

Course Name						
MATERIALS PROCESSING LABORATORIES						
Code	Semester	Local Credits	ECTS Credits	Course Implementation, Hours/Week		
				Theoretical	Tutorial	Laboratory
MET 455E	7	1	3	-	-	2
Department/Program		Metallurgical and Materials Engineering Department				
Course Type		Required		Course Language		English
Course Prerequisites		MET 364E				
Course Category by Content, %	Basic Sciences		Engineering Science	Engineering Design		General Education
			% 20	% 80		
Course Description	Basic principles of electrochemical corrosion and galvanic corrosion, Passivation and cathodic protection, Hardness-Impact-Erichsen tests of metallic materials, Tensile-Compression-Bending tests of metallic materials, Wear-Torsion tests of metallic materials, Stress relaxation-Fatigue-Creep tests of metallic materials, Heat treatment (Tempering, Hardening, Hardening capability, Jominy test), Casting experiments, Determination of humidity amount, Sieve analysis, CO2 sodium silicate method for die production					
Course Objectives	It is primarily targeted in this course to experimentally show the students the subject material they learned theoretically in courses such as materials science and basic principles of electrochemical corrosion, materials mechanical testing, plastic deformation, heat treatment, casting experiments etc. It is also the purpose of this course to direct the students' knowledge to be exploited in the design and applications. Students will gain an understanding about the basic concepts of production processes and the relationships between the parameters and processes, and the correlation between structure, property, and performance of a given material, and ability to analyze the results. Moreover, oral and written communication skills of the students are intended to be improved by the conversations held before, during, and after the experiments for discussing the preparation of experiments and their results, and by preparing a formal written report.					
Course Learning Outcomes	<div>1. It is the aim of this course to experimentally show the students the subject material they learned theoretically in courses such as materials science and basic principles of electrochemical corrosion, materials mechanical testing, plastic deformation, heat treatment, casting experiments, etc.</div> <div>2. Getting information about materials selection and design according to their manufacturing techniques and applications areas.</div> <div>3. Students will gain an understanding about the various materials, their features and relation between structure-property-performance of the materials</div> <div>4. Teaching of different characterization techniques and approaches applied to materials.</div> <div>5. Moreover, oral and written communication skills of the students are intended to be improved by holding conversations before, during, and after the experiments to discuss the setting up the experiments and their results, and by preparing a formal written report.</div>					
Text Book	Metallurgy Laboratory Pamphlet, and other resources defined for each experiment					
Homework & Projects						
Laboratory Work		9 EXPERIMENTS				
Computer Use		USE OF WORD AND EXCEL, DATA EVALUATION PROGRAMMS				
Other Activities		LABORATORY ORIENTATION (LAB SECURITY)				
Assessment Criteria				Quantity	Effects on Grading, %	
	Activities			-	-	
	Midterm Exams			-	-	
	Quizzes			9	20 (Quiz / Experiment)	
	Homework			-	-	
	Projects			-	-	
	Term Paper/Project			-	-	
	Laboratory Work			9 (Exp)	60 (Written Report / Experiment)	
	Other Activities				20 (Participation in the experiments)	
Final Exam			-	-		

COURSE PLAN

Weeks	Topics	Course Outcomes
1	Registration	1
2	Introduction to metallurgical laboratories and laboratory security.	1
3	Basic principles of electrochemical corrosion and galvanic corrosion	1-5
4	Passivation and cathodic protection	1-5
5	Hardness-Impact-Erichsen tests of metallic materials	1-5
6	Tensile-Compression-Bending tests of metallic materials	1-5
7	Wear-Torsion tests of metallic materials	1-5
8	Stress relaxation-Fatigue-Creep tests of metallic materials	1-5
9	Heat treatment (Tempering, Hardening, Hardening capability, Jominy test)	1-5
10	Casting experiments, Determination of humidity amount	1-5
11	Sieve analysis, CO ₂ sodium silicate method for die production	1-5
12	Make-up experiments	
13	Make-up experiments	
14	Make-up experiments	

Relationship between the Course and Metallurgical and Materials Engineering Curriculum

	Student Outcomes	Level of Contribution		
		1	2	3
1	an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering science and mathematics	X		
2	an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety and welfare as well as global, cultural, social, environmental and economic factors			X
3	an ability to communicate effectively with a range of audiences			X
4	an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgements, which must consider the impact of engineering solutions in global, economic, environmental and societal contexts		X	
5	an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives			X
6	an ability to develop and conduct appropriate experimentation, analyse and interpret data, and use engineering judgement to draw conclusions		X	
7	an ability to acquire and apply new knowledge as needed, using appropriate learning strategies		X	

1: Little, 2. Partial, 3. Full

Course relationships with major elements of the field and material classes

		Level of Contribution		
		1	2	3
MAJOR ELEMENT OF THE FIELDS	STRUCTURE			X
	PROPERTIES			X
	DESIGN EXPERIMENT/ANALYSE DATA			X
	PROCESSING		X	
	COST/PERFORMANCE	X		
	QUALITY/ENVIRONMENT			X
	DESIGN PROCESS OR PRODUCT			X
MATERIAL CLASSES	METAL			X
	CERAMICS AND GLASS	X		
	POLYMERS			
	COMPOSITES			
	BIOMATERIALS			

1: Little, 2. Partial, 3. Full

<u>Prepared by</u>	<u>Date</u>	<u>Signature</u>
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