Jordan University of Science and Technology

Faculty of Engineering

Civil Engineering Department

CE755 Physical And Chemical Processes - JNQF Level: 9
Second Semester 2023-2024

Course Catalog
3 Credit Hours. Physiochemical and transformation processes in natural and engineered environmental systems; process modeling; design of operations involving state and phase transformation; chemical oxidation, reduction, sorption; stripping; and exchange processes; membrane separations, particle aggregation and coagulation, sedimentation and filtration.
Teaching Method: On Campus

Text Book	
Title	Physicochemical Processes for Water Quality Control
Author(s)	Weber, W.J., Jr.
Edition	1st Edition
Short Name	W
Other Information	Wiley ? Inter-science, New York, 1972

Course References

Short name	Book name	Author(s)	Edition	Other Information
MWH	Water Treatment: Principles and Design	MWH	3rd Edition	John Wiley and Sons, Inc., Hoboken, New Jersey, 2012.
AWWA	Water Quality and Treatment	AWWA	4th Edition	McGraw Hill, Inc. 1990.
AWWA2	Water Treatment Plant Design	AWWA	1st Edition	McGraw Hill, Inc. 1990

Instructor	
Name	**Prof. Wa'il Abu-El-Sha'r**
Office Location	C5L1

Office Hours	
Email	wail@just.edu.jo

Class Schedule & Room
Section 1: Lecture Time: Thu : 12:30 - 15:30 Room: C2009

Tentative List of Topics Covered		
Weeks	**Topic**	**References**
Week 1	TRANSFORMATION PROCESSES Introduction and Overview	From **W**, From **MWH**, From **AWWA**, From **AWWA2**
Week 2	Phase Transformations: Volatilization / Stripping Processes	From **W**, From **MWH**
Week 3	Species Transformations: Oxidation / Reduction Processes	From **W**, From **MWH**
Week 4	Phase and Species Transformations: Dissolution / Precipitation Processes	From **W**, From **MWH**
Week 5	PARTICLE SEPARATION PROCESSES ? Particle Aggregation: Colloid Stability and Destabilization Coagulation / Flocculation Processes	From **W**
Week 6	Particle Removal: Sedimentation Processes Flotation Processes	From **W**, From **MWH**
Week 7	Filtration Processes	From **W**
Week 8	SOLUTE SEPARATION PROCESSES Solute Partitioning:	From **W**
Weeks 9, 10	Sorption Phenomena Adsorption Processes	From **W**
Weeks 10, 11	Ion Exchange Processes	From **W**
Week 12	Solute / Solvent Exclusion: Reverse Osmosis	From **W**, From **MWH**
Week 13	Ultrafiltration and Electrodialysis	From **W**, From **MWH**
Weeks 14, 15	INTRODUCTION TO THE USE OF NANOTECHNOLOGY IN WATER QUALITY CONTROL	
Week 16	Projects Presentation	

Mapping of Course Outcomes to Program Outcomes and NQF Outcomes	Course Outcome Weight (Out of 100%)	Assessment method
To be able to apply knowledge of physical and Chemical processes in Water Quality Control [1L9S1]	30%	
To be able to apply the best available technologies for designing project to treat water from trace organic contaminants. [1L9S3]	40%	
To characterize water resources and identify pollutants to be treated and suggest a treatment scheme (treatment plant) [1L9S2]	30%	

Relationship to Program Student Outcomes (Out of 100%)											
PI-1a	PI-2a	PI-2b	PI-2c	PI-2d	PI-3a	PI-4a	PI-4b	PI-5a	PI-6a	PI-6b	PI-7a

Relationship to NQF Outcomes (Out of 100%)		
L9S1	L9S2	L9S3
30	30	40

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