

**ABDULLAH GÜL UNIVERSITY
GRADUATE SCHOOL OF ENGINEERING AND SCIENCE
ADVANCED MATERIALS AND NANOTECHNOLOGY MSc. PROGRAM
COURSE DESCRIPTION**

Course Name	Code	Semester	T+P Hour	Credit	ECTS
Material Science & Engineering	AMN 501	FALL - SPRING	3 + 0	3	10

Prerequisite Courses -

Type of the Course	Core
Language of Instruction	English
Coordinator of the Course	Assist. Prof. İlker ERDEM
Lecturer(s) of the Course	Assist. Prof. İlker ERDEM
Assisting Personnel	-
Objective of the Course	Introducing fundamentals of materials science and engineering. The course will present the students a main understanding about the structural and physicochemical properties of different types of materials with the aim of preparation of students for advanced research and learning activities.
Learning Outcomes	<ol style="list-style-type: none"> 1. Learning types of materials and their utilization in different applications 2. Learning chemical structures and raw materials for different materials 3. Learning effects of production conditions on different materials 4. Learning techniques used for characterization of technical properties of different materials 5. Learning fundamental techniques for material processing
Course Content	<ul style="list-style-type: none"> • Introduction of types of materials and their application areas, • Introduction of chemical structure of materials, • Introduction of effects of processing parameters on materials' structure, • Introduction of characteristics mechanical properties of materials, • Introduction of characterization methods for ceramic materials, • Introduction of characteristic properties of metal, polymer and ceramic materials

SUBJECTS, PRELIMINARY PREPARATIONS AND POST-LECTURE ACTIVITIES

Week	Subjects	Practice
1	Introduction: What are the properties of materials? Why are they important?	
2	Atomic structure and interatomic bonding: Electron distribution, chemical bonding, effect of interatomic structure on materials' properties	
3	Atomic structure and interatomic bonding: Electron distribution, chemical bonding, effect of interatomic structure on materials' properties	
4	The structure of crystalline solids: Crystal structures	
5	Imperfections in solids: Types of imperfections in crystal structure and their effects on materials properties	
6	Diffusion: Importance of diffusion in solid materials and its applications during material processing	
7	Midterm	
8	Mechanical properties of metals: Mechanical properties of materials, their importance for application of metals	
9	Mechanical properties of metals: Mechanical properties of materials, their importance for application of metals	

10	Polymer structures: Polymers, their structure and applications	
11	Polymer structures: Polymers, their structure and applications	
12	Phase diagrams: Phases of materials, changing of phases with respect to processing conditions and its effects on material properties	
13	Structure and properties of ceramics: Ceramic materials and their applications	
14	Term project presentations	

SOURCES/REFERENCES

Course Notes	The notes and the slides of the course
Other References	1. W.D. Callister, D. G. Rethwisch, "Material Science and Engineering: An Introduction", 9th Edition, John Wiley & Sons, Inc., NY, 2014.

MATERIAL SHARING

Documents	The lecturing slides of the course are shared on canvas or another online application
Homework	The homework of the course are shared on canvas or another online application
Exams	
Projects	

EVALUATION METHODS

IN-TERM ACTIVITIES	QUANTITY	WEIGHT, %
Midterm Exam	1	30
Homework	4	10
Term Project	1	15
Final Exam	1	45
TOTAL		100
Effect of in-term Activities on Success		60
Effect of Final Exam on Success		40
TOTAL		100

Course Category

Basic Sciences and Mathematics	
Engineering Sciences	X
Social Sciences	

RELATIONSHIP BETWEEN LEARNING OUTCOMES OF THE COURSE WITH THE QUALIFICATIONS OF THE PROGRAM

No	Program Qualifications	Contribution Level				
		1	2	3	4	5
1	PQ1. Ability of Working Independently and Taking Responsibility				X	
2	PQ2. Learning Competence				X	
3	PQ3. Communication and Social Activity				X	
4	PQ4. Field-specific Competence					X

*from 1 to 5 the score increases.

ECTS / WORK LOAD TABLE

Activities	Activities	Duration (Hour)	Total Work Load (Hour)
Lectures (including exam week: 16x total lecture hours)	15	3	45

Midterm Exam (Preparation)	1	35	35
Final Exam (Preparation)	1	45	45
Homeworks	4	10	40
Repetition of the Topics	14	5	70
Report Preparation for Term Project	1	40	40
Presentation Preparation for Term Project	1	20	20
Total Work Load			295
Total Work Load / 30			9.83
ECTS Credits			10