

 MARMARA UNIVERSITY - Faculty of Engineering Environmental Engineering SYLLABUS 2023-2024 SPRING											
Course Code	Course Name	Course Type	Weekly Course Hours			Credits	ECTS	Weekly Time & Classroom Schedule			Weekly Time & Classroom Schedule
			T	A	L						
ENVE 7066	Alternative Treatment Methods for Emerging Contaminants										
Prerequisite		Prerequisite to									
Course Lecturer	Gül Gülenay Hacıosmanoğlu					Office Hours Schedule					
E-mail	gulenay.haciosmanoglu@marmara.edu.tr										
Phone	0216 777 36 13					Office / Room No		M4-230			
Teaching Assistant(s)						Phone					
E-mail						Office /					
Course Objectives	To overview the main concepts related to emerging contaminants (ECs) To evaluate the efficiencies of the conventional treatment methods regarding ECs To explain the main properties of ECs in relation to the treatment efficiencies To teach the state-of-the-art technologies for EC treatment										
Teaching Methods	Face to face lecture, Powerpoint Presentations, Lecture Notes										
Learning Outcomes	By the end of the course the students will be able to										
	1. Understand the main concepts related to ECs										
	2. Know the efficiencies of the conventional treatment methods for EC removal										
	3. Realize the main properties of ECs in relation to the treatment efficiencies										
	4. Assess the advanced and combined treatment methods for ECs										
Textbooks and/or References	5. Gain perspectives on future research needs related to ECs										
	1 Gwerzi, W. (ed.). Emerging Contaminants in the Terrestrial-Aquatic-Atmosphere Continuum: Occurrence, Health Risks and Mitigation. Elsevier, 2022.										
	2 Richardson, S. D., and C. Postigo. Discovery of new emerging DBPs by high-resolution mass spectrometry. Comprehensive Analytical Chemistry. Vol. 71. Elsevier, 2016.										
	3 Connell, Des W., Gregory J. Miller. Chemistry and Toxicology of Pollution: Ecological and Human Health. John Wiley & Sons, 2022.										
	4 Bhat, S. A., Kumar, V., Li, F., Verma, P. Detection and Treatment of Emerging Contaminants in Wastewater. IWA Publishing, 2024.										
	5 George, N. (ed). Management and Mitigation of Emerging Pollutants. Springer Nature, 2023.										
	6 Singh, S. P. (ed). New trends in emerging environmental contaminants. Springer, 2022.										
	7 Crini, N., Lichtfouse, E., Crini, G. Emerging Contaminants Vol. 2. Vol. 66. Springer International Publishing, 2021.										
WEEK		TOPICS						Reference No - Section			
Week 1		1. Introduction, occurrence and risks of emerging contaminants (ECs)						Gwerzi (2022)- Chapter 1, 5			
Week 2		2. Overview of ECs: microplastics, pharmaceuticals and personal care products						Bhat (2024)- Chapter 1; Gwerzi (2022)-Chapter 10			
Week 3		3. Overview of ECs: conventional and emerging DBPs, PFAS, pesticides and other Ecs						Richardson (2016); Connell (2022)-Chapter 9, 11			
Week 4		4. Physico-chemical properties of ECs in relation to the treatment efficiencies						Connell (2022)- Chapter 4			
Week 5		5. Transport and transformation processes of ECs						Connell (2022)- Chapter 4			
Week 6		6. Sampling, detection and analysis methods for ECs in different environmental matrices						Bhat (2024)-Chapter 2, 9, 11			
Week 7		7. Evaluation of conventional treatment methods regarding ECs						Bhat (2024)-Chapter 7, 10; George (2023)-Chapter 3			
Week 8		8. Midterm week									
Week 9		9. Alternative treatment methods: electrocoagulation and membrane processes						Singh (2022) - Chapter 17, 20			
Week 10		10. Alternative treatment methods: engineered adsorbents						Bhat (2024)- Chapter 6, 12; Singh (2022)-Chapter 10, 13			
Week 11		11. Alternative treatment methods: biological processes and AOPs						Bhat (2024)-Chapter 3, 7; George (2023)-Chapter 4			
Week 12		12. Student presentations and discussion						[Recent publications]			
Week 13		13. Combined treatment methods						Bhat (2024)-Chapter 2, 4; Crini (2021)-Chapter 1, 4			
Week 14		14. Student presentations on combined methods and discussion						[Recent publications]			
Week 15		15. Challenges and future research directions						Gwerzi (2022)- Chapter 22, 23			
Evaluation Tools	Evaluation Tool	Quantity	Date		Weight in Total (%)				Weight in Semester Evaluation (%)		
	Final Exam	1			40				0		
	Final Make-up Exam (if exists)	1			40				0		
	Semester Evaluation				60				100		
	Midterm(s)	1			40				66.7		
	Quiz(ze)s										
	Project(s)										
	Homework(s)	2			10				16.7		
	Laboratory										
	Presentations	2			10				16.7		
	No	Program Outcomes						Relations			
		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 engineering problems.						1	2	3	

Courses vs. Program Outcome Relations	2	Ability to identify, formulate and solve complex problems. For this purpose, selecting and applying appropriate methods, analysis and modeling skills.			
	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.			
	4	Ability to select and use modern techniques and tools required for development of environmental engineering applications, the ability to use information technology effectively.			
	5	Design experimental setup to investigate the environmental engineering problems, conduct experiments, collect data, analyze and interpret results.			
	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	14	42	Applied Hours		
Midterm	1	15	Final	1	20
Quiz			Project		
Laboratory			Homework	2	22
Atelier			Seminar		
Field Study			Presentation	2	30
Other			Self Study	1	42
TOTAL :			21		171.00
Recommended ECTS Credit (Total Hours / 27) :				8.1	
1: weak, 2: moderate, 3: strong					