

Date:	Examination No.: 15367	Version: 12/2/2023	Start: 12/2/2023
Module Name - Code	Wastewater Engineering-1147 Elective		
Module Language:	English		
Responsible:	Prof. Dr. Shuokr Qarani, Mr. Khasro Kakil (M.Sc.) and Ms. Sarwah Othman Ismael (M.Sc.)		
Lecture (s):	Soft copies of lectures will provide for the students. Examples will solve on the white board and in the PPTs.		
College:	College of Engineering – Salahaddin University-Erbil		
Duration:	15 week – 1 semester		
Course outcomes:	<p>At the end of the semester, students would:</p> <ol style="list-style-type: none"> 1- Gain the knowledge in different stages of the wastewater collection system include sewage flow estimation, sewer shapes, materials, operation and maintenance of sewers, also 2- Able to design process sewage collection system 3- Be familiar with different wastewaters treatment technologies 4- Able to design process units include preliminary, primary, secondary and tertiary treatment methods and how to monitor the operation units. 5- Carrying out practical tests for several wastewater parameters in the Laboratory 		
Course Content:	<p>The course includes knowledge's of wastewater nature in term of 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.</p>		
Literature:	<p>Books:</p> <ol style="list-style-type: none"> 1- Riffat, R. (2013) Fundamentals of wastewater treatment and engineering, First Edition, Taylor & Francis Group, LLC, CRC Press. 2- Davis, M. L. (2010) Water and wastewater engineering- design principles and practice, The McGraw Hill Companies. <p>References:</p> <ul style="list-style-type: none"> • Aziz, S. Q. and Mustafa, J. S. (2021) Wastewater sludge characteristics, treatment techniques and energy production, Recycling and Sustainable Development, In Press. Ministry of Higher Education and Scientific research Directorate of Quality Assurance and Accreditation • 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, 9-10September 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. 		

	<ul style="list-style-type: none"> • 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 												
Type of Teaching:	4hrs for theoretical and 1 hrs. laboratory working.												
Pre-requisites:													
Frequency:	Yearly in fall semester												
Requirements for credit points:	<p>For the award of credit points, it is necessary to pass the module exam. The module exam (practical and theoretical) contains:</p> <p style="text-align: center;">120 min for theoretical and 30 min for Practical</p> <p style="text-align: center;">Student's attendance is required in all classes.</p>												
Credit point:	5												
Grade Distribution:	<p>The Grade is generated from the examination result(s) with the following</p> <table border="1"> <tr> <td>Mid-term examination (s)</td> <td>20 % (Theoretical part)</td> </tr> <tr> <td>Quizzes, home works, etc</td> <td>20%</td> </tr> <tr> <td>Practical Part</td> <td>10 %</td> </tr> <tr> <td>Annual Effort</td> <td>50 %</td> </tr> <tr> <td>Final Examination</td> <td>40 % + 10 % = 50%</td> </tr> <tr> <td>Total</td> <td>100</td> </tr> </table>	Mid-term examination (s)	20 % (Theoretical part)	Quizzes, home works, etc	20%	Practical Part	10 %	Annual Effort	50 %	Final Examination	40 % + 10 % = 50%	Total	100
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Work load:	The workload is 140h. It is the result of 75h attendance and 65h self-studies.												