AYDIN ADNAN MENDERES UNIVERSITY
COURSE INFORMATION FORM

Course Title	Quantum Mechanics II								
Course Code	FİZ322		Couse Level	First Cycle (Bachelor's Degree)					
ECTS Credit	8	Workload	206 *(Hours)*	Theory	4	Practice	0	Laboratory	0
Objectives of the Course	To complete the introduction of the quantum mechanics and explain its applications to some simple Microsystems								
Course Content	Angular momentum, hydrogen atom, identical particles								
Work Placement	N/A								
Planned Learning Activities and Teaching Methods	Explanation (Presentation), Discussion, Problem Solving								
Name of Lecturer(s)	Lec. Cenk AKYÜZ								

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

Recommended or Required Reading	
1	Kuantum Mekaniği (Temel Kavramlar ve Uygulamaları) (Authors: Tekin Dereli, Abdullah Verçin)
2	Introduction to Quantum Mechanics (Author: David J. Griffiths)

Week	Weekly Detailed Course Contents	
1	Theoretical	Introduction to Quantum Mechanics in three dimensions
2	Theoretical	The Schrödinger Equation in spherical coordinates
3	Theoretical	Angular Momentum (The construction of the Operators)
4	Theoretical	The algebra of Angular Momentum (Creation and annihilation operators)
5	Theoretical	Formation of Angular Momentum Matrix
6	Theoretical	Atoms with one electron
7	Theoretical	Hydrogen atom
8	Intermediate Exam	Midterm
9	Theoretical	Spin
10	Theoretical	The addition of Angular momentum
11	Theoretical	Identical Particles 1 (Systems with two particles – Atoms)
12	Theoretical	Identical particles 2 (Solids, Quantum Statistical Mechanics)
13	Theoretical	Variation principle
14	Theoretical	WKB Approximation
15	Theoretical	The discussion of the philosophy of quantum physics and its applications
16	Final Exam	Final Exam

Workload Calculation				
Activity	Quantity	Preparation	Duration	Total Workload
Lecture - Theory	14	4	4	112
Quiz	10	5	1	60
Midterm Examination	1	10	2	12
Final Examination	1	20	2	22
			Total Workload (Hours)	206
			[Total Workload (Hours) / 25*] = **ECTS**	8
**25 hour workload is accepted as 1 ECTS*				

Learning Outcomes	
1	The student should be able to distinguish classical concepts and concepts in quantum scale and explain their difference with particular examples
2	The student should be able to solve problems about the motion of micro-particles in different potentials and command about their meanings
3	The student should be able to use her/his knowledge in explaining some of the properties of atoms and nuclei
4	The student should be able to explain the concept of discreteness, uncertainty, instability with particular examples and solve problems about these concepts
5	The student should be able to comprehend the relationship with the properties and the motion of many-body systems and solve simple problems involving these matters.
6	The student should be able to comprehend the importance of angular momentum especially in spherically symmetric systems
7	The student should be able to propose approximate solutions to the problems which can not be solved exactly
8	The student should be able to foil the charlatans who does not understand the philosophy of the nature of quantum mechanics but use it to foil people

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	L6	L7	L8
P1	2	3	2	3	2	1	1	1
P2	2	3	3	4	3	2	3	1
P3	2	3	3	3	3	2	3	1
P4	1	1	1	1	1	1	1	1
P5	1	1	1	1	1	1	1	1
P6	1	1	1	1	1	1	1	1
P7	5	4	4	4	3	4	2	3
P8	3	4	4	5	3	4	3	3
P9	4	5	5	4	4	3	4	1
P10	3	4	4	3	5	2	3	1
P11	1	1	1	1	1	1	1	1
P12	2	4	4	4	4	4	5	1
P13	2	2	2	2	2	2	2	3

P14	2	2	2	3	4	4	3	1
P15	1	1	1	1	1	1	1	1
P16	3	3	3	3	3	3	3	5
P17	2	2	2	2	2	2	2	5
P18	2	3	3	3	4	4	3	1