



PROGRAM SPECIFICATION

Attachment IV

Bachelor of Science in Water Engineering (2021 - 2022)

Awarding Institution	A'Sharqiyah University	
College / Centre	College of Engineering	
Department	Department of Water Engineering	
Program Title	Bachelor of Science (BSc) in Water Engineering	
Final Award	Bachelor of Science in (BSc) in Water Engineering	
Credit hours	123 CH	
Level of Study	Undergraduate	
Mode of Study	Full time	
Language of Study	English	
Benchmarks	<ol style="list-style-type: none"> 1. University of Illinois (USA) 2. University of Pretoria (South Africa) 3. Texas A&M University (USA) 4. American University of Sharjah (UAE) 5. University Laval (Canada) 	
Entry requirements	<ol style="list-style-type: none"> a. A student should have successfully passed the courses of all subjects of the general education diploma or its equivalence. b. Certificate issued from outside the Sultanate (need to be equivalent to the Ministry of Education in the Sultanate). c. Certificate issued from within the Sultanate and under the supervision of others other than the Ministry of Education (need to be equivalent from the Ministry of Education). d. A student should achieve the standards set for the subjects of the General Foundation Program. e. A student should have passed the following subjects to qualify for enrollment on the program: Pure Mathematics or Applied mathematics. f. Students who have studied in other educational institutions recognized by the University may be eligible to transfer if the transfer student has earned a grade point average of 2.00 or higher over a four-point grade scale. The head of the academic department or dean in the College in which the student has enrolled shall evaluate all courses taught at the former institution in which the student earned a grade of C or higher. g. A student must be medically fit 	
Minimum period of registration	FULL-TIME: 4 years	PART-TIME: 8 years
Maximum period of registration	FULL-TIME: 8 years	PART-TIME: 12 years

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Date specification produced	15/08/2020
Date specification last reviewed	09/03/2022



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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 700 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.

College Mission

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.

College Vision

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.

College Objectives

The Objectives of the College are to:

1. Enhance the effectiveness of College governance and management structures
2. Develop a set of high value local, regional and international partnerships to leverage strategic priorities
3. Generate maximum funds to invest in our future
4. Achieve cost optimization
5. Improve quality of teaching and learning
6. Develop and maintain innovative curriculum and delivery in the College
7. Contribute to knowledge and innovation through applied research and scholarship in priority areas
8. Ensure innovation in all areas of activity in the College
9. Contribute to the Community's cultural, social and economic development.
10. Provide students with an accessible and supported study experience and transition to employment
11. Improve participation, success and retention of students
12. Recruit, develop and retain talented staff, providing them with an enabling and satisfying work environment.
13. Provide state-of-the-art laboratory equipment and infrastructure for students and staff
14. Promote University values

The proposed Bachelor of Science in Water Engineering will be delivered by the College of Engineering at A' Sharqiyah University. The College at present runs a successful Bachelor of Engineering in Civil Engineering and Environmental Engineering. The two programs will share some courses.



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2. PROGRAM OUTLINE

Access to clean water is a vitally important cornerstone of modern society. As a water engineer, you will learn to use cutting-edge measurement, simulation and data analysis methods for water in the built and natural environment. By knowing these tools as a student in the Water Engineering Program, you can help to create a sustainable future for our planet's inhabitants.

In order to live comfortably and safely, societies have a high need to distribute, store, and purify water. Experts like water engineers are important for keeping these systems functioning by, for example, determining the amount of available water, calculating flows in the main water grid, and simulating water run-off in residential areas. The production of drinking water and treatment of wastewater demand long-term solutions that require advanced technical know-how in measurement, simulation and data analysis (including machine learning and artificial intelligence)

Aside from drinking water preparation, storm water management and water sanitation, water engineering also encompasses surface water hydrology and geohydrology as well as their applications in research and development.

3. PROGRAM AIMS

1. Develop the next generation of Omani students and provide them with broad, technical-orientated knowledge in water related engineering and natural sciences.
2. Equip the students with capabilities required for analysing, identifying, formulating and management of water resource related issues/problems.
3. Develop appropriate academic and scientific problem-solving strategies.
4. Impart training to the students to prepare them for conducting high value research on water resources and other related issues and also to pursue lifelong learning.
5. Prepare graduates with skills to investigate, analyze and apply appropriate measures to water engineering problems.

4. PROGRAM LEARNING OUTCOMES

1. Develop the next generation of Omani students and provide them with broad, technical-orientated knowledge in water related engineering and natural sciences.
2. Equip the students with capabilities required for analysing, identifying, formulating and management of water resource related issues/problems.
3. Develop appropriate academic and scientific problem-solving strategies.
4. Impart training to the students to prepare them for conducting high value research on water resources and other related issues and also to pursue lifelong learning.
5. Prepare graduates with skills to investigate, analyze and apply appropriate measures to water engineering problems.

5. DETAILED PROGRAM LEARNING OUTCOMES

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

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A. KNOWLEDGE AND UNDERSTANDING	<ul style="list-style-type: none"> • Apply knowledge of basic water chemistry (equilibrium, thermodynamics) to solve problems associated with water/wastewater treatment and natural water quality. • Apply knowledge of various reactions to solve problems associated with water/wastewater treatment and natural water quality. • Understand the different aspects of design and development of water and wastewater projects such as desalination plants and wastewater treatment plants to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability. • Demonstrate a basic understanding of water treatment and water reuse in industrial and agricultural sectors.
B. SUBJECT-SPECIFIC INTELLECTUAL SKILLS	<ul style="list-style-type: none"> • Apply fundamental concepts to solve simple and complex problems of the different aspects of water engineering such as fluid flow, water treatment, rainfall and runoff, etc. • Carry out different laboratory experiments on fluid flow in pipes and open channels, water chemistry, and sewage treatment. • Apply the principles of water chemistry and water treatment. • Apply the principles of hydraulics in the design of network pipes, dams, and pump stations. • Demonstrate an awareness of digital technologies in water treatment and water reuse. • Design new experiments, analyze the results, and suggest logical and scientific explanation.
C. PROFESSIONAL PRACTICAL SKILLS	<ul style="list-style-type: none"> • Recognize the roles of other professionals and parties associated with the design and delivery of water engineering projects. • Recognize the importance of professional ethics, their impact on the operation of the profession and their influence on society, • Explain the importance of professional registration. • Explore the natural water resources in the Sultanate of Oman and re-engineer them to contribute to the national wealth.
D. TRANSFERABLE SKILLS	<p>Communication</p> <ul style="list-style-type: none"> • Develop and apply good oral and written communication skills with a range of stakeholders including colleagues, team members and the general public. • Acknowledge differences and able to adapt to difference of opinions while being open minded.



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	<ul style="list-style-type: none"> Recognize and value communication as a tool for negotiating and creating new understanding. <p>Teamwork and interpersonal skills</p> <ul style="list-style-type: none"> Create and share learning and knowledge and to contribute effectively to teamwork. Perform live projects as a team and contribute to strengthen each other's weaknesses. Cooperate and listen to team members. <p>Information literacy and study skills</p> <ul style="list-style-type: none"> Recognize need for information and distinguish ways of addressing gap and select appropriate sources. Locate strategically and access information to construct research strategies. Compare and evaluate information. Synthesize and create missing information. <p>Numeracy</p> <ul style="list-style-type: none"> Appreciate issues of sample selection, accuracy, precision and uncertainty during collection, recording and analysis of data in the field and laboratory Prepare, process, interpret and present data using appropriate qualitative and quantitative techniques and software packages <p>Leadership and entrepreneurship</p> <ul style="list-style-type: none"> Demonstrate a clear appreciation of innovation and entrepreneurship and their impact on the economy.
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6. PROGRAM STRUCTURE

Students must achieve the required credit hours for the program by completing the University Requirements, College Requirements, Major Requirements and Electives listed below:

6.1 University Requirements

Total Credit Hours 12

Course Code	Course Title	Pre-Requisites	Credits
ISLM101	Islamic Civilization		3
ENGL101	English Communication Skills I		3
ENGL102	English Communication Skills II	ENGL101	3
MNGT313	Entrepreneurship	60 credit hours	3
Total			12



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6.2 College Requirements

Total Credit Hours 24

Course Code	Course Title	Pre-Requisites	Credits
CHEM111	Applied Chemistry		3
PHYS111	Applied Physics		3
MATH101	Calculus I		3
ENGR201	Engineering Drawing		3
MATH102	Calculus II	MATH101	3
MATH204	Probability and Statistics	MATH101	3
ENGR321	Applied Engineering Mathematics	MATH102	3
ENGR322	Internship	Pass 85 Credits	0
ENGR111	Computer Applications		3
Total			24

6.3 Major Requirements

Total Credit Hours 78

Course Code	Course Title	Pre-Requisites	Credits
ENGR110	Engineering Laboratories		3
CVEN310	Surveying		3
WATE121	Water Chemistry	CHEM111	3
CVEN231	Engineering Geology	CHEM111	3
ENEN201	Renewable Energy		3
WATE211	Introduction to Water Quality		3
WATE212	Water Microbiology		3
WATE213	Water Treatment I	WATE211 & WATE212	3
WATE221	Water Treatment II	WATE213	3
CVEN332	Civil Engineering Materials		3
ENEN461	Solid Waste Management		3
WATE413	Water Laws & Legislation		3
WATE311	Water Supply Technology	WATE222	3
WATE222	Fluid Mechanics		3
WATE312	Computer Application in Water Resources		3
WATE321	Irrigation & Drainage Technology	WATE311	3
WATE322	Wastewater Treatment	WATE221	3
WATE323	Pump Station Design		3
CVEN552	Engineering Hydrology	CVEN451	3



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CVEN451	Hydraulics Engineering	CVEN350	3
WATE411	Capstone Design Project I	90 credit hours	3
CVEN554	Hydrogeology & Groundwater Contamination		3
ENEN582	Desalination Engineering		3
WATE423	Capstone Design Project II		3
CVEN553	Water Resources Engineering	CVEN451	3
WATE414	Hydraulic Structures		3
Water Engineering Elective (3 Courses)			9

6.4 Water Engineering Electives (Choose 9 Credit Hours)

Course Code	Course Title	Pre-Requisites	Credits
ENEN531	Advanced Wastewater Treatment	WATE323	3
CVEN564	Coastal Engineering		3
WATE422	Groundwater Remediation	CVEN554	3
WATE423	Advanced Technology in Desalination		3
WATE424	Arid Zone Hydrology	CVEN554& CVEN552	3
WATE425	Nano-technology in Water Applications		3
WATE426	Water-Borne Diseases		3
WATE427	Special Topics in Water Engineering		3
WATE428	Water Pollution Control		3
WATE429	Design & Management of Irrigation Systems	WATE322	3
ENGR406	Industrial Internship I	90 credit hours	0
ENGR407	Industrial Internship II	ENGR406	0

7. PROGRAM REFERENCE POINTS

The Bachelor of Science in Water Engineering has been designed to take account of the University's mission statement in that the program seeks to provide high quality higher education for the intellectual, social and the professional development of the individual and the social and economic development of the Sultanate of Oman.

8. TEACHING AND LEARNING METHODS (indicative)

In accordance with sound educational research and current best practice, the programme will be delivered through a broad range of learning and teaching strategies. The delivery of the programme and its assessment will reflect A'Sharqiyah University's Learning, Teaching and Assessment Strategy and in particular emphasises:

- The development of autonomous learners.
- Provision of learning opportunities that are personally and professionally relevant and quality assured.

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- The maintenance of a supportive learning environment.
- The promotion of the scholarship of teaching.

At this level of study, students are encouraged to take responsibility for their own learning with staff facilitating the learning process. The aim is to encourage a high level of student autonomy in learning and the capacity to apply this within the wider environment. These overall aims are achieved through the use of a variety of learning and teaching techniques which include lectures, **tutorials, seminars, laboratory experiments, site visits, self-study, projects, workshops, discussions, debates, group work, case studies, problem-based learning and visiting speakers.**

A learner-centred approach will be adopted with the aim of promoting independent learning; as a consequence, direct face-to-face teaching contact hours will be supplemented by tutor-guided and independent reading and research which will emphasise the need to work in a critical way with theory and empirical research sources.

Additionally, Moodle Virtual Learning Environment will be used for developing interactive activities such as quizzes or forums; it also allows staff and students to create discussion groups. Students are encouraged to make significant use of on-line resources especially journals and e-books.

9. ASSESSMENT METHODS (Indicative)

In developing the assessment strategy, the team members have considered the Learning and Teaching Strategy and International best practice. Additionally, the assessments reflect the University's Academic Regulations.

Students will be assessed on their achievement of the programme learning outcomes which, in turn, are achieved by meeting the learning outcomes of both the core and elective courses. The assessment of the programme learning outcomes will therefore be achieved by assessment at the course level. Selection of the methods for assessment will be determined by the requirements of each individual course and the rationale for selection of those methods will be left to the course descriptors.

Assessments are chosen to examine a student's ability to integrate theory and practice, and to think critically in relation to theory, empirical research and practice. Subject specific, professional and transferable skills are developed within classroom-based and independent learning activities. Most courses assess a variety of skills, either directly or indirectly through the assessment work for the module.

The assessment strategy in the taught elements of the course is designed to allow students to demonstrate subject knowledge, skills, tools and techniques appropriate to the discipline. Examples of assessment methods which will be used include: **Quizzes, midterm exams, final exams, practical assessment in labs, project evaluation, viva questions.**

The research course enables students to study and research into a specific topic in depth, and also develops further the capacities for self-managed learning, critical thinking and the creative application of knowledge to solve problems.



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10. CAREER and STUDY OPPORTUNITIES

Graduates from this program will find employment opportunities in a range of organizations including related municipalities and ministries, desalination plants, water and wastewater treatment plants, industrial wastewater, water laboratories, and hydropower industry.

Graduates from this course can also pursue further study and can improve their academic qualification by doing a Master's degree.

11. 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 advise 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.

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4. PROGRAM STRUCTURE DIAGRAM (Bachelor of Science in Water Engineering (123 Credit Hours))

Year One		Year Two		Year Three		Year Four	
Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring
ENGR111 Computer Applications	ENGR110 Engineering Laboratories	CVEN332 Civil Engineering Materials Pre-ENGR110	CVEN231 Engineering Geology Pre-CHEM111	ENGR331 Applied Engineering Mathematics Pre-R: MATH102	ENEN201 Renewable Energy Pre- MATH102	CVEN552 Engineering Hydrology Pre-CVEN451	CVEN554 Hydrogeology & Groundwater Contamination Pre-CVEN451
ISLM101 Islamic Civilization	WATE121 Water Chemistry Pre-CHEM111	CVEN310 Surveying Pre- MATH101	ENGR201 Engineering Drawing	WATE311 Water Supply Technology Pre-WATE222	WATE321 Irrigation & Drainage Technology Pre-WATE311	WATE411 Capstone Design Project I**	Water Engineering Technology Elective
CHEM111 Applied Chemistry	MATH102 Calculus II Pre- MATH101	WATE211 Introduction to Water Quality Pre-WATE121	WATE221 Water Treatment II Pre-WATE213	WATE312 Computer Application in Water Resources Pre-ENGR111	ENEN461 Solid Waste Management Pre-CVEN310	Water Engineering Technology Elective	Water Engineering Technology Elective
ENGL101 English Communication Skills I	PHYS111 Applied Physics	WATE212 Water Microbiology Pre-WATE121	MATH204 Probability and Statistics Pre- MATH102	CVEN451 Hydraulics Engineering Pre-CVEN332	WATE322 Wastewater Treatment Pre-WATE221	CVEN553 Water Resources Engineering Pre-CVEN451	WATE423 Capstone Design Project II Pre-WATE411
MATH101 Calculus I	ENGL102 English Communication Skills II Pre-ENGL101	WATE213 Water Treatment I Pre-CHEM111	WATE222 Fluid Mechanics Pre- MATH102	MNGT313 Entrepreneurship*	WATE323 Pump Station Design Pre-WATE311	ENEN582 Desalination Engineering Pre-CVEN332	WATE413 Water Laws & Legislation Pre- MNGT313
					ENGR322 Summer Internship	WATE414 Hydraulic Structures Pre-CVEN451	
15 CH	15 CH	15 CH	15 CH	15 CH	15 CH	18 CH	15 CH