



Course Category by Content, % 20 % 60 % 20 % Course Description Metallurgy sector is usually considered as the primary source of heavy metal emission, one of the most important parameters of environmental production processes. It is possible to minimize the dangers and hazales during the numerous steps is metal production processes. It is possible to minimize the dangers and hazales during the numeral importance of environmental production processes to metal and the design of 2470-waste processes. The ways to minimize the waste is an occurse of pollutions in metallurgical processes. The ways to minimize these wastes, waste management, recycling processes and developing energy efficient technologies. Course Objectives 1. Toxicological & Ecological effects of metal and compounds 2. Design of zaro-waste processes and steps of materials Course Objectives 3. Transforming metallic wastes not re-waste materials 3. Transforming metallic wastes for the submit legal and ethical responsibilities will be taught. In the choice of a darw waste processes and steps of denvironment and environmental protection, toxicology, pollution, recycling, waste water, solid wastes, ecology, and theiral responsibilities will be anyled and gameteria. It is used to for a submit and technologies importance of environmental protection toxicology, pollution, recycling, waste water, solid wastes, ecology, and ethical responsibilities will be environment. In the course of the damages caused by the metallurgical processes of environmental protection, toxicology, pollution, recycling, waste water, solid wastes, ecology, and ethical responsibilities will be comment. Course Learning Outcomes 1. General acteriohytication and metadising s	Course Name								
Code Semester Local Credits ECTS Credits Theoretical Tutorial Laboration MET 446E 8 2 4 2 0	ENVIRONMENT & ETHIC	S in MET	ALLURG	ICAL & MATERIALS	S PROCESSING				
MET 44E 1 1 Note Department/Program Metallurgical & Materials Engineering Course Language English Course Type Required Course Language Engliseh Course Category by Content, % Basic Sciences Engineering Science Engineering Design General Education Course Category by Content, % Metallurgical water is useally considered as the primary source of Isaay metal ensistence on of the metal production processes. It is possible to minimize the dangers and hazards of metallurgical production processes. It is possible to minimize the dangers and hazards of metallurgical production processes. The water metallurgical wastes and sources of poliulons in metallurgical production processes. It is possible to minimize the dangers and hazards of metallurgical processes. The water is minimize these wastes, waste management, reciping processes and the course to waste processes of an evaluary category waster and overlapping processes and the course, the importance of efficial responsibilities over legal responsibilities will be emphasized in this course, the importance of efficial responsibilities over legal responsibilities of engines and the course, the importance of efficial responsibilities of engines and the course and the course will be able to learn: Course Lanning Outcomes I. Gareard concept such as a minorment, environment and environment and environmental protection, taxicology, pollution, recycling, waste water, solid wastes, ecology on deting metallurgical production recycling, waste water, solid wastes, ecology concept and environmental protection ensourced is concean turns	Codo	Some	stor	Local Crodite	ECTS Crodite		-		
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			Other	Activities		1		50	



	COURSE PLAN	
Weeks	Topics	Course Outcomes
1	Introduction, general concepts of environment, environmental protection, toxicology, pollution, recycling, and engineering ethics,	I -VII
2	Toxicology of metals, toxicological effecting mechanisms of metal compounds depending on their structures and types,	I
3	Water and waste water standards, water recycling, waste water formation in metallurgical plants,	I -,III
4	Waste water beneficiation, technologies for the recovery, ethical approaches in selection of recycling technologies.	I ,IV
5	Solid wastes (primary and secondary) materialize during metallurgical operations,	III,IV,V
6	Stack gases of Electric Arc Furnaces and primary metal production processes, and methods for their beneficiation,	III,V
7	Assessing and discussing the ethics of the environmental impact of red mudd, cyanide waste solution dams, etc. and solid waste collection systems such as İzaydaş,	IV, VI,VII
8	Investigating the economical, technological, environmental and ethics aspects of metal recycling, -case study: non ferrous metals scrabs	V,VI,VII
9	Investigating the economical, technological environmental and ethics aspects of metal recycling, -case study: ferrous scrabs	V,VI,VII
10	,Investigating the economical, technological environmental and ethics aspects of metal recycling, -case study: electronic scrap, aluminum cans household ware, alt autos	V,VI,VII
11	Gaseous wastes form in metallurgical operations, minimization techniques, precautionary measures	II, V,
12	Gaseous wastes form in metallurgical operations, minimization techniques, precautionary measures	li,V
13	Presentation, discussion, and evaluation of student projects,	I - VII
14	Presentation, discussion, and evaluation of student projects,	I - VII

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)			х	
2	Ability to characterize materials using standard and/or self designed experimental methods and to evaluate the results (ABET:b)				
3	Ability to design a system or a process, taking into consideration of the desired specifications, quality, ethics and environment. (ABET:c)		Х		
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)		Х		
5	Ability to define, formulate and solve engineering problems in the development, production, processing, protection and usage of engineering materials. (ABET:e)			Х	
6	An understanding of professional and ethical responsibilities(ABET:f)			Х	
7	An understanding of current/contemporary issues and impact of engineering solutions in broad cultural, national and global levels;. (ABET:h, j)			Х	
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)			Х	
9	Ability to use essential tools and techniques of modern engineering in the development, production, processing, protecting and surface treatment of the existing and new engineering materials. (ABET:k)		Х		

1: Little, 2. Partial, 3. Full

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Course relationships with major elements of the field and material classes

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

1: Little, 2. Partial, 3. Full

Prepared by	Date	Signature
Prof. Dr. İsmail DUMAN and Prof. Dr. Servet TİMUR	March 2013	