

MARMARA UNIVERSITY - Faculty of Engineering											
Environmental Engineering											
SYLLABUS											
2022 - 2023 SPRING											
Course Code	Course Name	Course Type	Weekly Course			Credits	ECTS	Weekly Time & Classroom Schedule			
			T	A	L						
ENVE XX	Membrane Technologies (Under Graduate Technical Elective Course)	Elective	3	0	0	5	5				
Prerequisite		Prerequisite to									
Course Lecturer					Office Hours Schedule	Only by appointment.					
E-mail					Office / Room No						
Phone					Phone						
Teaching Assistant(s)					Office / Room No						
E-mail											
Course Objectives		This course provides the student an introduction of the theories of membrane (separation) technologies; membrane processes; membrane materials and characterization; transport in membranes; module and process design and membrane applications including desalination, MBR's and industrial applications especially, emphasises on water and wastewater treatment and reuse and recovery of valuable materials. The course also intends to involved real scale applications both treatment plant and production in situ in order to support theoretical part will be given in the class. Also these course objectives might be interesting for Environmental Engineering, Chemical Engineering, Metallurgical and Material Engineering and Mechanical Engineering students and they would be learning how multidiscipline are crucial for membrane technologies. Thus, Students from different disciplines will be able to improve themselves in the development and application of									
Teaching Methods		The course is divided into seven sections; starting with the membrane idea, production, design and current applications covering many engineering expertise' fields will be explained in detail step by step at each class hours based on solid literature and recent membrane technologies' applications. During the membrane technologies course theoretical ideas will be supported with class project, site visits and exams.									
Learning Outcomes		By the end of the course the students will be able to 1) Understand the fundamental concepts of membrane (separation) technologies, 2) An able to analyze and have sophisticated knowledge required membrane production and characterization methods, 3) An able to calculate membrane transport and define fouling mechanisms, 4) An able to design membrane modules to apply for any particular real scale applications, 5) Students are expected to have a thorough conceptual and quantitative understanding of membrane technologies and its' applications with taken consider .									
Textbooks and/or References		There is no required textbook. All required materials will be uploaded course' google drive folder before the upcoming class. However, the following books are good resources for this course: 1 Basic Principles of membrane technology, Marcel Mulder, second edition, Kluwer Academic Publishers, 2003 2 Leos JZ, Zydney AL. Microfiltration and ultrafiltration: principles and applications. Routledge; 2017. 3 Water treatment- membrane processes, American Water Works Association Research Foundation, Lyonnaise des Eaux, Water Research Commission of South Africa, McGraw-Hill, 1996 4 Membrane technology and applications, Richard Baker, second edition, John Wiley & Sons, Ltd. 2004									
WEEK		TOPICS							Reference No -		
Week 1		Introduction Course Syllabus and Concept of Membrane Technologies (AKA Separation Process)									
Week 2		Membrane Technologies History and Overview Quiz 1: Why we need membrane technologies							1, 2		
Week 3		Membrane Materials and Characterization Quiz 2: Why membrane material is matter							1, 2		
Week 4		Site visit to National Membrane Center (ITU-MEMTEK)									
Week 5		Transport in membranes, module and process design Quiz 3: What learned during MEMTEK visit							1, 2		
Week 6		Membrane Fouling Mechanisms and Determination							1, 2		
Week 7		Low and High Pressure Membrane Technologies and Applications							1, 2, 3, 4		
Week 8		Exam:1							2, 4		
Week 9		ROSA calculation module Quiz 4: Design RO membrane application for particular requirement									
Week 10		Site visit (or video conference) to PANTEX (RO and water reuse application)									
Week 11		Membrane Biological Reactors (MBRs) Quiz 5: Design MBR application for particular requirement							3, 4		
Week 12		Site visit (or video conference) Ağa Municipal WWTP (MBR application)									
Week 13		Project Assignment (Based on hypothetical scenarios)									
Week 14		Project Assignment (Based on hypothetical scenarios)									
Evaluation Tools		Evaluation Tool			Quantity	Date	Weight in Total (%)	Weight in Semester Evaluation (%)			
		Final Exam			1		40				
		Final Make-up Exam (if exists)			1		40				
		Semester Evaluation					60				
		Midterm(s)			1		20				
		Quiz(ze)s			5		15				
		Project(s)			1		20				
		Homework(s)									
		Laboratory									
		Field Visits to WTPs			1		5				
Courses vs. Program Outcome Relations		No			Program Outcomes			Relations*			
								1	2	3	
		1			Having knowledge about mathematics, science and environmental engineering as the owner of the accumulation of sufficient information about the theoretical and applied knowledge in these areas. Ability to apply the model to solve theoretical and applied					X	
		2			Ability to identify, formulate and solve complex problems. For this purpose, selecting and applying appropriate methods, analysis and modeling skills.			X			
		3			Ability to design complex system, process, device or product under realistic constraints and conditions, to meet certain requirements. For this purpose to apply the methods of modern design.				X		
		4			Ability to select and use modern techniques and tools required for development of environmental engineering applications, the ability to use information technology effectively.				X		
		5			Design experimental setup to investigate the environmental engineering problems, conduct experiments, collect data, analyze and interpret results.					X	
		6			Ability to work effectively with disciplinary and multi-disciplinary teams, self-study skills.					X	
		7			Ability to communicate effectively in oral and written, knowledge about at least one foreign language.					X	
		8			Awareness of the need for lifelong learning, information access, monitoring and continuous self-renewal ability in science and technology developments.					X	
		9			Professional and ethical responsibility.					X	
		10			Having knowledge about project management, risk management, change management. Recognition of the entrepreneurship, innovation and sustainable development in business life.			X			
		11			Having knowledge about environmental engineering applications on the universal and social dimensions of health, environmental and safety impacts, contemporary issues, engineering solutions, and awareness of the legal consequences.				X		
*** Lifelong Learning Programme (LLP) ***					Language of Instruction: English						
Evaluation Tool		Quantity		Student Workload Hours		Evaluation Tool		Quantity		Student Workload Hours	
Theoretical Hours		13		39		Applied Hours					
Midterm		1		12		Final		1		24	
Quiz		5		3		Project		1		24	
Laboratory						Homework					
Atelier						Seminar					
Field Study		1		3		Presentation					
Other						Self Study					
						TOTAL :		20		105,00	
						Recommended ECTS Credit (Total Hours / 20) :		5,0			
						* 1: weak, 2: moderate, 3: strong					