Course Name						
Techniques in Process Metallurgy						
Code	**Semester**	**Local Credits**	**ECTS Credits**	**Course Implementation, Hours/Week**		
				Theoretical	**Tutorial**	**Laboratory**
MET 429	7	3	5	3	0	0

Department/Program	Metallurgical and Materials Engineering Department		
Course Type	Required	**Course Language**	Turkish
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 dimesionless fluid , heat , mass transfer numbers .
Text Book	1-Perry's chemical engineers' handbook 8 th edition james tilton Mc graw whill 2008
Other References	1-Guthrie , R.I.L. : Engineering in Process Metallurgy Clareon Press oxford 1993 2-Marko Zlokarnik ; Stiring , WILEY-VCH 2001 3-Geiger , G.H., Porier , D.R.Transport phenomena in Metallurgy Addsion Wesley Publishing Company 1973 4-Pawlek , F.; Metalhüttenkunde Walter de Gruyter 1983 5-Reiji Mezaki ; Engineering Data on Mixing , Elsevier Science & Technology Books , 2000
Homework & Projects	This is an optional project with the following title" Process desing 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	MIN 1	25
	Quizzes		
	Homework		
	Projects	MAX 1	30
	Term Paper/Project		
	Laboratory Work		
	Other Activities		
	Final Exam	1	45

COURSE PLAN

Weeks	Topics	Course Outcomes
1	Introduction to the metallurgical transport phenomena	I
2	The mechanism of momentum , heat and mass transfer ;	I
3	Investigation of particle motion in fluids , stokes rule , fluid bed , gas cleaning	I
4	Vacumm production and application in metallurgy	II
5	Gas jets (super sonicand hypersonic gases) and examples in metallurgy , gas liquid interactions	II
6	Convective , conductive and radiative heat transferin metallurgy (heat loses through walls , quenching dimesion analsis analysis through TTT diagrams	II
7	Intermediate examination	II
8	Diffusion in gases , solids ; Homogenization of alloys	II
9	Momentum analysis in casting	II
10	Heat transfer analysis in casting	II
11	Thermal behavior of metallurgical packed bed ractors ,	II
12	Thermal behavior of metallurgical packed bed ractors , exercises	II
13	Design of Batch reactors in metallurgy , exercises	II
14	Design of continous 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)	**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 and surface treatment 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 **Prof. Dr. Okan Addemir**	Date	**Signature**