AYDIN ADNAN MENDERES UNIVERSITY
COURSE INFORMATION FORM

Course Title	Superconductivity and İts Applications								
Course Code	FİZ432		Couse Level	First Cycle (Bachelor's Degree)					
ECTS Credit	7	Workload	179 *(Hours)*	Theory	3	Practice	0	Laboratory	0
Objectives of the Course	To give comparative information about superconductivity with conventional conductivity. To give information about classical superconductivity To give information about theories of superconductivity. To give information about high temperature superconductivity. To give information about superconductivity tunneling. To give information about engineering applications of superconductivity								
Course Content	Properties of materials in the superconducting state; charge flow dynamics of type II superconductors; high Tc superconductors; applications for computers and high-frequency devices.								
Work Placement	N/A								
Planned Learning Activities and Teaching Methods	Explanation (Presentation), Discussion, Individual Study, Problem Solving								
Name of Lecturer(s)	Prof. Gönül BİLGEÇ AKYÜZ								

Assessment Methods and Criteria		
Method	Quantity	Percentage (%)
Midterm Examination	1	30
Final Examination	1	70
Assignment	10	10

Recommended or Required Reading	
1	T. P. Orlando and K. A. Delin, Foundations of Applied Superconductivity, Prentice Hall.
2	F. C. Moon, 1994, Superconducting Levitation, John Wiley
3	Y. Wang, Fundamental Elements of Applied Supercunductivity in Electrical Engineering, 2013, Wiley
4	P. J. Lee, 2001, Engineering Superconductivity, John Wiley.

Week	Weekly Detailed Course Contents	
1	Theoretical	Conventional superconductivity
2	Theoretical	Introduction to superconductivity
3	Theoretical	Classical superconductors: Meisner effect and flux quantization.
4	Theoretical	Ginzburg-Landau and London theories.
5	Theoretical	BCS theory and high temperature superconductivity
6	Theoretical	Superconductivity tunneling
7	Theoretical	Critical states and transport phenomena.
8	Intermediate Exam	Midterm
9	Theoretical	Levitation and frozen image model
10	Theoretical	Superconducting MagLev
11	Theoretical	Superconducting Motor and Generators
12	Theoretical	Superconducting Magnetic Energy Storage
13	Theoretical	Superconducting Flywheel Energy Storage
14	Theoretical	Superconducting Fault Current Limiters
15	Final Exam	Final

Workload Calculation				
Activity	Quantity	Preparation	Duration	Total Workload
Lecture - Theory	15	5	3	120
Assignment	10	3	1.5	45
Midterm Examination	1	5	2	7

Final Examination	1	5	2	7
			Total Workload (Hours)	179
			[Total Workload (Hours) / 25*] = **ECTS**	7
**25 hour workload is accepted as 1 ECTS*				

Learning Outcomes	
1	To be able to define the superconductivity phenomena with conventional conductivity
2	To be able to describe superconductivity in terms of Gizburg-Landau and London theories.
3	To be able to understand BCS theory and describe high temperature superconductivity with BCS theory
4	To be able to understand superconductivity tunneling and transport phenomena.
5	To be able to have opinion about the applications of superconductivity.

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	L3	L4	L5
P1	4	4			
P2	4	4	4		
P3	3		3		2
P4		4		5	
P5	5	5	4	4	4