

**School of Engineering and Natural Sciences / Computer Engineering (English)**

**2023 - 2024 Academic Year**

**INTRODUCTION to MATERIAL SCIENCE**

**Syllabus**

<b>Course Description</b>					
<b>Name</b>	<b>Code</b>	<b>Semester</b>	<b>T+A Hour</b>	<b>Credit</b>	<b>ECTS</b>
INTRODUCTION to MATERIAL SCIENCE	COE1213240	Spring Semester	3+0	3	5
<b>Prerequisites Courses</b>					
<b>Recommended Elective Courses</b>					
<b>Language of Instruction</b>	English				
<b>Course Level</b>	First Cycle (Bachelor's Degree)				
<b>Course Type</b>	Elective				
<b>Course Coordinator</b>	Prof.Dr. Talip ALP				
<b>Name of Lecturer(s)</b>	Prof.Dr. Talip ALP				
<b>Assistant(s)</b>					
<b>Aim</b>	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				
<b>Course Content</b>	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 ,Phase diagrams ,Fracture, Fatigue, Creep behaviors ,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				
<b>Course Learning Outcomes</b>			<b>Teaching Methods</b>	<b>Assessment Methods</b>	
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	
<b>Teaching Methods</b>	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				
<b>Assessment Methods</b>	A: Traditional Written Exam, E: Homework, F: Project Task, G: Quiz				
<b>Lecture Schedule</b>					
<b>Sequenc e</b>	<b>Topics</b>	<b>Preliminary Preparation</b>			
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 □				
<b>Evaluation Methods</b>		<b>Weight(%)</b>			
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.

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

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

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