Civil Engineering Department

College of Engineering

Salahaddin University-Erbil

Subject: Wastewater Engineering

Course Book: *4th Year*

Lecturer's name: Prof. Dr. Shuokr Qarani Aziz

Mr Khasro Kakil (M.Sc.)

Mrs Sarwah Othman Ismael (M.Sc.)

Academic Year: 2022-2023

Course Book

1. Course name	**Wastewater Engineering**
2. Lecturer in charge	**Prof. Dr. Shuokr Qarani, Mr. Khasro Kakil (M.Sc.), nd Mrs Sarwah Othman Ismael (M.Sc.)**
3. Department/ College	**Civil/Engineering**
4. Contact	e-mail: shuokr.aziz@su.edu.krd, shoker71@yahoo.com kasro.dizayee@su.edu.krd, kasrodizayee@gmail.com, srwa.ismail@su.edu.krd, srwa_othman90@yahoo.com Tel: (optional)
5. Time (in hours) per week	**For example Theory: 4 Practical: 1**
6. Office hours	**According to the time table**
7. Course code	**CE 403**
8. Teacher's academic profile	**Shuokr Qarani Aziz** was born in Erbil, Iraq. He received B.Sc. degree in Civil Engineering and M.Sc. degree in Sanitary Engineering from Salahaddin University-Erbil, Iraq, in 1993 and 2000, respectively; PhD degree in Environmental Engineering from University Sains Malaysia (USM), Malaysia, in 2011. Currently, Dr. Shuokr is a lecturer in the Civil Engineering Department, College of Engineering, Salahaddin University-Erbil, Iraq. He got Professor degree on 17 July 2018. He designed numerous water and wastewater treatment-plant units, sanitary systems for buildings and storm sewer systems. He published 87 papers in local and ISI journals and conferences. Furthermore, he published 25 scientific subjects in local magazines, newspapers and internet sites. In addition, he published 2 books and 5 book chapters on wastewater quality and treatment processes. He is Editorial and reviewer Board for more than 20 International Scientific Journals. His research interests include water and wastewater quality and treatment, sustainability, COVID-19, solid waste management, environmental planning and management and noise pollution.
9. Keywords: Wastewater, treatment plant, quality, storm water, sanitary, reusing	
10. Course overview: This course book includes the knowledge in different stages of work involved in the planning, designing and implementation of sewerage system. The process starts from identifying sewage flow estimation, sewer shapes, materials, operation and maintenance of sewers, design parameters, sewage pumping, studying the characteristics and suitable treatment methods for the produced wastewaters. preliminary, primary, secondary and tertiary treatment methods are apply for treatment of wastewaters to bring the quality of the treated wastewater to the permissible standards and finally it can be discharged to the environment, or it can be reused.	
11. Course objective: To apply data and experience regarding methods and tools used in the structure of sewerage systems, including sewage types (sanitary, industry, rainfall and infiltration) and characteristics, sewerage system design, sewer	

appurtenance, wastewater characterization which includes physical, biological, and chemical processes applied for wastewater treatment, sludge treatment and disposal and design of wastewater treatment plant units.

12. Students' duties

Students are required to do mid-term examination(s), classroom activities, quizzes, home works, final examination, and attend the class..

13. Forms of teaching

Water supply and sewerage lectures and notes are provided for the students. Microsoft word, Excel, Power point, recorded videos and animations are used during academic year. Furthermore, solving of problems and explanations are illustrated on the white board. Online teaching will apply, if required. Site visiting will arrange.

14. Assessment scheme

The final mark will be based on:

Mid-term examination (s)	30 % (Theoretical part)
Quizzes, home works, etc.	10 %
Practical Part	10 %
Annual Effort	50 %
Final Examination	40 % + 10 % = 50%
Total	100%

15. Student learning outcome:

At the end of the course, the student should learn:

1. Calculation of the sewage amount.
2. Designing the sewers for collection and transportation of sewage to wastewater treatment plant.
3. Measuring and analyzing physical, chemical and biological characteristics of wastewater and comparing them with standards.
4. Suggestion and design wastewater treatment plant units
5. Planning and design a good sewerage system for a community.
6. The fundamentals of physical, chemical, and biological concepts as they applying to water and wastewater treatment.
7. Designing of storm sewer systems.
8. Reusing of treated wastewater.

16. Course Reading List and References:

Books:

- Riffat, R. (2013) ***Fundamentals of wastewater treatment and engineering,*** First Edition, Taylor & Francis Group, LLC, CRC Press.
- Davis, M. L. (2010) ***Water and wastewater engineering- design principles and practice***, The McGraw Hill Companies.

References:

- Aziz, S. Q. and Mustafa, J. S. (2021) **Wastewater sludge characteristics, treatment techniques and energy production,** Recycling and Sustainable Development, In Press.

- Aziz, S. Q. (2020) **Variation of Erbil Municipal Wastewater Characteristics Throughout 26 Years (1994-2020) with Possible Treatments and Reusing: A Review**. 3rd International Conference on Recent Innovations in Engineering (ICRIE 2020), Duhok University, Duhok City, Kurdistan Region-Iraq, 9-10 September 2020.

- Aziz, S. Q., Omar, I. A.,Bashir, M. J. K., and Mojiri, A. (2020) **Stage by Stage Design for Primary, Conventional Activated Sludge, SBR and MBBR Units for Residential Wastewater Treatment and Reusing.** Advances in Environmental Research, Vol. 9, No. 4, pp. 233-249.

- Aziz, S.Q., and Ali, S. M. (2018) **Characteristics and potential treatment technologies for different kinds of wastewaters**. ZANCO Journal of Pure and Applied Sciences, Salahaddin University-Erbil, Vol. 30, No. S1, pp. s122-s134.

- Any book on **Water and Wastewater Engineering** and **Water Supply and Sewerage** can be used as reference.

17. The Topics: Theoretical Part, Prof. Dr. Shuokr Qarani Aziz | **Lecturer**

Month	Week No.	Topic description	
September	Week 1	Course book, advising and guidelines	**Dr. Shuokr**
	Week 2	Sewerage system, and wastewater quality and quantity	
	Week 3	Sewer system and appurtenances	
October	Week 4	Sewer shapes, materials and loads on sewers	
	Week 5	Storm sewer system design	
	Week 6	Wastewater treatment plant , Preliminary treatment	
	Week 7	Primary treatment	
November	Week 8	Primary treatment	
	Week 9	Mid-term examination	
	Week 10	Secondary treatment	
	Week 11	Advanced treatment	

	Week 12	Sludge treatment and disposal		
	Week 13	Wastewater disposal standards and reusing		
	Week 14	Final Examination		
December	Week 15	Final Examination		

18. Practical Topics: Mr Khasro Kakil (M.Sc.) **Lecturer**

8.1 Teacher's academic profile: I born in Erbil and received my BSc in Mosul University in Civil Engineering and MSc in Cranfield University in UK in the field of Water and Wastewater Engineering and now undergoing PhD study in the field of treatment of wastewater technology regarding produced water exploration in the field of gas and oil, also have vast experience (over 38 years) in the field of civil engineering including: supervision, design, implementation and monitoring of different water and sanitation projects and have experience of more than 12 years in implementing humanitarian programs with UN (UN/FAO and UNICEF) and INGOs (IRC and IRD). On 2012, I got a place in Engineering Collage - Civil Engineering Department and now continuing in teaching for nine years, toughing Environmental Engineering and water supply/Practical During this period I was assisting Professor Shoukr in carrying out any tasks during the academic year. I supervised many student project projects for 4th class and also during this period I worked as a deputy of the Salahaddin new Camp committee for preparation of the new SU-E modern Campus.

Sarwah Othman Ismael was born in Erbil, Iraq. She received a B.Sc. degree in Civil Engineering from Salahaddin University-Erbil, Iraq, in 2011; and M.Sc. degree in water resource and environmental engineering from Salahaddin University-Erbil, Iraq, in 2020. Currently, she works as an assistant lecturer at the Department of Civil Engineering, College of Engineering, Salahaddin University-Erbil.

18.2 Topic Description

Class No.	Week No.	Topic description		
	Week 1	Introduction to Sanitary and Environmental Engineering Lab	**Mr. Khasro**	
September	Week 2	Dissolved Oxygen		
	Week 3	Dissolved Oxygen		
October	Week 4	Biochemical oxygen demand (BOD)		
	Week 5	Biochemical oxygen demand (BOD)		

	Week 6	Total solids		
	Week 7	Total solids		
November	Week 8	MPN test		
	Week 9	Mid-term examination		
	Week 10	Chemical oxygen demand		
	Week 11	Chemical oxygen demand		
December	Week 12	Residual chlorine		
	Week 13	Residual chlorine		
	Week 14	Final Examination		
	Week 15	Final Examination		

19. Examinations: Provided separately in the attached files.

20. Extra notes:

21. Peer review