

Subject Description Form

Subject Code	CSE527
Subject Title	Water and Wastewater Treatment Plant Design
Credit Value	3
Level	5
Pre-requisite/ Co-requisite/ Exclusion	<u>Recommended background knowledge:</u> Basic understanding of hydraulics and water/wastewater treatment is recommended. In addition, students should be capable of using spreadsheet software (for example, Microsoft Excel).
Objectives	The conventional water and wastewater treatment processes and equipment selections will be reviewed through practical aspects. Students are required to perform the functional/detail design of treatment units, mass balance design and hydraulic design of entire treatment plant through the completion of individual design works and design project.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. develop/implement appropriate design measures to fulfill the treatment requirements and to optimize the treatment functions; b. apply both the fundamentals of environmental science and methods of feasible hydrological calculations to formulate effective solutions for the design and/or operation of the treatment works.
Subject Synopsis/ Indicative Syllabus	<u>Keyword Syllabus</u> Process Design: the design of individual treatment units that are used in water and wastewater treatment plants, including various physical, chemical and biological processes. Mass balance in Treatment Plant: the balance of BOD, SS and flowrate. Treatment Plant Hydraulics: even distribution, flow in pipes, flow in open channels, head loss calculation in various treatment units. Equipment: pump design, valves/gates/pipes, storage and feeding chemicals, mixing devices, and oxygen transfer equipments. Others: Inlet/outlet design of treatment units, Treatment plant layout. The higher intellectual level required for MSc will be achieved by integrating all of the above items in syllabus through the design of a whole treatment plant which can treat real influents to the required effluent standards.
Teaching / Learning Methodology	Real design examples will be shown to and discussed with the students during the lectures, so the students can fully understand the typical problems and requirement in water and wastewater treatment plants design.

	Lectures will provide fundamental treatment methods and practical design approaches to the students, so that the students can achieve design goals through the optimization of the function of each treatment unit and in terms of the whole treatment process. Tutorials will provide excellent chances for the students to discuss their individual designs and/or calculations in details with the lecturer in person. This is useful for best fitting the needs for the students with various backgrounds.		
Assessment Methods in Alignment with Intended Learning Outcomes	Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed
			a b
	1. Assignments	30%	✓ ✓
	2. Group presentation	20%	✓ ✓
	3. Group report	50%	✓ ✓
	Total	100%	
	Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes: The assessment methods appropriately evaluate the intended learning outcomes through progressive application and integration of knowledge. Assignments assess individual understanding of environmental science, design principles, and hydrological calculations, while the group presentation and report assess students' ability to develop, justify, communicate, and optimize feasible treatment design and operational solutions. Students must pass all the assessments and achieve a passing overall score / grade to pass the subject.		
Student Study Effort Expected	Class contact:		
	▪ Lecture		39 Hrs.
	Other student study effort:		
	▪ Completion of Three Assignments		9 Hrs.
	▪ Completion of Group Presentation		20 Hrs.
	▪ Completion of Group Report		25 Hrs.
	▪ Reading and Studying		13 Hrs.
	Total student study effort		106 Hrs.

Reading List and References	<u>Books:</u> Mark J. Hammer, Mark J. Hammer Jr., <i>Water and Wastewater Technology</i>; Prentice Hall, Inc. Metcalf & Eddy, <i>Wastewater Engineering, Collection and Pumping of Wastewater</i>, McGraw-Hill. Metcalf & Eddy, <i>Wastewater Engineering, Treatment and Reuse</i>; McGraw-Hall. S.R. Qasim, <i>Wastewater Treatment Plants; Planning, Design and Operation</i>; Technomic Publishing Co. Inc. Susumu Kawamura, <i>Integrated Design of Water Treatment Facilities</i>, John Wiley & Sons, Inc.
---	--