



Course Specifications

Course Title:	Water Desalination
Course Code:	2044213-2
Program:	Bachelor in Chemistry
Department:	Department of Chemistry
College:	College of Sciences
Institution:	Taif University

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A. Course Identification

1. Credit hours: 2 (Theoretical)
2. Course type
a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b. Required <input type="checkbox"/> Elective <input checked="" type="checkbox"/>
3. Level/year at which this course is offered: 8 th Level/ 4 th Year
4. Pre-requisites for this course (if any): NA
5. Co-requisites for this course (if any): NA

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	2 Theoretical hours/ Week	100 %
2	Blended	-	-
3	E-learning	-	-
4	Distance learning	-	-
5	Other	-	-

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	30
2	Laboratory/Studio	-
3	Tutorial	-
4	Others (specify)	-
	Total	30

B. Course Objectives and Learning Outcomes

1. Course Description

The course introduce introduction of desalination technologies, sea water chemistry, thermodynamics of desalination, current desalination process, Reverse Osmosis (R.O) principle, R.O performance parameters, R.O treatments, R.O membrane & plant configurations, Multistage Flash Distillation (MSF), MSF equipment & practice, Multiple Effect Distillation (MED), Solar Humidification, Electro- dialysis, Control of scale in the desalination Plants, Control of corrosion in the desalination Plants.

2. Course Main Objective

The course describes the Basic concepts of Sea water Desalination Technologies.

3. Course Learning Outcomes

	CLOs	Aligned PLOs
1	Knowledge and Understanding:	
1.1	Recall basic definitions and terminology of thermodynamics	K1
1.2	Describe introduction of desalination technologies.	K2
1.3	Describe the modern industrial desalination process	K3

CLOs		Aligned PLOs
2	Skills:	
2.1	Apply the thermodynamic relations	S1
2.2	Calculate Reverse Osmosis performance parameters	S2
2.3	Explain the environmental impacts of the desalination plants	S3
3	Values:	
3.1	Participate in the development of the performance of work teams.	V1
3.2	Represent the environmental protection ethics	V2

C. Course Content

No	List of Topics	Contact Hours
1	Introduction of desalination technologies and sea water chemistry.	2
2	Thermodynamics of desalination.	4
3	Current Desalination process	2
4	Reverse Osmosis (RO) Principle and RO performance parameters.	4
5	RO- Membrane & Plant configurations and treatments.	4
6	Multistage Flash Distillation (MSF), Equipment & Practice.	2
7	Solar Humidification	4
8	Electro- dialysis	4
9	Control of Scale in the desalination Plants	2
10	Control of Corrosion in the desalination Plants	2
Total		30

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	Knowledge and Understanding		
1.1	Recall Basic definitions and terminology of thermodynamics	Lecture	Written Exam
1.2	Describe Introduction of Desalination Technologies.	Lecture	Written Exam
1.3	Describe the modern industrial desalination process	Lecture	Written Exam
2.0	Skills		
2.1	Apply the thermodynamic relations.	Discussion	Homework Assignments
2.2	Calculate Reverse Osmosis performance parameters.	Problem-Solving	Homework Assignments
2.3	Explain the environmental impacts of the desalination plants	Problem-Solving	Homework Assignments
3.0	Values		
3.1	Participate in the development of the performance of work teams.	Collaborative Learning	Individual Presentations

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
3.2	Represent the environmental protection ethics	Collaborative Learning	Individual Presentations

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Homework Assignments (Electronic)	Throughout Semester	15%
2	Individual presentations	Throughout Semester	5%
3	Periodical Exam	7/8	15%
4	Mid Term Exam	11/12	15%
5	Final exam	16	50%

*Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice:

Commitment to the rules of the Academic Advising Department at the university in accordance with the academic guidance manual approved by the university and the attached forms, there are different arrangements made by teaching staff to support student consultations including;

- Office hours: 8 hours per a week for each academic member.
- Academic guidance: an academic member has a number of students to guide them throughout degree journey.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	<ul style="list-style-type: none"> • Fundamentals of Salt Water Desalination, Hisham T. El-Dessouky and Hisham M. Ettouney (2002). Elsevier Science, Latest Edition. ISBN: 9780080532127.
Essential References Materials	<ul style="list-style-type: none"> • Advances in Water Desalination, Lior, Noam (2012). Wiley (USA), Latest Edition. ISBN: 978-0-470-05459-8.
Electronic Materials	<ul style="list-style-type: none"> • Saudi Digital Library (SDL)
Other Learning Materials	<ul style="list-style-type: none"> • Learning Management System (Blackboard) • Simulation of Reverse Osmosis in a lab scale.

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Lecture hall with 100 seats.
Technology Resources (AV, data show, Smart Board, software, etc.)	Blackboard access.
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	--

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of Teaching and assessment	Students	Survey (indirect method)
Extent of achievement of course learning outcomes	Program leader	Reports (Direct method)
Quality of learning resources	Peer referees Students	Reports (Direct method) Survey (indirect method)

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)

Evaluators (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))

Assessment Methods (Direct, Indirect)

H. Specification Approval Data

Council / Committee	Department Council/ Quality assurance committee
Reference No.	7-3-1445
Date	27/2/1445 HJ 12/09/2023 G



Chemistry Program TU