DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGY
COURSE SYLLABUS

Course Details								
Code					**Academic Year**			**Semester**
EBT206					2			4
Title					**T**	**A**	**L**	**ECTS**
Solid State Physics					2	1	0	6
Language	German							
Level	**Undergraduate**	**X**	**Graduate**		**Postgraduate**			
Department / Program	Energy Science and Technology							
Forms of Teaching and Learning	Face-to-face							
Course Type	**Compulsory**	**X**	**Elective**					
Objectives	This course aims to teach the basics of solid state physics, to make them understand the physical properties of metals and insulating materials, and to make them comprehend the importance of technology.							
Content	This course covers crystal structure of solids, reverse lattice, X-ray diffraction, crystal bonding, phonons I: crystal vibrations, phonons II: thermal properties, free electron fermi gas.							
Prerequisites	None							
Coordinator	Assist. Prof. Dr. Gülsüm Gündoğdu							
Lecturer(s)	Assist. Prof. Dr. Gülsüm Gündoğdu							
Assistant(s)	Res. Assist. Berat Berkan Ünal							
Work Placement	None							
Recommended or Required Reading								
Books / Lecture Notes	Katıhal Fiziğine Giriş (KITTEL), Translation: B. Karaoğlu, ARTE-Bilgi Tk, 1996. Elementary Solid State Physics, M. Ali Omar, 1993.							
Other Sources								
Additional Course Material								
Documents								
Assignments								
Exams								
Course Composition								
Mathematics und Basic Sciences	30						%	

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Engineering		%
Engineering Design		%
Social Sciences		%
Educational Sciences		%
Natural Sciences	30	%
Health Sciences		%
Expert Knowledge	40	%

Assessment

Activity	Count	Percentage (%)
Midterm Exam	1	40
Quiz		
Assignments		
Attendance		
Recitations		
Projects		
Final Exam	1	60
	Total	**100**

ECTS Points and Work Load

Activity	Count	Duration	Work Load (Hours)
Lectures	14	2	28
Self-Study	10	8	80
Assignments	14	3	42
Presentation / Seminar Preparation			
Midterm Exam	1	2	2
Recitations	14	1	14
Laboratory			
Projects			
Final Exam	1	2	2
		Total Work Load	**168**
		ECTS Points (Total Work Load / Hour)	**6**

Learning Outcomes

1	The ability to model and solve solid state physics problems will be improved.
2	The abilities will be improved to detect, define, formulate and solve complex physics problems in Solid State Physics and related fields by selecting and applying appropriate analysis and modeling methods.
3	The ability to work individually and to work within and across disciplines as a team will be improved.
4	Effective verbal and written communication skills in Turkish and the ability to use/improve foreign language knowledge will be improved.

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5	Awareness of the necessity of lifelong learning and the ability to access information, follow developments in science and technology and constantly renew themselves will be made.
Weekly Content	
1	Periodic arrangement of atoms, Symmetry operations, Mesh types
2	Occupancy ratio, Miller indices, Simple crystal structures, Non-ideal crystal structures
3	Diffraction of waves by crystals, X-ray diffraction, Electron diffraction, Neutron diffraction, Bragg's law
4	Reverse lattice, Diffraction condition, Laue equations and Ewald Sphere
5	Reverse lattice, Diffraction condition, Laue equations and Ewald Sphere
6	Brillouin zones and determination of the first Brillouin zone in cubic structures, Structure factor
7	Interatomic forces and bonds, noble gas crystals, ionic crystals, metallic crystals and covalent crystals
8	Midterm
9	Lattice vibrations, monatomic and polyatomic lattices
10	Lattice vibrations, monatomic and polyatomic lattices
11	State density, dielectric function, inelastic scattering by phonons
12	Heat capacity of phonons, Einstein model, Debye model, Thermal conductivity, Umklapp effects
13	Free Electron Fermi Gas, One-dimensional energy levels, Fermi-Dirac distribution function
14	Free electron gas in three dimensions, Heat capacity of electron gas, Electrical conductivity and Ohm's law, Thermal conductivity of metals
15	Dielectric function of electron gas, Motion in magnetic field, Hall effect
16	Final exam

Matrix of Course Learning Outcomes versus Program Outcomes

	P1	P2	P3	P4	P5	P6	P7	P8	P9
All	5	5	5		5		5		5
L1	5	5	5		5		5		5
L2	5	5	5		5		5		5
L3	5	5	5		5		5		5
L4	5	5	5		5		5		5
L5	5	5	5		5		5		5

Contribution Level: 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High

Prepared by:	
Date of Issue:	