ABDULLAH GÜL UNIVERSITY
GRADUATE SCHOOL OF ENGINEERING & SCIENCE
MATERIALS SCIENCE AND MECHANICAL ENGINEERING PROGRAM
COURSE DESCRIPTION AND SYLLABUS

Course Title	Code	Semester	T+L Hours	Credit	ECTS
Physics of Solids	MSME-676	FALL-SPRING	3 + 0	3	10

Prerequisite Courses	Quantum physics / modern physics are preferred

Type	Elective
Language	English
Coordinator	Murat Durandurdu
Instructor	Murat Durandurdu
Adjunt	none
Aim	To understand crystal and amorphous structures. To understand the mechanical, magnetic, dielectric and electrical properties of solids.
Learning Outcomes	Understanding crystal and amorphous structures To know the electrical properties of solids Understand the magnetic properties of solids To know mechanical properties of materials Understanding phase transitions in materials Explain the optical properties of solids.
Course Content	Crystal structures, amorphous structures, homopolar bonds, mechanical properties, semiconductors, metals, phase transitions, paramagnetism, diamagnetism, ferromagnetism, dielectric properties, superconductivity

WEEKLY TOPICS AND PRELIMINARY STUDY

Week	Topic	Preliminary Study
1	Introduction to quantum mechanics, De Broglie waves, Heisenberg principles and Schrödinger Equation, Quantum numbers of many electron atoms	The relevant articles from the literature
2	Crystal Structures	The relevant articles from the literature
3	Amorphous Materials	The relevant articles from the literature
4	Semiconductor Materials	The relevant articles from the literature
5	Metallic Materials	The relevant articles from the literature
6	Mechanical properties of Solids	The relevant articles from the literature
7	Phase Transitions	The relevant articles from the literature
8	Midterm	The relevant articles from the literature
9	Magnetic Materials	The relevant articles from the literature
10	Magnetic Materials	The relevant articles from the literature
11	Superconductivity	The relevant articles from the literature
12	Superconductivity	The relevant articles from the literature
13	Dielectric Materials	The relevant articles from

		the literature
14	Dielectric Materials	The relevant articles from the literature
15	Polymers	The relevant articles from the literature
16	Final Exam	

SOURCES	
Lecture Notes	Lecture notes and presentations
Other Sources	The Physics of Solids by J. B. Ketterson The Physics of Solids by Richard John Turton Concepts of Modern Physics, A. Beiser. Elementary Solid State Physics, M.Ali OMAR Introduction to Solid State Physics, C. KITTEL

COURSE MATERIALS SHARING	
Documents	Lectures notes are shared on the internet
Homeworks	Students will be given one homework each week
Exams	1 Midterm and 1 Final Exam

EVALUATION SYSTEM		
SEMESTER STUDY	**NUMBER**	**CONTRIBUTION**
Midterm	1	30%
Homework	10	30%
Quiz		
SUB-TOTAL	11	60%
Contribution of Semester Study		70%
Contribution of Final Exam	1	40%
TOTAL	12	100%

Course Category	
Sciences and Mathematics	50%
Engineering	50%
Social Sciences	0%

RELATIONSHIPS BETWEEN LEARNING OUTCOMES AND PROGRAM QUALIFICATIONS							
No	Program Qualifications	Contribution Level				
		1	2	3	4	5
1	Accessing knowledge, evaluating and interpreting information by doing scientific research in the field of Materials Science and Mechanical Engineering					x
2	Ability to use science and engineering knowledge for development of new methods in Materials Science and Mechanical Engineering					x
3	To be able to understand and analyze materials by using basic knowledge on Materials Science and Mechanical Engineering					x
4	Design and implement analytical, modeling and experimental research	x				
5	Solve and interpret the problems encountered in experimental research			x		
6	Considering scientific and ethical values during the collection and interpretation of data	x				
7	Integrating knowledge of different disciplines with the help of scientific methods, and completion and implementation of scientific knowledge using data		x			
8	To gain leadership ability and responsibility in disciplinary and interdisciplinary team works	x				
9	To be able to contribute to the solution of social, scientific and ethical problems encountered in the field of Materials Science and Mechanical Engineering		x			
10	To be able to define, interpret and create new information about the interactions	x				

	between various discipline of Materials Science and Mechanical Engineering					

*Increasing from 1 to 5.

ECTS / WORK LOAD TABLE			
Activities	Number	Duration (Hours)	Total Work Load
Course Length (includes exam weeks: 16x total course hours)	Each week	3	48
Out-of-class Study Time (Pre-study, practice)	15 weeks	4	60
Internet search, library work, literature search	15 weeks	3	45
Homework	11 hafta	14	154
Midterm	1	3	3
Final Exam	1	4	4
Total Work Load			
Total Work Load / 30		31	10.1
Course ECTS Credit			10