

MM 509 Powder Metallurgy Production Processes				MECHANICAL ENGINEERING DEPARTMENT					
Semester	Methods of Education							Credits	
	Lecture	Recit.	Lab.	Project/Field Study	Homework	Other	Total	Credit	ECTS credit
1,2	36	6				146	188	3	7.5
Language	Turkish								
Compulsory / Elective	Optional								
Prerequisites	-								
Course Contents	Metal powder production techniques: Atomization, chemical, electrolytic and milling processes. Characterization of metal powders. Powder compaction: pressing, HIP/CIP, rolling, extrusion, injection molding. Sintering: stages, furnaces and gases. Full density processes, plasticity theory for porous materials. Mechanical properties of powder metallurgy processed materials. Powder systems and applications.								
Course Objectives	To introduce; powder metallurgy techniques which are accepted as high tech manufacturing processes, powder production processes and powder properties, P/M finished parts and their application areas.								
Learning Outcomes and Competences	To know powder metallurgy techniques and their applications To define, formulize and solve the engineering problems To design, perform and evaluate experiments To apply the knowledge of mathematics, science an engineering								
Textbook and /or Reference	1. Randall M. German, (1984), Powder Metallurgy Science, Metal Powder Industries Federation (MPIF), 2nd edition, New Jersey (NJ), USA. 2. Leander F. Pease III and William G. West, (2002), Fundamentals of Powder Metallurgy, MPIF, New Jersey (NJ), USA. 3. Werner Schatt, Klaus-Peter Wieters, (1997) Powder Metallurgy: Processing and Materials European Powder Metallurgy Association, EPMA, UK.								
Assessment Criteria					If any, mark as (X)		Percentage (%)		
	Midterm Exams				X		40		
	Quizzes								
	Homeworks								
	Projects								
	Term Paper								
	Laboratory Work								
	Other								
	Final Exam				X		60		
Instructors	Prof. Ibrahim USLAN								
Week	Subject								
1	Introduction to Powder Metallurgy Production Process								
2	Metal Powder Production Techniques:Milling and Electrolytic Process								
3	Metal Powder Production Techniques:Cehemical,Gas and Water Atomization Process								
4	Metal Powder Productions Techniques:Döner Disk ve Döner Elektrot Atomizasyonu								
5	Characterization of Material Powders:Particle Sizing								
6	Characterization of Material Powders:Shape,Surface Area,Flow Rate								
7	Characterization of Material Powders:Gren Density,Gren Strength,Compressibility								
8	Powder Compaction:Pressing,Hot and Cold Isostatic Pressing								
9	Powder Compaction:Rolling,Extrusion,Powder injection molding.								
10	Sintering,Diffüsiön:Sinterleme Aşamaları,Fırınlar ve Gazlar								
11	Full Density Processes:Liquid Phase Sintering,Infiltration,Mechanical Consolidation								
12	Plasticity Theory of Porous Materials								
13	Mechanical Properties of Powder Metallurgy Processed Materials								
14	Powder Systems and Applications								