Module (Water Supply and Sewerage) Catalogue

2023-2024

College/ Institute	College of Erbil Technical Engineering	
Department	Civil Engineering	
Module Name	Water Supply and Sewerage	
Module Code	WSS704	
Degree	Technical Diploma ☐ Bachler ■ High Diploma ☐ Master ☐ PhD ☐	
Semester	7	
Qualification	PhD	
Scientific Title	Lecturer	
ECTS (Credits)	6	
Module type	Prerequisite ☐ Core ■ Assist. ☐	
Weekly hours	4	
Weekly hours (Theory)	(4) hr Class	(162) Total hrs Workload
Weekly hours (Practical)	(0) hr Class	(0) Total hrs Workload
Number of Weeks	15	
Lecturer (Theory)	Dr Fahid Abbas Tofiq	
E-Mail & Mobile NO.	fahid.tofiq@epu.edu.iq	
Lecturer (Practical)	N/A	
E-Mail & Mobile NO.	N/A	
Websites	http://staff.epu.edu.iq/public/faculty/fahid.tofiq	

Course Book

Course Description	Sanitary Engineering is the branch of engineering dedicated to the construction of infrastructure that promotes public health. In practical terms, it typically encompasses Water Supply Engineering and Sewerage Engineering. The former focuses on ensuring a reliable source of clean water, while the latter deals with the effective disposal of excess and waste liquids. Environmental Engineering, on the other hand, encompasses all natural systems, including the atmosphere, lithosphere, hydrosphere, and biosphere that surround us. This field addresses issues related to air and water quality, food safety, pollution, waste management, and other ecological concerns that impact human health and the environment. Environmental engineering seeks to control factors that may have detrimental effects on human development. The provision of water resources plays a vital role in a country's socioeconomic development. As available land and freshwater resources face ongoing contamination and increasing demand, it is crucial to conserve them through both structural measures and the development of sustainable watershed management policies. Evaluating the long-term environmental impacts of various structural and non-structural measures is essential for maintaining the sustainable development of land and water resources.
Course objectives	The aim of this course is to equip students with the skills necessary for designing water supply and sewer systems, encompassing both sanitary sewer and storm drain systems. Throughout the course, students will delve into the design criteria for comprehensive water supply and sewer systems. They will gain expertise in creating layouts and designs for water distribution systems, as well as gravity-based sanitary sewer and storm drain systems. Additionally, students will explore the principles of engineering design for water and wastewater treatment systems. This includes an in-depth examination of physical, chemical, and biological treatment processes, as well as the management of treatment residuals. Furthermore, a key objective of this course is to teach students how to approach sanitation and environmental projects in a manner that ensures their feasibility and economic viability while promoting sustainable development.
Student's obligation	Regular attendance at lectures is a crucial component of this course. It is expected that students will be present for every class session throughout the

	entirety of the scheduled class period. Absence from class should be reserved for only the most exceptional circumstances. In the event that you must miss a class, it is your responsibility to obtain any announcements, course materials, and assignments that were covered. You are accountable for the content presented during the lecture, whether or not it is covered in the textbook. Please anticipate that the exams will include questions assessing your comprehension of concepts discussed in both the lectures and homework assignments. Engaging in group study can be highly beneficial. Collaborative learning is encouraged; however, it's important to ensure that you possess a comprehensive understanding of the concepts beyond just the mathematical procedures used to solve problems. You should be capable of independently working through assignments. Furthermore, students are required to submit all designated homework, reports, seminars, or any additional assignments as specified by the lecturer promptly and in the appropriate format.
Required Learning Materials	Various teaching tools and methods will be employed in the lecture halls to enhance the learning experience. These include data show equipment for presentations, whiteboards, overhead projectors, informative posters, and distribution of lecture notes as handouts. Additionally, online lectures and the Moodle platform may be integrated into the teaching approach to provide additional resources and support.

Evaluation

Task		Weight (Marks)	Due Week	Relevant Learning Outcome
Paper Review				
Assignments	Homework	10%	1-12	All
	Class Activity	2%	1-12	All
	Report	8%	10	All
	Seminar	8%	8	All
	Essay			
	Project			
Quiz		8%	1-12	All
Lab.				
Midterm Exam		24%	8	All
Final Exam		40%	14	All
Total		100%		

Specific learning outcome:	Upon successfully completing this module, students will have achieved the following learning outcomes: 1. Develop a comprehensive understanding of the fundamentals of water supply, sanitary wastewater management, stormwater drainage systems, water treatment plants, and wastewater treatment plants. 2. Demonstrate the ability to design and maintain systems that are both cost-effective and dependable. 3. Gain proficiency in addressing the technical aspects of drinking water treatment and distribution in a holistic manner. 4. Make informed choices regarding the selection of technologies and tools, spanning from cost-efficient solutions to advanced options. 5. Skillfully define and evaluate project alternatives based on specified selection criteria. 6. Acquire knowledge of hydraulic principles and their relevance to the movement of water within treatment facilities, pipelines, and distribution networks. Additionally, understand the physical, chemical, and biological processes and their interconnectedness within water supply systems. 7. Comprehend the structural components of drinking water supply systems, encompassing water transportation, treatment processes, and distribution methodologies.
Course References:	▪Key references: 1. Water Supply and Sewerage, by E W Steel and Terence, J. McGhee. 2. Water and Wastewater Engineering, Volume 1, published by John Wiley & Sons Inc. The authors are Mackenzie L. Davis, David A. Cornwell, and Brad A. Self. 3. Introduction to Environmental Engineering by P. Aarne Vesilind, PWS Publishing Co., 1997. 4. Design of Water Supply Pipe Networks by Prabhata K. Swamee Ashok K. Sharma. 5. Wastewater Engineering: Treatment, Disposal, Reuse, Metcalf & Eddy, Inc., McGraw Hill, 1991.

Course topics (Theory)	**Week**	**Learning Outcome**
Introduction	1	1
Water Quality	2	1
Quantity of water and sewerage	3	1,2
Water and wastewater characteristics	4	3
Aqueducts and water pipes (water distribution network)	5	6
Collection and distribution of Water	6	6

Intake structures and pumping installations	7	2, 7
Amount of storm water and storm water sewerage system	8	6,7
Design of sewer system	9	2,6,7
Water treatment system	10	7
Water treatment system	11	7
Environmental Engineering	12	5

Practical Topics	**Week**	**Learning Outcome**
N/A		

Questions Example Design

The exam questions may have similarities with the examples and Homework assignments taught during the course, but it is not necessary to be the same.
For example:
1. 20 % of the questions are descriptive questions, and the rest of the questions are numerical.
Ex1. What are the main factors that cause destruction of environment? (descriptive)
Ans.
1. The population explosion,
2. The concentration of population in urban areas,
3. The tempo of industrial and agricultural developments.
Ex2. A community has an estimated population in a period of 25 years ahead which is equal to 40000 capita. The present population is 30000 capita, and the present average water consumption is 20000 m3/d. The existing natural treatment plant has a design capacity of 26000 m3/d. Assuming an arithmetic rate of population growth, determine for how many years the existing plant will reach it is design capacity.
Ans.
P = p+n*c, c = (40000 – 30000)/25 = 400 capita/year (population growth)
Rate of water demand per capita = capacity/ population, = 20000/30000 = 0.666 m3/day/capita
Plant capacity/capita = 26000/0.666 = 39000 capita
39000 = 30000 + 400 *(t), t = 22.5 years.

Extra notes:

Given the constraints of classroom time, it is crucial for students to engage with the reference books outside of class. To maximize your understanding, it's recommended that you complete the assigned readings before the corresponding class session and review them afterward. This approach will ensure a solid grasp of the concepts and enable you to tackle the assigned problems effectively. The lectures will focus on enhancing comprehension of the principles and techniques outlined in the textbooks, with active student participation encouraged. Always come prepared with your calculator and paper.

Since each class builds upon the material covered in previous sessions, it is imperative to stay current with assignments. Collaborating with peers on homework is permitted as a means to enhance learning. Additionally, be aware that any student may be asked to present a homework solution to the class at any time. Homework will be assessed for completion, and problem solutions will be provided with the graded assignments, making it unfeasible to submit late homework.
External Evaluator