



MARMARA UNIVERSITY - Faculty of Engineering

SYLLABUS

Environmental Engineering

2014-2015 Fall Semester

Course Code	Course Name	Course Type	Weekly Course Hours			Credits	ECTS	Weekly Time & Classroom Schedule	
			T	A	L				
ENVE 7062	Environmental Nanotechnology	Compusory	3	0	0		8	Monday 09:00-12:00	
Prerequisite		Prerequisite to							
Course Lecturer	Assist. Prof. Esra Erdim					Office Hours Schedule	Wednesday 10:00-11:50		
E-mail	esra.erdim@marmara.edu.tr					Office / Room	MB549		
Phone	216 348 02 92 / 1265					Phone			
Teaching Assistant(s)						Office / Room			
E-mail									
Course Objectives	This course will cover fundamental principles of nanotechnology as well as its implications and applications for the environment. Lecture topics will include: synthesis and characterization of nanomaterials; unique properties of nanomaterials; nanomaterial transport, fate, environmental toxicity and risk; and nanomaterials applied to water treatment, environmental remediation, environmental sensing, and renewable energy production. This course will be taught in an interactive, active-learning fashion, and it will be based on the textbook and primary literature in environmental nanotechnology.								
Textbooks and/or References	1.	Environmental Nanotechnology: Applications and Impacts of Nanomaterials, Wiesner, M. And Bottero, J.Y							
	2.	Environmental and Human Health Impacts of Nanotechnology. Jamie Lead & Emma Smith. ISBN: 978-1-4051-7634-7. John Wiley & Sons ©2009.							
	3.	Nanoparticles in the Water Cycle: Properties, Analysis and Environmental Relevance, Fritz H. Frimmel and Reinhard Niessner, Springer Heidelberg Dordrecht London New York, 2010.							
	4.	Nanotechnologies for Water Environment Applications, Tian C. Zhang, Rao Y. Surampalli, Keith C. K. Lai, Zhiqiang Hu, ASCE Publications, 2009							
	5.	Nanotechnology 101, Mongillo, H., ABC-CLIO, 2007.							
Teaching methods	Board, Digital projector, video, lecture with discussion								
WEEK	Date	TOPICS						Reference No - Section	
Week 1		Environmental Nanotechnology - Introduction & course objectives - Assignments & grading expectations, Nanotechnology and the Energy Challenge - Energy-water nexus - Sustainability							
Week 2		Nanomaterial Synthesis and Characterization - Classes of nanomaterials - Surface physical-chemical properties							
Week 3		Lab. Study- Synthesis of metallic nanoparticles							
Week 4		Reactive Oxygen Species - Photosensitization and free radicals - ROS generation by metal sulfides and fullerenes							
Week 5		Reactive Oxygen Species - Photosensitization and free radicals - ROS generation by metal sulfides and fullerenes							
Week 6		Environmental Fate and Transport - Physical-chemical interactions - Aggregation - Deposition							
Week 7		Disinfection and Membrane Processes - Transport principles of membrane processes - Membrane fabrication using nanomaterials							
Week 8		Midterm Exam							
Week 9		Adsorbants and Antimicrobial Nanomaterials - Adsorbants for water and wastewater treatment - Disinfection applications							
Week 10		Adsorbants and Antimicrobial Nanomaterials - Adsorbants for water and wastewater treatment - Disinfection applications							
Week 11		Toxic Impacts of Nanomaterials - Exposure and risk assessment-Dose-response - Mechanisms of toxicity							
Week 12		Student Presentations							
Week 13		Student Presentations							
Week 14		Student Presentations							
Evaluation Tools	Evaluation Tool	Quantity	Date			Weight in Total (%)	Weight in Semester Evaluation (%)		
	Final Exam	1				50			
	Final Make-up Exam (if exists)								
	Semester Evaluation					50			
	Midterm(s)	1				25			
	Quiz(ze)s								
	Project(s)								
	Homework(s)	1				25			
Laboratory									
Other									
Program and Learning Outcome Relations	No	Program Outcomes					Relations		
	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					1	2	3
	2	Ability to identify, formulate and solve complex problems. For this purpose, selecting and applying appropriate methods, analysis and modeling skills are required							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.							
	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.							
	6	Ability to work effectively with disciplinary and multi-disciplinary teams, self-study skills.							
	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.							
	9	Professional and ethical responsibility.							
	10	Having knowledge about project management, risk management, change management. Recognition of the entrepreneurship, innovation and sustainable development in business life.							
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.								
*** 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	0	0		
Midterm	1	25			Final	1	40		
Quiz					Project				
Laboratory					Homework	1	40		
Atelier					Seminar				
Field Study					Presentation	1	15		
Other					Self Study		28		
TOTAL :						18	190,00		
Recommended ECTS Credit (Total Hours / 25) :							8		
1: weak, 2: moderate, 3: strong									