Course Name						
WELDING TECH.AND METALLURGY						
Code	**Semester**	**Local Credits**	**ECTS Credits**	**Course Implementation, Hours/Week**		
				Theoretical	**Tutorial**	**Laboratory**
MET468E	8	2	3	2	-	-

Department/Program	Metallurgical and Materials Engineering Department			
Course Type	Elective	**Course Language**	English	
Course Prerequisites	None			
Course Category by Content, %	**Basic Sciences**	**Engineering Science**	**Engineering Design**	**General Education**
	-	% 30	% 70	-
Course Description	Definition and importance of welding, Classification of welding processes, Fusion welding processes, Solid state welding processes, Heat affected zone, Weldability, Welding defects, Distorsion of welded materials, Fundamentals of manufacturing by welding.			
Course Objectives	1. To teach the basic principles of welding, 2. To teach the general principles of welding methods, 3. To define electrode types, 4. To teach the microstructural variations occurred during welding, 5. To explain weld failures, their causes and preventions.			
Course Learning Outcomes	Students who pass the course will be able to: I. Understand the basic principles of welding as a manufacturing method, II. Understand the application principles of the welding methods, III. Interpret the microstructural variations occured during welding, IV. Weldability concept, V. Understand the weld failure and their prevention methods.			
Textbook	W. Galvery, F. Marlow, Welding Essentials: Questions and Answers, 2nd.Ed. Industrial Press, Inc. USA, 2007.			
Other References	1.K. Weman, Welding process handbook, CRC Pres, Cambridge, 2003. 2.ASM Handbook, Welding, Brazing and Soldering, Vol 6. ASM International, USA, 2003. 3.S. Kalpakjian, Manufacturing processes for engineering materials, Prentice Hall, N.J., 2003.			
Homework & Projects	Students will be given a subject and this will be presented in the class. Presentation subjects may be used as a source for exams.			
Laboratory Work				
Computer Use				
Other Activities				

Assessment Criteria	Activities	**Quantity**	**Effects on Grading, %**
	Midterm Exams	**2**	**40**
	Quizzes		
	Homework		
	Projects		
	Term Paper/Project		
	Laboratory Work		
	Other Activities	**1**	**20**
	Final Exam	**1**	**40**

COURSE PLAN

Weeks	Topics	Course Outcomes
1	Introduction to welding technology	I
2	Pressure welding methods (forge welding, stir welding, resistance welding)	I-II
3	Pressure welding methods (resistance welding)	I-II
4	Melt welding methods (gas flame welding	I-II
5	Arc welding,	II
6	Electron beam welding, plasma welding)	II
7	Welding electrodes,	II
8	Shielded gas welding methods,	II
9	Introduction to welding metallurgy	III
10	Weldability	III
11	Solidification of the weld metal	III
12	Heat affected zone (HAZ)	III-IV
13	Weld failures	V
14	Principles of welded constructions	V

Relationship between the Course and METALLURGICAL AND MATERIALS ENGINEERING **Curriculum**

	Program Outcomes	Level of Contribution		
		1	**2**	**3**
1	Ability to apply the knowledge of mathematics, science and engineering principles to solve problems in metallurgical and materials engineering (ABET:a)		**X**	
2	Ability to characterize materials using standard and/or self designed experimental methods and to evaluate the results (ABET:b)	X		
3	Ability to design a system or a process, taking into consideration of the desired specifications, quality, ethics and environment. (ABET:c)	**X**		
4	Ability to communicate both orally and in the written form and to take part in, and provide leadership of the teams in the elucidation of engineering problems; (ABET:d, g)			
5	Ability to define, formulate and solve engineering problems in the development, production, processing, protection and usage of engineering materials. (ABET:e)			**X**
6	An understanding of professional and ethical responsibilities(ABET:f)			
7	An understanding of current/contemporary issues and impact of engineering solutions in broad cultural, national and global levels;. (ABET:h, j)	**X**		
8	A comprehension of the nature of engineering progress closely linked with the development of new materials and production processes. An ability to engage in life-long learning and a recognition of its necessity (ABET:i)		**X**	
9	Ability to use essential tools and techniques of modern engineering in the development, production, processing, protecting of the existing and new engineering materials. (ABET:k)			**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			
	POLYMERS			
	COMPOSITES			

1: Little, 2. Partial, 3. Full

Prepared by	**Date**	**Signature**
PROF. DR. HÜSEYİN ÇİMENOĞLU PROF. DR.MURAT BAYDOĞAN	December 2020	