

## COURSE DESCRIPTIONS

<b>Faculty</b>	Engineering				
<b>Department</b>	Renewable Energy Engineering	<b>NQF level</b>	7		
<b>Course Title</b>	Water Desalination Using Solar Energy	<b>Code</b>	703548	<b>Prerequisite</b>	-
<b>Credit Hours</b>	3 credits	<b>Theory</b>	100%	<b>Practical</b>	0
<b>Course Leader</b>	Dr. Amer Al-Canaan	<b>E-mail</b>	<a href="mailto:a.alcanaan@jadara.edu.jo">a.alcanaan@jadara.edu.jo</a>		
<b>Lecturers</b>	Dr. Amer Al-Canaan	<b>E-mails</b>	<a href="mailto:a.alcanaan@jadara.edu.jo">a.alcanaan@jadara.edu.jo</a>		
<b>Lecture time</b>	13:00- 14:30 Monday, Wednesday	<b>Classroom</b>	D302	<b>Attendance</b>	D302
<b>Semester</b>	Second 2021/2022	<b>Production</b>	October 2021	<b>Updated</b>	February 2022

## Short Description

The course is a requirement for level 5 renewable energy engineering students. It introduces the basic principles and analysis and Describe the desalination and pretreatment of water.

## Course Objectives

1. Understand the desalination and pretreatment of water.
2. Understand the properties of saline water and solutions
3. Analysis of desalination processes.
4. Understand various design desalination systems
5. Understand water desalination using solar energy
6. Analysis of desalination systems, economical feasibility study of desalination processes

## Learning Outcomes

## A. Knowledge - Theoretical Understanding

**a1. Learn/Understand** the basic concepts of water desalination and solar energy, the various processes of desalination, fundamentals of thermodynamics and electrochemistry and recent advances in desalination technologies. (K1)

## B. Knowledge - Practical Application

**a.2 Compare** water desalination processes and technologies in terms of given criteria (quality, complexity, advantages, energy consumption) and explain their principle of operation. (K2)

## C. Skills - Generic Problem Solving and Analytical Skills

**b1. Calculate** the theoretical solar power that can be collected on given surface area, energy,

current or other related quantities to water desalination processes. (S1)
<b>D. Skills - Communication, ICT, and Numeracy</b>
<b>b3. Write technical report and perform oral presentations</b> in teamwork related to water desalination technologies. (S3)
<b>E. Competence: Autonomy, Responsibility, and Context</b>
<b>Teaching and Learning Methods</b>
<ul style="list-style-type: none"> <li>• Online lectures, Group work and discussion</li> </ul>
<b>Assessment Methods</b>
<ul style="list-style-type: none"> <li>• Lecture, lab, Group work and discussion</li> <li>• Midterm exam, Final exam, Class Assignment and group work.</li> <li>• Observation of student contribution in teamwork and/or project presentations</li> </ul>

Course Contents					
Week	Hours	CLOs	Topics	Teaching & Learning Methods	Assessment Methods
1.	3	a1, a2	Historical applications of desalination and pretreatment of water	eLearning, online discussions/lectures	
2.	3	a1, a2	Introduction and Basic Concepts of desalination and pretreatment of water, Chapter 1	eLearning, online discussions/lectures	
3.	3	a1, a2, b1	The properties of water and solutions, Chapter 2	eLearning, online discussions/lectures	
4.	3	a1, a2	The properties of water and solutions, Chapter 2	eLearning, online discussions/lectures	Quiz #1
5.	3	a1, a2	The desalination processes analysis. Chapter 3	eLearning, online discussions/lectures	
6.	3	a1, a2, b3	The desalination processes analysis Chapter 3	eLearning, online discussions/lectures	Group work #1
7.	3	a1, a2	The desalination processes analysis Chapter 3	eLearning, online	<b>Midterm;</b> <b>Written</b>

				discussions/lectures	exams
8.	3	a1, a2, b1, b3	Water desalination using renewable energy, Chapter 4	eLearning, online discussions/lectures	
9.	3	a1, a2	Water desalination using renewable energy, Chapter 4	eLearning, online discussions/lectures	
10.	3	a1, a2, b1, b3	Principle of operation of the solar collector Chapter 5	eLearning, online discussions/lectures	Group work # 2
11.	3	a1, a2, b1	Principle of operation of the solar collector (cont.)	eLearning, online discussions/lectures	
12.	3	a1, a2, b1	Principle of operation of the solar collector (cont.)	eLearning, online discussions/lectures	Quiz #2
13.	3	a1, a2, b1	Principle of operation of the solar collector (cont.)	eLearning, online discussions/lectures	
14.	3	a1, a2, b1	Analysis of systems economical feasibility study of desalination processes (cont.) Chapter 6 Solve problems	eLearning, online discussions/lectures	
15.	3	a1, a2, b1	Analysis of systems economical feasibility study of desalination processes (cont.) Chapter 6  Solve problems	eLearning, online discussions/lectures	
16.	3	a1, a2, b1	<b>Review, and final exam</b>	eLearning, online discussions/lectures	Written exam

<b>Infrastructure</b>	
<b>Textbook</b>	1. Solar Energy Desalination Technology ( PDFDrive ), 1 <sup>st</sup> Edition, Hongfei Zheng, 2017. Paperback ISBN: 9780128054116, eBook ISBN: 9780128094228
<b>References</b>	1. Sea, water Desalination, Andrea Cipollina, 2009, Springer,

	ISBN: 3642011500
<b>Required reading</b>	Recent Advances in Membrane Science And Technology in Sea Water Desalination
<b>Electronic materials</b>	PPT, book, lecture notes, charts, tables
<b>Other</b>	Irena

<b>Course Assessment Plan</b>						
<b>Assessment Method</b>		<b>Grade</b>	<b>CLOs</b>			
			<b>a1</b>	<b>a2</b>	<b>b1</b>	<b>b3</b>
<b>First (Midterm)</b>		<b>30%</b>	24	6		
<b>Second (if applicable)</b>						
<b>Final Exam</b>		<b>50%</b>	36	10	4	
<b>Coursework</b>		<b>20%</b>				
<b>Coursework assessment methods</b>	Assignments					
	Case study					
	Discussion and interaction/ participation					
	Group work activities					10
	Lab tests and assignments					
	Presentations / attendance					
	Quizzes		5	5		
<b>Total</b>		<b>100%</b>	<b>65</b>	<b>21</b>	<b>4</b>	<b>10</b>

<b>Plagiarism</b>
<p>Plagiarism is claiming that someone else's work is your own. The department has a strict policy regarding plagiarism and, if plagiarism is indeed discovered, this policy will be applied. Note that punishments apply also to anyone assisting another to commit plagiarism (for example by knowingly allowing someone to copy your code).</p> <p>Plagiarism is different from group work in which a number of individuals share ideas on how to carry out the coursework. You are strongly encouraged to work in small groups, and you will certainly not be penalized for doing so. This means that you may work together on the program. What is important is that you have a full understanding of all aspects of the completed program. In order to allow proper assessment that this is indeed the case, you must adhere strictly to the course work requirements as outlined above and detailed in the coursework problem description. These requirements are in place to encourage individual understanding, facilitate individual assessment, and deter plagiarism.</p>