

School of Engineering and Natural Sciences / Industrial Engineering (English)

2023 - 2024 Academic Year

INTRODUCTION to MATERIAL SCIENCE

Syllabus

Course Description					
Name	Code	Semester	T+A Hour	Credit	ECTS
INTRODUCTION to MATERIAL SCIENCE	IND1213240	Spring Semester	3+0	3	5
Prerequisites Courses					
Recommended Elective Courses					
Language of Instruction	English				
Course Level	First Cycle (Bachelor's Degree)				
Course Type	Required				
Course Coordinator	Prof.Dr. Talip ALP				
Name of Lecturer(s)	Prof.Dr. Talip ALP				
Assistant(s)					
Aim	Improve students analytical thinking by focusing structure-property- process relations;Recognize basic materials science knowledge, the nowadays engineering materials, the basic production routes as well as their application areas				
Course Content	This course contains; Introduction to Material Science and Engineering ,Atomic Structure and Interatomic Bonding ,Fundamentals of Crystallography and the Structure of Crystalline Solids ,Imperfections in Solids ,Diffusion ,Mechanical Properties of Metals ,Dislocations and Plastic deformation ,Strengthening mechanisms ,Fracture, Fatigue, Creep behaviors ,Phase diagrams ,Phase Transformations ,Properties and Applications of Metals, Ceramics, Polymers and Composites ,Corrosion Mechanism of Materials and Protection Methods ,Economic, Environmental and Societal Issues in Materials Science and Engineering and students presentations				
Course Learning Outcomes			Teaching Methods	Assessment Methods	
Recognices with basic concepts, technologies, terms of materials science			10, 13, 14, 2, 23, 5, 9		
Evaluates the elastic and plastic deformation mechanism, strengthening mechanism as well as mechanical properties.			10, 13, 14, 16, 2, 5, 9	A, E, F, G	
Compares structure-property-process relations in materials.			10, 14, 16, 2, 5, 9	A, E, F, G	
Classify engineering materials and describe atomic bonds, orders, crystallography and the effects of bonding in materials.			10, 14, 16, 2, 5, 9	A, E, F, G	
Describe the application areas of materials			10, 14, 16, 2, 5, 9	A, E, G	
Teaching Methods	10: Discussion Method, 13: Case Study Method, 14: Self Study Method, 16: Question - Answer Technique, 2: Project Based Learning Model, 23: Concept Map Technique, 5: Cooperative Learning, 9: Lecture Method				
Assessment Methods	A: Traditional Written Exam, E: Homework, F: Project Task, G: Quiz				
Lecture Schedule					
Sequenc e	Topics	Preliminary Preparation			
1	Introduction to Material Science and Engineering □□				
2	Atomic Structure and Interatomic Bonding □□				
3	Fundamentals of Crystallography and the Structure of Crystalline Solids □□□□				
4	Imperfections in Solids				
5	Diffusion				
6	Mechanical Properties of Metals				
7	Dislocations and Plastic deformation □				
8	Strengthening mechanisms □				
9	Fracture, Fatigue, Creep behaviors □				
10	Phase diagrams				
11	Phase Transformations				
12	Properties and Applications of Metals, Ceramics, Polymers and Composites □□□□				
13	Corrosion Mechanism of Materials and Protection Methods □□□				
14	Economic, Environmental and Societal Issues in Materials Science and Engineering and students presentations □				
Evaluation Methods		Weight(%)			
Midterm Exam		30			
General Exam		70			

Resources

Fundamentals of Materials Science and Engineering: an Integrated Approach' William D. Callister Jr, David G. Rethwisch John Wiley and Sons Inc., 5th Edition, 2016.

1) Material Science and Engineering' William D. Callister Jr, David G. Rethwisch John Wiley and Sons Inc., 9th Edition, 2011.

2) The science and engineering of materials' Donald R. Askeland,, Pradeep P. Phulé, Thomson/Brooks-Cole, 4th Edition, 2003.