SULTAN QABOOS UNIVERSITY

COURSE OUTLINE

PROGRAM: Water Technology

1. Course Code	SWAE 3325	
2. Course Title	Desalination and Membrane Technology	
3. Credits	3 CR, 12 CP, 6 ECTS	
4. Pre-requisite Course (s)	CHEM2101, PHYS2101, MATH2107	
5. Co-requisite Course (s)	None	
6. Equivalent Course (s)	None	
7. Course Category (*Specify either as* Elective *or* Requirement *and appropriate level: College, Department, etc.)*	☐ University Requirement	☐ University Elective
	☐ College Requirement	☐ College Elective
	☐ Department Requirement	☒ Department Elective
	☐ Other (specify):	
8. Course Owner	College: CAMS	Department: SWAE
9. Course Type	Lecture/Laboratory	
10. Language of Instruction	English	

11. Course Description

This course introduces the students to theoretical and practical aspects of water and wastewater treatment using desalination and membrane technology. It deals with environmental, economic and management issues associated with desalination and membrane technology. Special emphasis will be given to use of such technologies in Oman through field visits, guest lecturers from the industry, laboratory experiments and tutorials. Use of such technologies in agriculture and oil industry will also be discussed. Major types of desalination such as thermal, membrane including the emerging technologies will be discussed. Energy requirements in both desalination and membrane processes will be covered.

12. Teaching/Learning Strategies

Apart from normal lectures, field trips, videos, guest lecturers from the industry and 3-4 laboratory sessions are also part of this course. Students will have to do a group project based on what they learn in lectures, during field visits and in the laboratory sessions. Group project outcomes have to be presented in oral sessions as well as through a written reports. There will be 2 tests, 1 comprehensive final and 5 unannounced quizzes to assess student achievements.

13. Evaluation Methods

A Exceptional performance
B Very good performance
C Satisfactory performance
D Minimally acceptable performance
F Unacceptable performance

2 Tests	20%:
4 Quizzes (Out of 5, pop-up)	10%
Final	40%
Group Project and Oral Presentation	5%

Reports, Lab, and Homeworks	25%
Total:	100%

14. Required Course Core Material

Textbook:
1. ABCs of Desalting by O.K. Buros, Second Edition. Published by the. International DesalinationAssociation. Topsfield, Massachusetts, USA. Sponsored by. Saline Water Conversion Corporation. (SWCC)
2. Desalination Water from Water by Jane Kucera, Wiley-Scrivener; 1 edition (February 17, 2014), ISBN-10: 1118208528, ISBN-13: 978-1118208526

Reference Books: (These books are available at SQU library)
1. Reverse Osmosis Treatment of Drinking Water. Talber N. Eisenberg and E. J. Middlebrook. Butterworth, 1986.
2. Advances in Water Desalination by Noam Lior, Wiley; 1 edition (December 10, 2012), ISBN-10: 047005459X, ISBN-13: 978-0470054598

15. Matching Course Objectives with the Program Outcomes and with SQU Graduate Attributes

* ***Click here** to view a list of action verbs use in developing objectives*

SQU Graduate Attributes

A. SQU graduates should be able to:	**B. SQU graduates possess**	**C. SQU graduates should relish** good citizenship qualities, conscious of their national identity and socially responsible, engage in community affairs and mindful of contemporary issues.
1. apply the knowledge and skills relevant to the specialization 2. communicate effectively and use information and communication technologies 3. critically analyze complex information and present it in simple legible manner	1. interpersonal communication skills and alignment with culture of international labour market to assist them in practical life and in living successfully 2. skills and motivation for independent learning and engagement in lifelong learning and research 3. work ethics and positive values, and enjoy intellectual independence and autonomy 4. teamwork skills and display potential leadership qualities	

#	Course Learning Objective	Relevant Program Outcome(s)	Applicable Attribute(s)
1.	Learn established and emerging technologies of desalination and membrane processes used in water and wastewater treatment	• Work independently and in team environments at national and international levels. • Learn emerging technologies and implement them for personal and employer's success. • Contribute to the welfare of the society at regional and global levels.	A1

2.	Learn and gain hands-on experience on various technogies currently in application with especial reference to Oman	• Work independently and in team environments at national and international levels. • Learn emerging technologies and implement them for personal and employer's success. • Contribute to the welfare of the society at regional and global levels. • Continue professional development and advanced learning throughout the career.international levels.	A1, A3
3.	Design components of systems using mathematical computations	• Work independently and in team environments at national and international levels. • Continue professional development and advanced learning throughout the career.	A1, A2, A3
4.	Assess environmental and economic impacts of desalination and membrane technologies	• Work independently and in team environments at national and international levels. • Contribute to the welfare of the society at regional and global levels.	A1, A2, A3
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16. Student Responsibilities

It is the student's responsibility to know and comply with all University Academic Regulations relevant to participation in this course. These regulations specifically include the Attendance and Student Academic Misconduct policies.

For attendance, it is the student's responsibility to be punctual and to attend all classes.

Students are expected to perform their work with honesty and avoid any academic misconduct, which is defined as the use of any dishonest or deceitful means to gain some academic advantage or benefit. This can take many forms, including but not limited to, the following: copying, plagiarism, collusion and forging documents. For full details please refer to the Undergraduate Academic Regulations and to the Student Academic Misconduct Policy.

Additionally, this course requires that you:

Students should be aware of and abide by all University Regulations.

In the laboratory and during field visits, students must wear safety clothing

COURSE INFORMATION			
Course Code	3325	**Course Title**	Desalination and Membrane Technology
Year/Semester	Fall	**Section**	10
Day, Time, and Place			

Course Coordinator	Mushtaque Ahmed		
Office Location	Room 217	**Office Hours**	8 AM to 4 PM
Office Ext.	1245	**Email**	ahmedm@squ.edu.om; ahmedm2316@gmail.com

Tentative Schedule

Week	Lecture/Topic	Material to be Covered	Assignment /Exam	Weight (%)
1	Basics of Desalination & Membarne Technology; Saline Water Chemistry Lab/Tutorial 1: History of Desalination, Video			
2	Thermal Desalination Processes Lab/Tutorial 2: Measurement of Salinity			
3	Thermal Desalination Processes Lab/Tutorial 3: Distillation Experiment			
4	Membrane Processes Lab/Tutorial 4: Videos on Membrane			
5	Membrane Processes Lab/Tutorial 5: RO Membarne Experiment			
6	Other Desalination Processes Lab/Tutorial 6: RO Membarne Experiment		Test 1	15%
7	Other Desalination Processes Lab/Tutorial 7: Visit to Desalination Research Organisation (MEDRC)			
8	Membrane Processes in wastewater Treatment Lab/Tutorial 8: Ceramic Membrane Experiment			
9	Environmental Impacts of Desalination Lab/Tutorial 9: Environmental Impact Calculations and Analysis			
10	Economics of Desalination and Membrane Technologies Lab/Tutorial 10: Economic Analysis Calculations			
11	Desalination in Agriculture and Oil Industry Lab/Tutorial 11: Field Visit			

12	Desalination and Membrane Technologies in Oman Lab/Tutorial 12: Field Visit			
13	Desalination and Membrane Technologies in Oman Lab/Tutorial 13: Field Visit		Test 2	15%
14	Lab/Tutorial 14: Field Visits			
15	Future Directions Group Project Presentation	Oral presentation of group projects		5%

APPENDIX A: INSTRUCTORS OF MULIPLE SECTIONS

Section	Instructor	Day, Time, and Location	Office Location and Extension	Email	Office Hours

APPENDIX B: ADDITIONAL INFOMARION

Water Technology Program Outcomes

- Work independently and in team environments at national and international levels.
- Learn emerging technologies and implement them for personal and employer's success.
- Contribute to the welfare of the society at regional and global levels.
- Maintain the standards of health, safety, environment and professional ethics at work and society.
- Continue professional development and advanced learning throughout the career.