



AYDIN ADNAN MENDERES UNIVERSITY COURSE INFORMATION FORM

Course Title		Solid State Physics II							
Course Code		FİZ436		Couse Level		First Cycle (Bachelor's Degree)			
ECTS Credit	7	Workload	181 (<i>Hours</i>)	Theory	3	Practice	0	Laboratory	0
Objectives of the Course		The purpose of this lecture is to that the electronic and heat properties of solid, crystal should be understand by using physics laws. And also, The background is done for future work.							
Course Content		Nearly free electron model and Bloch function, Wave equation of electron in a periodic Potential and Kronig Penney model, Energy band gap and classification of electronic features of solids, Equations of motion in semiconductor, Intrinsic carrier concentration, Band structure of some semiconductor, Impurity conductivity and the effect of this on some semiconductor materials, Fermi surface and construction of Fermi surface, Calculation of simple energy band diagram : Tight binding method, Investigation of dielectric properties of electron gas, Superconductivity and introduction of high TC superconductor, Investigation of some dielectric and magnetic properties, The concepts of Plasmons, polaritons, polarons and exciton, Low dimension systems and introduction to nanotechnology							
Work Placement		N/A							
Planned Learning Activities and Teaching Methods				Explanation (Presentation), Discussion					
Name of Lecturer(s)		Assoc. Prof. Yelda KADIOĞLU							

Assessment Methods and Criteria

Method	Quantity	Percentage (%)
Midterm Examination	1	20
Final Examination	1	70
Quiz	6	10
Assignment	6	10

Recommended or Required Reading

1	1.Introduction to Solid State Physics (C. Kittel)
2	Solid State Physics (J.R. Hook and H. E. Hall)

Week	Weekly Detailed Course Contents	
1	Theoretical	Nearly free electron model and Bloch function
2	Theoretical	Wave equation of electron in a periodic Potential and Kronig Penney model
3	Theoretical	Energy band gap and classification of electronic features of solids
4	Theoretical	Equations of motion in semiconductor
5	Theoretical	Intrinsic carrier concentration
6	Theoretical	Band structure of some semiconductor
7	Theoretical	Impurity conductivity and the effect of this on some semiconductor materials
8	Intermediate Exam	Midterm
9	Theoretical	Fermi surface and construction of Fermi surface
10	Theoretical	Calculation of simple energy band diagram : Tight binding method
11	Theoretical	Investigation of dielectric properties of electron gas
12	Theoretical	Superconductivity and introduction of high tc superconductor
13	Theoretical	Investigation of some dielectric and magnetic properties
14	Theoretical	The concepts of Plasmons, polaritons, polarons and exciton
15	Theoretical	Low dimension systems and introduction to nanotechnology

Workload Calculation

Activity	Quantity	Preparation	Duration	Total Workload
Lecture - Theory	14	1.5	3	63
Assignment	6	5	1	36
Quiz	6	2	1	18
Midterm Examination	1	25	2	27



Final Examination	1	35	2	37
Total Workload (Hours)				181
[Total Workload (Hours) / 25*] = ECTS				7
*25 hour workload is accepted as 1 ECTS				

Learning Outcomes

1	Able to evaluate the differences about metals semimetals and semiconductors by the band gap energy.
2	Able to classify the materials in according to their magnetic properties.
3	Able to analysis superconductivity and magnetic properties of materials.
4	Able to explain qualitatively electrical, optical, thermal, and magnetic data of solid in literatures using the solid-state physics concepts
5	Able to understand the physical process underlying many solid state devices.
6	Able to understand the elementary classical and quantum theory of free electrons and nearly free electrons in solids.
7	Able to have a basic knowledge about nanotechnology and material sciences.

Programme Outcomes (Physics)

1	To understand the importance of physics by understanding the general concepts of physics, matter and energy
2	To be able to define the movements of matter and to distinguish the characteristics of movements under different force (potential)
3	Be able to say the meaning of Lagrange and Hamiltonian formulations of the movement and apply them to simple problems,
4	To be able to express the fundamental concepts such as time, space, force, momentum and energy in the movements of matter close to the speed of light and be able to solve and interpret the simple problems related to
5	To be able to establish the relationship between electric and magnetic forces and to be able to illustrate their applications to technology and solve problems related to the movement of particles in electric and magnetic fields
6	Be able to say the basic laws of electromagnetics and apply them to problems, illustrate their applications to simple technology
7	To be able to tell the reasons of the differences between the classical cases and the quantum scale and explain the reasons
8	Explain the concepts of discontinuity, uncertainty, matter-antimatter, indecisiveness of quantum physics with examples and explain simple problems related to the subject.
9	To be able to solve the problems of micro-particles under different simple potentials and be able to say their meanings
10	To be able to establish the relationship between the movements and properties of multi-particle systems and the laws of probability and solve simple problems
11	To be able to illustrate the laws, meanings and applications of thermodynamics and use them
12	Be able to use their knowledge about quantum physics and mechanics in explaining some properties of atoms and nuclei
13	To be able to show the meanings of some theoretical concepts by experimenting, and develop a strong relationship between thought and the real world, develop analytical thinking
14	To be able to apply the meanings of the basic laws of physics, their comprehension of universality and the relations between them and the unity of the laws of nature.
15	Use computer to solve physics problems
16	To be able to understand the problems by using their analytical knowledge skills and to propose solutions by dealing with the laws of physics
17	Be able to use the knowledge of physics to understand new technologies
18	To be able to tell the relations between symmetry and conservation laws in laws of physics

Contribution of Learning Outcomes to Programme Outcomes 1:Very Low, 2:Low, 3:Medium, 4:High, 5:Very High

	L1	L2
P14		4
P17	4	3

