

1. Course Description

COURSE DESCRIPTION FORM	
Course Code and Title	KM489 ELECTROCHEMICAL TECHNOLOGIES
Course Semester	7
Catalog Description (Content) of the Course	Electrochemical applications in industrial chemistry, separation and treatment. Electrochemical applications in clean energy production. Electrochemical reactors and their design specifications used in industry.
Main Textbook	Scott, K., "Electrochemical Processes for Clean Technology" The Royal Society of Chemistry, 1995.
Supporting Textbooks	1. Rajeshwar, K., Ibanez, J., "Environmental Electrochemistry: Fundamentals and Applications in Pollution Abatement", 1997. 2. Bard, J.A., Faulkner, L.R., "Electrochemical Methods: Fundamentals and Applications" John Wiley & Sons, Inc., 2nd Edition., 2002. 3. Gerischer, H., Tobias, C.W., "Advances in Electrochemical Science and Engineering" Volume 4, VCH Publishers Inc., 1995. 4. Crow, D. R., "Principles and applications of electrochemistry", London : Chapman and Hall, 1988 5. Heitz, E., Kreysa, G., "Principles of Electrochemical Engineering: extended version of a DECHEMA experimental course", Newyork: VCH, 1986. 6. Bilimsel makaleler.
Course Credit (ECTS)	4
Prerequisites of the Course (Compulsory attendance should be indicated here.)	There is no prerequisite or co-requisite for this course
Type of the Course	Elective
Instruction Language of the Course	Turkish
Object and Target of the Course	To give information on electrochemical technologies used for environmental and clean energy production. To give information on novel industrial electrochemical application. Developing oral and written communication skills.
Learning Outcomes of the Course	-To gain knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied information in these areas to model and solve engineering problems. -To identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose. -To devise, select, and use modern techniques and tools needed for engineering practice; ability to employ information technologies effectively. -To work efficiently in intra-disciplinary teams. -To communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language.
Mode of Delivery	Face to face
Weekly Schedule of the Course	1. Week Introduction 2. Week Principles of electrochemical reactor 3. Week Principles of electrochemical reactor 4. Week Design of electrochemical reactor 5. Week Design of electrochemical reactor 6. Week Electrochemical membrane separation processes

	7. Week Electrochemical membrane separation processes 8. Week Electrochemical membrane separation processes 9. Week Treatment of industrial effluents by electrochemical routes 10. Week Treatment of industrial effluents by electrochemical routes 11. Week Electrochemical synthesis 12. Week Electrochemical synthesis 13. Week Clean energy production by electrochemical routes 14. Week Clean energy production by electrochemical routes			
Educative Activities <i>(Credit will be determined based on the time given for these activities. Should be filled carefully.)</i>	Theoretical Study Hours of Course Per Week Reading Searching in Internet and Library Preparing Reports Mid-Term and Studying for Mid-Term Final and Studying for Final			
Assessment Criteria		Quantity	Total Contribution (%)	
	Midterm	2	30	
	Homework	4	10	
	Assignment			
	Projects	1	20	
	Practice			
	Quiz			
	Contribution of In-term Studies to Overall Grade		60	
	Contribution of Final Examination to Overall Grade		40	
	Attendance			
Workload of the Course	Activity	Total Week Count	Weekly Duration (in hour)	Total Workload in Semester
	Theoretical Study Hours of Course Per Week	14	3	42
	Practicing Hours of Course Per Week			
	Reading	14	2	28
	Searching in Internet and Library	14	1	14
	Designing and Applying Materials			
	Preparing Reports	2	3	6
	Preparing Presentation			
	Presentation			
	Mid-Term and Studying for Mid-Term	4	3	12

	Final and Studying for Final	2	3	6					
	Other								
	Total work load			108					
	Total work load/25			4.32					
	ECTS of the course			4					
Course's Contribution To Program	Number	Program Outcomes			1	2	3	4	5
	1	Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied information in these areas to model and solve engineering problems.				x			
	2	Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose.				x			
	3	Ability to design a complex system, process, device or product under realistic constraints and conditions, in such a way as to meet the desired result; ability to apply modern design methods for this purpose. (Realistic constraints and conditions may include factors such as economic and environmental issues, sustainability, manufacturability, ethics, health, safety issues, and social and political issues, according to the nature of the design.)							
	4	Ability to devise, select, and use modern techniques and tools needed for engineering practice; ability to employ information technologies effectively.				x			
	5	Ability to design and conduct experiments, gather data, analyze and interpret results for investigating engineering problems.							
	6	Ability to work efficiently in intra-disciplinary teams.					x		
	7	Ability to work efficiently in multi-disciplinary teams;							
	8	Ability to work individually.					x		
	9	Ability to communicate effectively in Turkish, both orally and in writing; Ability to write effective reports and comprehend written reports, make effective presentations,				x			
	10	prepare design and production reports, give and receive clear and intelligible instructions.							
	11	Recognition of the need for lifelong learning; ability to access information, to follow developments in science and technology, and to continue to educate him/herself.				x			
	12	Awareness of professional and ethical responsibility.				x			
	13	Information about business life practices such as project management, risk management, and change management.							
	14	Information about awareness of entrepreneurship, innovation, and sustainable development.				x			
15	Knowledge about contemporary issues and the global and societal effects of engineering practices on health, environment, and safety.				x				

	16	Knowledge about awareness of the legal consequences of engineering solutions.					
	17	Knowledge on standards used in engineering practice.					
Name of Lecturer(s) and Contact Information		1. Prof.Dr. Niyazi Alper TAPAN atapan@gazi.edu.tr					