



MARMARA UNIVERSITY - Faculty of Engineering
Environmental Engineering
SYLLABUS
FALL 2014-2015

Course Code	Course Name	Course Type	Weekly Course Hours			Credits	ECTS	Weekly Time & Classroom Schedule
			T	A	L			
ENVE-702	Reaction Kinetics and Mass Transfer	Compulsory				3	8	Fridays, 9:30-12:20. MD 207
Prerequisite		Prerequisite to						
Course Lecturer	Yr. Doc. Dr. Rosa Flores					Office Hours	Tuesdays 12:30-14:30pm and by appointment	
E-mail	rflores@marmara.edu.tr					Office / Room No	MD 119	
Phone	216-348-0292-x 519					Phone		
Teaching Assistant(s)						Office / Room No		
E-mail								
Course Objectives	The course gives the basic skills that are required for further studies reaction engineering.							
Learning outcomes	1 The student will learn homogeneous and heterogeneous reaction systems. 2 The student will apply mass transfer fundamentals to process design. 3 The student will learn how to analyze ideal and non-ideal behaviour of reactors. 4 The student will apply reaction kinetics expressions, and ideal reactor types to different reactor types for specific water and waste treatment processes 5 The student will develop non-steady state descriptive equations for water/wastewater applications with fundamental mass balances.							
Textbooks and/or References	1) J.C. Crittenden et al. 2012. Water treatment, principles and design. MWH. 3rd edition. ISBN: 978-0-470-40539-0 2) H.S. Fogler. 2006. Elements of Chemical Reaction Engineering. Prentice Hall. 4th edition. ISBN: 0-13-047394-4 3)							
Teaching Methods								
WEEK	Date	TOPICS					Reference No - Section	
Week 1		Introduction to class, Chemical reactions and stoichiometry					5.1	
Week 2		Equilibrium reactions, Thermodynamics of chemical reactions					5.2, 5.3	
Week 3		Reaction kinetics, Rate laws					5.4, 5.5	
Week 4		Types of reactors, mass balance, Ideal reactors					6.1, 6.2, 6.3	
Week 5		Modeling completely mixed batch reactor, Modeling ideal continuous flow reactors					6.4, 6.5	
Week 6		Tracer curves, residence time distribution, non-ideal flow models					6.6, 6.7	
Week 7		Midterm 1						
Week 8		Separation processes, Mass transfer, Diffusion coefficients					7.1, 7.2, 7.3	
Week 9		Diffusion coefficients, Models for mass transfer					7.3, 7.4	
Week 10		Correlations for mass transfer at an interface, Two-film theory					7.5, 7.6	
Week 11		Midterm 2						
Week 12		NO Class, labor day						
Week 13		Adsorption					12	
Week 14		Student presentations						
Evaluation Tools	Evaluation Tool	Quantity	Date	Weight in Total (%)	Weight in Semester Evaluation (%)			
	Final Exam	1	10.06.2015	40				
	Final Make-up Exam (if exists)	1	TBA	40				
	Semester Evaluation			60	100			
	Midterm(s)	2	3/27/2015; 5/15/2015	20				
	Quiz(ze)s	1		0				
	Project(s)	1		10				
	Homework(s)	4		10				
	Laboratory	0						
Other								
Program and Learning Outcome Relations	No	Program Outcomes	Relation (1: weak relation ; 3: strong relation)					
			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 engineering problems.			x			
	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..			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 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 dimension 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 Tools	Quantity	Student Workload Hours	Evaluation Tools	Quantity	Student Workload Hours			
Theoretical Hours	14	42	Applied Hours	1	3			
Midterm	2	30	Final	1	25			
Quiz	3	9	Project	0	0			
Laboratory	0	0	Homework	4	56			
Atelier	0	0	Seminar	0				
Field Study	0	0	Presentation	1	25			

Other				Self Study			
TOTAL							190
Recommended ECTS Credit (Total Hours/25):					7.6		
1:weak, 2:moderate, 3:strong							