PROGRAM AIM/S

The aims of this program are to:

- a. Provide high quality instruction and opportunities to prepare graduates for environmental engineering practice and to engage in life-long learning;
- b. Provide research opportunities for students that generate communicate and apply new knowledge to improve society;
- c. Provide opportunities for leadership and service;
- d. Prepare students to uphold high ethical and professional standards; and
- e. Prepare students to work effectively in a multi-disciplinary environment as parts of working teams.

4 LEARNING OUTCOMES (Definitive)

Upon successful completion of the program, students will be able to:

A. KNOWLEDGE AND UNDERSTANDING	<ol style="list-style-type: none"> 1. Apply knowledge of mathematics, science, and engineering; 2. Design and conduct experiments, as well as to analyze and interpret data; 3. Design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability; 4. Function on multidisciplinary teams.
B. SUBJECT-SPECIFIC INTELLECTUAL SKILLS	<ol style="list-style-type: none"> 5. Apply knowledge of mathematics through differential equations, calculus-based physics, chemistry, and at least one additional area of science, consistent with the program educational objectives; 6. Proficiency in environmental engineering, water resources engineering; and 7. Introduction to structural engineering, geotechnical engineering and transportation engineering.
C. PROFESSIONAL / PRACTICAL SKILLS	<ol style="list-style-type: none"> 8. Conduct environmental engineering experiments and analyze and interpret the resulting data; 9. Design a system, component, or process in more than one environmental engineering context; 10. Explain basic concepts in management, business, public policy, and leadership; 11. Explain the importance of professional licensure.
D. GENERAL COMPETENCE	<p>Communication</p> <ul style="list-style-type: none"> • Communicate effectively. <p>Teamwork and interpersonal skills</p> <ul style="list-style-type: none"> • Function on multidisciplinary teams. <p>Leadership and entrepreneurship</p> <ul style="list-style-type: none"> • Lead group of employees • Establish companies in the field of interest

5 PROGRAM STRUCTURE

Students must achieve the required credit hours for the program by completing University Required and Elective courses listed in sections 5.1 to 5.5 below:

5.1 University Requirements: Total Credit hours 12

Course Code	Course Title	Pre-Requisites (P) Co-Requisites (C)	Credit hours
ISLM101	Islamic Civilization		3
ENGL101	English Communication Skills I		3
ENGL102	English Communication Skills II	ENGL101	3
MNGT313	Entrepreneurship		3
TOTAL			12

5.2 University Electives: Total Credit hours XX

Course Code	Course Title	Pre-Requisites (P) Co-Requisites (C)	Credit hours

5.3 College Requirements: Total Credit hours 42

Course Code	Course Title	Pre-Requisites (P) Co-Requisites (C)	Credit hours
MATH101	Calculus I	FPPM002 (C)	3
MATH102	Calculus II	MATH101	3
MATH406	Calculus III	MATH102	3
MATH203	Differential Equations	MATH102	3
MATH204	Probability and Statistics	MATH102	3
MATH305	Numerical Methods	MATH102– ENGR111	3
PHYS101	Physics I		3
MATH215	Linear Algebra		3
PHYS102	Physics II	PHYS101	3
CHEM101	Chemistry		3
ENGR201	Engineering Drawing	FPIT002	3
ENGR202	Technical Writing and Presentation	ENGL102	3
ENGR404	Engineering Economics	MATH204	3
ENGR111	Computer Applications		3
ENGR322	Internship	105 Credits	0
TOTAL			42

5.4 Program Requirements: Total Credit hours 83

Course Code	Course Title	Pre-Requisites (P) Co-Requisites (C)	Credit hours
ENGR110	Engineering Laboratories		3
ENGR220	Statics	MATH102	3
ENGR321	Dynamics	ENGR220	3

CVEN310	Surveying		3
CVEN231	Engineering Geology	CHEM101	2
CVEN332	Civil Engineering Materials		3
ENEN201	Renewable Energy		3
ENEN301	Environmental Chemistry	CHEM101	3
ENEN302	Environmental Microbiology	CHEM101	3
ENEN422	Environmental Measurements	CHEM101	3
ENEN461	Solid Waste Management	CVEN361	3
ENEN441	Air Pollution		3
ENEN431	Water and Wastewater Treatment	CVEN361	3
ENEN360	Environmental Law		3
CVEN361	Environmental Engineering		3
CVEN350	Thermofluids Engineering	ENGR321	3
CVEN451	Hydraulics Engineering	CVEN350	3
CVEN552	Engineering Hydrology	CVEN451	3
CVEN470	Engineering Project Management		3
CVEN554	Hydrogeology & Groundwater Contamination		3
CVEN491	Capstone Design Project I		3
CVEN592	Capstone Design Project II	CVEN491	3
CVEN553	Water Resources Engineering	CVEN451	3
ENEN582	Desalination Engineering	CVEN361	3
ENEN572	Environmental Impact Assessment	CVEN361	3
Sub-total			75
	Environmental Engineering Elective		9
TOTAL			83

5.5 Program Electives: Total Credit hours 9

Choose from the following:

Course Code	Course Title	Pre-Requisites (P) Co-Requisites (C)	Credit hours
CNMN405	Building Information Modelling	ENGR201	3
ENEN531	Advanced Wastewater Treatment	ENEN431	3
ENEN561	Industrial and Hazardous Waste	CVEN361	3
ENEN571	Environmental Pollution	CVEN361	3
ENEN581	Climate Change	CVEN361	3
ENEN583	Waste and Energy	CVEN461	3
ENEN584	Sustainable Engineering	CVEN361	3
COEN280	Construction Methodology		3
COEN282	Construction Equipment		3
COEN585	GIS Application in Civil Engineering		3



5.5 Program Electives: Total Credit hours 9

Choose from the following:

Course Code	Course Title	Pre-Requisites (P) Co-Requisites (C)	Credit hours
COEN586	Sustainable Construction	CVEN361	3
CVEN260	Geotechnical Engineering		3
CVEN564	Coastal Engineering	CVEN451	3

6 PROGRAM REFERENCE POINTS

The Environmental Engineering Program described herein, was developed based on the current curriculum at Texas Tech University (TTU), but more importantly, it was structured for ABET accreditation which is a form of quality assurance that declares a program meets the quality standards set by the technical profession.

ABET accreditation of the Environmental Engineering Program will be the main tool used to insure future developments of the program are maintained at high international standard.

The learning objectives, learning outcomes, performance indicators, and the course contents described below, will be continuously updated to reflect future developments in Environmental Engineering as part of the internal assessment process that will lead to ABET accreditation.

7 TEACHING AND LEARNING METHODS (indicative)

Lecturers, seminars, laboratory experiments, site visits, self-study, projects.

8 ASSESSMENT METHODS (Indicative)

Quizzes, midterm exams, final exams, practical assessment in labs, project evaluation, viva questions.

9 CAREER and STUDY OPPORTUNITIES

The program facilitates entries to job and work opportunities in a number of market and industrial settings such as:

1. Consulting firms
2. Municipalities and government organizations
3. Oil Companies
4. Industry

The graduate from this course can also pursue further study and can improve their academic qualification by doing a Master degree.

10 STUDENT SUPPORT

Students attend an orientation program at the start of their studies. They are supported by a Course Coordinator and the Head of Department is also available to advice on program-related queries.

Academic advising is an essential element of the educational process. Students are assigned academic advisors who help them in selecting their course of study and in planning their schedules. Academic advisors also approve students' schedules each semester. The academic advisor assists students in obtaining a well-balanced education and in interpreting university policies and procedures, it is ultimately the students' individual responsible for selecting their courses, meeting course prerequisites, and adhering to university policies and procedures. Students may also consult faculty, department or program chairs, program coordinators, and deans.

Students have access to the University's library with a range of reading materials, online resources and study support.

The University's Student Affairs Office supports students in adjusting to university life and advises on issues such as finance, regulations, legal matters, accommodation, transportation, disabilities and career guidance. Opportunities are also provided for students to participate in various extra-curricular activities.

The Student Council is also an important source of support and guidance.

The University has a Student Fund, which considers applications on a case-by-case basis.

11 PROGRAM STRUCTURE DIAGRAM (Indicative)

Year 1		Year 2		Year 3		Year 4		Year 5
FALL	SPRING	FALL	SPRING	FALL	SPRING	FALL	SPRING	FALL
ISLM101 Islamic Civilization	ENGL102 English Communication Skills II Pre-R: ENGL101	CVEN310 Surveying	CVEN231 Engineering Geology Pre-R: CHEM101	MNGT 313 Entrepreneurship	ENEN431 Water & Wastewater Treatment Pre-R: CVEN361	ENEN582 Desalination Engineering Pre-R: CVEN361	CVEN491 Capstone Design Project I	CVEN592 Capstone Design Project II Pre-R: CVEN491
ENGL101 English Communication Skills I	ENGR110 Engineering Laboratories	ENEN301 Environmental Chemistry CHEM101	ENEN201 Renewable Energy	CVEN332 Civil Engineering Materials	MATH305 Numerical Methods Pre-R: MATH102 - ENGR111	MATH406 Calculus III Pre-R: MATH102	CVEN554 Hydrogeology & Groundwater Contamination	CVEN553 Water Resources Engineering CVEN451
ENGR111 Computer Applications	MATH102 Calculus II Pre-R: MATH101	ENGR201 Engineering Drawing Pre-R: FPIT002	CVEN361 Environmental Engineering	ENEN422 Environmental Measurements CHEM101	CVEN350 Thermofluids Engineering ENGR321	CVEN451 Hydraulics Engineering Pre-R: CVEN350	ENEN441 Air Pollution	CVEN552 Engineering Hydrology Pre-R: CVEN451
MATH101 Calculus I FPPM002 (C)	PHYS102 Physics II Pre-R: PHYS101	ENGR202 Technical Writing and Presentation ENGL102	ENEN302 Environmental Microbiology CHEM101	MATH204 Probability and Statistics Pre-R: MATH102	ENEN360 Environmental Law	ENGR404 Engineering Economics Pre-R: MATH204	ENEN461 Solid Waste Management Pre-R: CVEN361	Environmental Engineering Elective
PHYS101 Physics I	CHEM101 Chemistry	ENGR220 Statics Pre-R: MATH102	ENGR321 Dynamics Pre-R: ENGR220	CVEN470 Engineering Project Management	MATH203 Differential Equations Pre-R: MATH102	ENEN572 Environmental Impact Assessment Pre-R: CVEN361	Environmental Engineering Elective	Environmental Engineering Elective
		MATH215 Linear Algebra					Summer Internship	

12 MAPPING of ASSESSMENT of LEARNING OUTCOMES - YEAR 1

KEY: F = Formative assessment S = Summative assessment FS = Formative AND Summative assessment

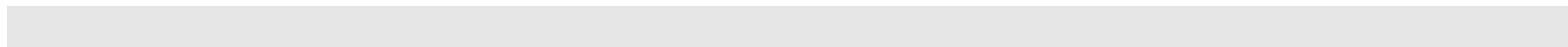
Upon completion of the program, students will be able to:

		REQUIRED COURSES:									
		ENGR111	ISLM101	ENGL101	MATH101	PHYS101	ENGR110	ENGL102	MATH102	PHYS102	CHEM101
KNOWLEDGE AND UNDERSTANDING											
1	An ability to apply knowledge of mathematics, science, and engineering	FS			S	S	FS		S	S	S
2	An ability to design and conduct experiments, as well as to analyze and interpret data	FS			F	F	FS		F	F	F
3	An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	FS			S		FS				
4	An ability to function on multidisciplinary teams		F				FS				
SUBJECT-SPECIFIC INTELLECTUAL SKILLS											
5	Apply knowledge of mathematics through differential equations, calculus-based physics, chemistry, and at least one additional area of science, consistent with the program educational objectives	F			S	S	F		S	S	S
6	Proficiency in environmental engineering, water resources engineering	F					F				

12 MAPPING of ASSESSMENT of LEARNING OUTCOMES - YEAR 2

		REQUIRED COURSES:										
		CVEN310	ENEN301	ENEN231	ENGR220	ENEN201	CVEN361	ENGR202	ENEN302	ENGR201	MATH215	ENGR321
KNOWLEDGE AND UNDERSTANDING												
1	An ability to apply knowledge of mathematics, science, and engineering	S	F			FS	F		F		S	FS
2	An ability to design and conduct experiments, as well as to analyze and interpret data		F			FS	F		F		F	
3	An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	FS	FS	FS		FS	FS		FS		S	
4	An ability to function on multidisciplinary teams		F				F		F	FS		
SUBJECT-SPECIFIC INTELLECTUAL SKILLS												
5	Apply knowledge of mathematics through differential equations, calculus-based physics, chemistry, and at least one additional area of science, consistent with the program educational objectives	S	FS		FS	FS	FS		FS		S	FS
6	Proficiency in environmental engineering, water resources engineering		FS	FS		FS			FS			FS
7	Introduction to structural engineering, geotechnical engineering and transportation engineering	S			FS	FS	S					FS

PROFESSIONAL / PRACTICAL SKILLS												
8	Conduct environmental engineering experiments and analyze and interpret the resulting data		FS			FS	F		FS			FS
9	Design a system, component, or process in more than one environmental engineering context	S	FS		FS	FS	FS		FS	FS		FS
10	Explain basic concepts in management, business, public policy, and leadership											
11	Explain the importance of professional licensure											
GENERAL COMPETENCE (INCLUDING FOR EMPLOYABILITY)												
	Communication							FS		FS		
	Teamwork and interpersonal skills							FS		FS		
	Leadership and entrepreneurship											



12 MAPPING of ASSESSMENT of LEARNING OUTCOMES - YEAR 3

		REQUIRED COURSES:									
		CVEN332	MNGT313	ENEN431	CVEN470	MATH305	MATH203	MATH204	CVEN350	ENEN422	ENEN360
KNOWLEDGE AND UNDERSTANDING											
1	An ability to apply knowledge of mathematics, science, and engineering			F	FS	S	FS	FS	S	F	F
2	An ability to design and conduct experiments, as well as to analyze and interpret data			F	F	S	FS	FS	S	F	F
3	An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	FS	FS	FS	FS	S			S	FS	FS
4	An ability to function on multidisciplinary teams		FS	F	FS	S				F	F
SUBJECT-SPECIFIC INTELLECTUAL SKILLS											
5	Apply knowledge of mathematics through differential equations, calculus-based physics, chemistry, and at least one additional area of science, consistent with the program educational objectives			FS	FS	S	FS	FS	S	FS	FS
6	Proficiency in environmental engineering, water resources engineering			FS	FS	F	F	F		FS	FS
7	Introduction to structural engineering, geotechnical engineering and transportation engineering	FS			FS		FS	FS	S		
PROFESSIONAL / PRACTICAL SKILLS											

PROGRAM SPECIFICATION

8	Conduct environmental engineering experiments and analyze and interpret the resulting data	FS		FS	F	F			FS	FS	FS
9	Design a system, component, or process in more than one environmental engineering context			FS	F	F			FS	FS	FS
10	Explain basic concepts in management, business, public policy, and leadership		FS		FS						FS
11	Explain the importance of professional licensure		FS		FS						FS
GENERAL COMPETENCE (INCLUDING FOR EMPLOYABILITY)											
	Communication		FS		FS						F
	Teamwork and interpersonal skills		FS		FS						F
	Leadership and entrepreneurship		FS		FS						

12 MAPPING of ASSESSMENT of LEARNING OUTCOMES - YEAR 4

		REQUIRED COURSES:									
		ENEN582	MATH406	ENEN572	ENGR404	CVEN451	CVEN491	CVEN554	ENEN441	ELECTIVE01	CVEN461
KNOWLEDGE AND UNDERSTANDING											
1	An ability to apply knowledge of mathematics, science, and engineering	F	S	F	F	F	FS	F	F	F	F
2	An ability to design and conduct experiments, as well as to analyze and interpret data	F	S	F	F	F	FS	F	F	F	F
3	An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	FS	S	FS	FS	FS	FS	FS	FS	FS	FS
4	An ability to function on multidisciplinary teams	F	S	F	F	F	FS	F	F	F	F
SUBJECT-SPECIFIC INTELLECTUAL SKILLS											
5	Apply knowledge of mathematics through differential equations, calculus-based physics, chemistry, and at least one additional area of science, consistent with the program educational objectives	FS	S	FS	F	FS	FS	FS	FS	FS	FS
6	Proficiency in environmental engineering, water resources engineering	FS		FS		FS		FS	FS	FS	FS
7	Introduction to structural engineering, geotechnical engineering and transportation engineering		F				FS				

PROFESSIONAL / PRACTICAL SKILLS											
8	Conduct environmental engineering experiments and analyze and interpret the resulting data	FS	F	FS	F	FS	FS	FS	FS	FS	FS
9	Design a system, component, or process in more than one environmental engineering context	FS	F	FS	S	FS	FS	FS	FS	FS	FS
10	Explain basic concepts in management, business, public policy, and leadership		F		S		FS				
11	Explain the importance of professional licensure						FS				
GENERAL COMPETENCE (INCLUDING FOR EMPLOYABILITY)											
	Communication						FS				
	Teamwork and interpersonal skills						FS				
	Leadership and entrepreneurship						FS				

12 MAPPING of ASSESSMENT of LEARNING OUTCOMES - YEAR 5

		REQUIRED COURSES:				
		CVEN592	CVEN553	CVEN552	Elective02	Elective03
KNOWLEDGE AND UNDERSTANDING						
1	An ability to apply knowledge of mathematics, science, and engineering	FS	F	F	F	F
2	An ability to design and conduct experiments, as well as to analyze and interpret data	FS	F	F	F	F
3	An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	FS	FS	FS	FS	FS
4	An ability to function on multidisciplinary teams	FS	F	F	F	F
SUBJECT-SPECIFIC INTELLECTUAL SKILLS						
5	Apply knowledge of mathematics through differential equations, calculus-based physics, chemistry, and at least one additional area of science, consistent with the program educational objectives	FS	FS	FS	FS	FS
6	Proficiency in environmental engineering, water resources engineering		FS	FS	FS	FS
7	Introduction to structural engineering, geotechnical engineering and transportation engineering	FS				

PROFESSIONAL / PRACTICAL SKILLS						
8	Conduct environmental engineering experiments and analyze and interpret the resulting data	FS	FS	FS	FS	FS
9	Design a system, component, or process in more than one environmental engineering context	FS	FS	FS	FS	FS
10	Explain basic concepts in management, business, public policy, and leadership	FS				
11	Explain the importance of professional licensure	FS				
GENERAL COMPETENCE (INCLUDING FOR EMPLOYABILITY)						
	Communication	FS				
	Teamwork and interpersonal skills	FS				
	Leadership and entrepreneurship	FS				