

Course Name						
PROCESS METALLURGY						
Code	Semester	Local Credits	ECTS Credits	Course Implementation, Hours/Week		
				Theoretical	Tutorial	Laboratory
MET374E	6	2	3	2	-	-
Department/Program	Metallurgical and Materials Eng.					
Course Type	ELECTIVE		Course Language	ENGLISH		
Course Prerequisites	None					
Course Category by Content, %	Basic Sciences	Engineering Science	Engineering Design	General Education		
	-	% 20	% 80	-		
Course Description	To introduce transport phenomena and properties in metallurgical operations , fluid statics and fluid dynamics , Dimensional analysis and reactor design , heat and mass transfer through motionless media , heat and mass transfer in convective flow system , numerical techniques and computer applications.					
Course Objectives	This course is intended to serve as a comprehensive course in process engineering metallurgy for an upper undergraduate in the metallurgical/materials science curriculum. Many of the unique features of metallurgical systems have been described in sufficient detail and numerous illustrative examples have been included so that it should also be useful for engineers with a different background who are working in this field					
Course Learning Outcomes	I - To understand transport properties of metallurgical processes II -To Learn the calculation methods in the designing of various processes using engineering dimensionless fluid , heat , mass transfer numbers .					
Textbook	1-Guthrie , R.I.L. : Engineering in Process Metallurgy Clarendon Press oxford 1993					
Other References	1-Geiger , G.H., Porier , D.R.Transport phenomena in Metallurgy Addison Wesley Publishing Company 1973 2-Pawlek , F.; Metalhüttenkunde Walter de Gruyter 1983 3-Reiji Mezaki ; Engineering Data on Mixing , Elsevier Science & Technology Books , 2000 4 Perry's chemical engineers' handbook 8 th edition James Tilton Mc Graw Hill 2008					
Homework & Projects	This is an optional project with the following title" Process design in the field of Selected Process Metallurgy " and will be performed in groups .					
Laboratory Work						
Computer Use						
Other Activities Assessment Criteria						
	Activities		Quantity	Effects on Grading, %		
	Midterm Exams		1	25		
	Quizzes					
	Homework					
	Projects					
Term Paper/Project		1	30			
Laboratory Work						
Other Activities						
Final Exam		1	45			

COURSE PLAN

Weeks	Topics	Course Outcomes
1	Introduction to transport phenomena in process metallurgy	I
2	Momentum heat and mass transfer mechanism	I
3	Particle motion in liquid media, fluid bed, solid gas separation	I
4	Vacuum in metallurgy	II
5	Gas jets and application in metallurgy	II
6	Conductive, convective and radiative heat transfer in metallurgy, problems and solutions	II
7	Mid exam	II
8	Diffusion in gases, solids; homogenization of alloys	II
9	Momentum analysis in metal casting	II
10	Heat transfer analysis in metal casting	II
11	Thermal behavior of metallurgical packed bed reactors,	II
12	Thermal behavior of metallurgical packed bed reactors, exercises	II
13	Design of Batch reactors in metallurgy, exercises	II
14	Design of continuous reactors in metallurgy, exercises	II

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)			
3	Ability to design a system or a process, taking into consideration of the desired specifications, quality, ethics and environment. (ABET:c)			
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)			
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			
	PROPERTIES	X		
	DESIGN EXPERIMENT/ANALYSE DATA			
	PROCESSING			X
	COST/PERFORMANCE			X
	QUALITY/ENVIRONMENT			X
MATERIAL CLASSES	DESIGN PROCESS OR PRODUCT	X		
	METAL			X
	CERAMICS			
	POLYMERS			
	COMPOSITES			

1: Little, 2. Partial, 3. Full

Prepared by	Date	Signature
Assoc. Prof. Dr. Güldem Kartal Şireli	December 2020	