جامعة الإسراء
ISRA UNIVERSITY

Course Syllabus

According to JORDAN National Qualification Framework (JNQF)

Course Name: Water Treatment Engineering (1)

Course Number: 403460, 04034171

General Course Information:

Course title	Water Treatment Engineering (1)
Course number	403460 , 04034171
Credit hours	3 Credit hours (theory)
Education type	3 Hours (theory)
Prerequisites/corequisites	Engineering Hydrology + Chemistry (1)
Academic Program	Civil Engineering
Program code	03
Awarding institution	Isra University
Faculty	Faculty of Engineering
Department	Civil Engineering
Level of course	Fourth year
Academic year /semester	2022/2023, first Semester
Awarded qualification	B.Sc.
Other department(s) involved in teaching the course	None
Language of instruction	English
Date of production/revision	15/10/2022

Course Coordinator:

Coordinator's name	Dr. Ethar Al-Essa
Office No	4206 Engineering Building
Office Phone extension number	2508
Office Hours	Sun. (12-3:00 PM), Mon. (12:30-02:30 PM), Tue. (12-3:00 PM), Wed. (12:30-02:30 AM), and Thu. (2-3 PM)
Email	ethar.alessa@iu.edu.jo

Other Instructors:

Instructor name	
Office No	
Office Phone extension number	
Office Hours	
Email	

Course Description *(English/Arabic)*:

English	Water sources, water consumption, design periods, population projection. Water: chemical, physical and biological characteristics. Water treatment for drinking purposes including precipitation, sedimentation, coagulation, flocculation, hard and soft water, smell, taste and odor, chlorination process, hydraulic of water distribution networks.

Arabic	موارد وخصائص المياه والمياه العادمة، الخطوات المتعددة في عمليات المعالجة، ادارة مخلفات عملية المعالجة، تصميم محطات معالجة المياه والمياه العادمة، نظرية ونمذجة المفاعلات، عمليات المعالجة الفيزيائية والكيميائية والبيولوجية، هيدروليكا شبكات توزيع مياه الشرب وأنظمة تجميع المياه العادمة.

Textbook: ***Author(s), Title, Publisher, Edition, Year, Book website.***

1. Hammer J., and Hammer Jr., 2012, *"Water and Wastewater Technology",* 7th ed., Pearson Education Inc., New Jersey, USA

References: ***Author(s), Title, Publisher, Edition, Year, Book website.***

Required book (s), assigned reading and audio-visuals:

1. Lin S.D., "*Water and Wastewater Calculations Manual"*, 2nd ed., McGraw-Hill, USA. DOI: 10.1036/0071476245. (**Available at the teacher)**
2. Crites, R. and Tchobanoglous, G.,1998, "*Small and decentralized wastewater management systems*", McGraw-Hill, Singapore. **(Available at the Library)**
3. Tchobanoglous, G., Burton, F. L., Stensel, H. D., & Metcalf & Eddy, 2003, "*Wastewater engineering: Treatment and reuse*", McGraw-Hill, USA. **(Available at the Library)**

Course Educational Objectives (CEOs):

1.	To enable the students to understand the main resources of water in term of quantity and quality.
2.	To familiarize the student with the fundamentals of water treatment technologies and the considerations for water treatment plant design and implementation.
3.	To enable the students to understand the basic concepts of water supply, consumption and wastewater quantity.
4.	To enable the students to understand the concept of the wastewater treatment engineering.
5.	To study the principles and design of water and wastewater treatment processes.

Intended Learning Outcomes (ILO's):

1.	Subject Intended learning outcomes (ILOs) describe what students are expected to know and be able to do at the end of the course. These outcomes are related to the knowledge, skill and competence that students acquire:	**Relationship to CEOs**	**Contribution to PLOs**	**Bloom Taxonomy Levels***	**Descriptors****
A	**Knowledge and Understanding:**				
A1	To understand the principles of water supply and water quality.	1	2, 7	1	K
A2	To be able to forecast the population growth and their water consumption.	1	1,3,6	1	K&C

B	**Intellectual skills:**				
B1	To study the design parameters of the main units of water treatment plant for public use. Additionally, to understand the three methods of disinfection the water prior pumping in the distribution system. Besides, to study the design parameters of the main units of wastewater treatment plant to meet the required standards.	2,3,4,5	4,5,6	1,4,5,6	K&S
C	**Subject specific skills:**				
C1					
C2					
C3					
D	**Transferable skills:**				
D1					

***Bloom Taxonomy Levels**

Level #	1	2	3	4	5	6
Level Name	**Knowledge**	**Comprehension**	**Application**	**Analysis**	**Evaluation**	**Synthesis**

**** Descriptor (National Qualification Framework Descriptors): K : Knowledge, S: Skill, C: Competency.**

Program Learning Outcomes describe what students are expected to know and be able to do by the time of graduation. These relate to the knowledge, skills, and behaviours that students acquire as they progress through the program. A graduate of the (BSc in civil engineering) program will demonstrate:		**Descriptors****		
		K	**S**	**C**
1.	An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics	**K**		
2.	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors			**C**
3.	An ability to communicate effectively with a range of audiences		**S**	
4.	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts			**C**
5.	An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives		**S**	
6.	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions		**S**	
7.	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies	**K**		**C**

Program Learning Outcome (PLOs):

**** Descriptors according to the national qualifications framework (K: knowledge, S: skill, C: Competency)**

Weekly Schedule *(please choose the type of teaching)*

☒ **Face to Face**

☐ **Hybrid** *(**2 Lectures** Face – To - Face **+1 Lecture** Asynchronous)*

☐ **Hybrid (***1 Lectures* Face – To - Face ***+1 Lecture*** Asynchronous)

☐ **Online** *(**2 Lectures** Synchronous +**1 lecture Asynchronous**)*

Week	First Lecture (Monday	Second Lecture (Wednesday)	Ach. ILOs	Ach. PLOs	Descriptors**
1	Introduction	Physical Characteristics of Water and Wastewater	A1	1	K
2	Physical Characteristics of Water and Wastewater	Physical Characteristics of Water and Wastewater	A1	1	K
3	Alkalinity	alkalinity	A1	1	K
4	hardness	hardness	A1	1	K
5	Population forecast	Domestic & Industrial Water Demand	A2	1	K
6	Coagulation	Coagulation	B1	1,4	K,S,
7	Flocculation	Flocculation	B1	4,5	K,S
8	Mid exam	Mid exam			
9	Sedimentation	Sedimentation	B1	1,4	K,S
10	Filtrations	Filtrations	B1	1,2	K,S
11	Grit chamber	Equalization basin	B1	1	K,S
12	Primary and secondary treatment units	Primary and secondary treatment units	B1	1,2	K
13	Disinfection of wastewater	Disinfection of wastewater			K
14	Collection systems	Collection systems			K,S
15	Introduction on wastewater characteristics	wastewater quality and management			K
16	Final exam	Final exam			

*** K: Knowledge, S: Skills, C: Competency**

Teaching Methods and Assignments:

Development of ILOs is promoted through the following teaching and learning methods:

- Face to face lectures
- Discussion Forums
- Homework
- Quizzes

Course Policies:

A- Attendance policies:

The maximum allowed absences is 15% of the lectures.

B- Absences from exams and handing in assignments on time:

Midterm exam can be retaken based on approval of excuse by the instructor's discretion.

Not handing assignment on time will incur penalties.

C- Academic Health and safety procedures

D- Honesty policy regarding cheating, plagiarism, and misbehaviour:

Cheating, plagiarism, misbehaviour will result in zero grade and further disciplinary actions may be taken.

E- Grading policy:

- All homework is to be posted online through the e-learning system.
- Exams will be marked within 72 hours and the marked exam papers will be handed to the students.
- Online Activities (Course Videos, Practice labs, Discussion Forums, Quizzes) **20 %**
- Midterm **30%**
- Final Exam **50 %**

F- Available university services that support achievement in the course: **E-Learning Platform, Labs, Library.**

Required equipment:

- **PC / Laptop**
- **Access to the IU E-Learning Platform at: https://elearn.iu.edu.jo/**
- **E-learning plan**
- **Satisfaction questionnaires for online and face-to-face learning**
- **Software for e-learning**

Assessment Tools implemented in the course:

- Final Exam
- Midterm Exam
- Homework
- Discussion Forums

Responsible Persons and their Signatures:

Course Coordinator	Dr. Ethar Al-Essa	**Completed Date**	
		Signature	

Received by (Department Head)	Dr. Ibraheem Varoqa	**Received Date**	
		Signature	