AYDIN ADNAN MENDERES UNIVERSITY
COURSE INFORMATION FORM

Course Title	Quantum Mechanics								
Course Code	FZK511		Couse Level	Second Cycle (Master's Degree)					
ECTS Credit	9	Workload	230 *(Hours)*	Theory	3	Practice	0	Laboratory	0
Objectives of the Course	Discussion of similarities and differences between quantum mechanics and classical mechanics by teaching the basic concepts of quantum mechanics, representation of mathematical formulation of quantum mechanics, representation of applications of quantum mechanics to basic systems like harmonic oscillator.								
Course Content	Quantum theory and wave structure of the matter, the meaning of the wave function, wave packet, free particle motion and wave equation, Schrödinger equation wave function and operator algebra, principles of wave mechanics, scattering problem in one dimension, transfer and scattering matrices, harmonic oscillator, WKB approximation ,								
Work Placement									
Planned Learning Activities and Teaching Methods	Explanation (Presentation), Discussion, Individual Study, Problem Solving								
Name of Lecturer(s)	Lec. Onur GENÇ								

Assessment Methods and Criteria		
Method	Quantity	Percentage (%)
Midterm Examination	1	20
Final Examination	1	30
Quiz	2	8
Attending Lectures	14	28
Assignment	14	14

Recommended or Required Reading	
1	Quantum Mechanics, Eugen Merzbacher, 3.Ed
2	Quantum Mechanics, B.H. Bransden & C.J. Joachim, 2.Ed
3	Quantum Mechanics, Arno Bohm, 3. Ed.
4	Introduction to Quantum Mechanics, R. Shankar, 2.Ed.

Week	Weekly Detailed Course Contents	
1	Theoretical	Quantum Theory and Wave Structure of the Matter
	Preparation Work	B.H. Bransden & C.J. Joachim Quantum Mechanics (2. Ed) Section 2.1-2.4
2	Theoretical	The Meaning of the Wave Function
	Preparation Work	Eugen Merzbacher Quantum Mechanics (3. Ed.), Chapter 1
3	Theoretical	Wave Packets, Free Particle Motion
	Preparation Work	Eugen Merzbacher Quantum Mechanics (3. Ed.) Section 2.1-2.3
4	Theoretical	Wave Equation
	Preparation Work	Eugen Merzbacher Quantum Mechanics (3. Ed.) Section 2.4, 2.5
5	Theoretical	Schrödinger's Equation and Wave Function
	Preparation Work	Eugen Merzbacher Quantum Mechanics (3. Ed.) Section 3.1, 32
6	Theoretical	Operator Algebra
	Preparation Work	Eugen Merzbacher, Quantum Mechanics (3. Ed.), Section 3.1, 32

7	Theoretical	Principles of Wave Mechanics
	Preparation Work	Eugen Merzbacher, Quantum Mechanics (3. Ed.), Section 3.3
8	Intermediate Exam	Midterm Exam
9	Theoretical	Scattering Problems in One Dimension
	Preparation Work	Shankar R. Introduction to Quantum Mechanics (2. Ed.) Section 5.3, 5.4
10	Theoretical	Transfer and Scattering Matrices
	Preparation Work	Eugen Merzbacher, Quantum Mechanics (3. Ed.), Section 6.3
11	Theoretical	Harmonic Oscillator
	Preparation Work	Shankar R., Introduction to Quantum Mechanics (2. Ed.), Section 7.4
12	Theoretical	WKB Approximation
	Preparation Work	B.H. Bransden & C.J. Joachim, Quantum Mechanics (2. Ed.), Section8.4, Appendix B
13	Theoretical	Variational Methods
	Preparation Work	Shankar R., Introduction to Quantum Mechanics (2. Ed.), Section 16.1
14	Theoretical	Vector Spaces in Quantum Mechanics
	Preparation Work	Eugen Merzbacher, Quantum Mechanics (3. Ed.) Section 9.1,9.92
15	Theoretical	Operators in Quantum Mechanics and Their Algebras
	Preparation Work	Eugen Merzbacher, Quantum Mechanics (3. Ed.), Section 9.3-9.6
16	Final Exam	Final Exam

Workload Calculation

Activity	Quantity	Preparation	Duration	Total Workload
Lecture - Theory	14	6	3	126
Assignment	12	3	3	72
Quiz	4	1	1	8
Midterm Examination	1	7	5	12
Final Examination	1	7	5	12
			Total Workload (Hours)	230
			[Total Workload (Hours) / 25*] = **ECTS**	9

**25 hour workload is accepted as 1 ECTS*

Learning Outcomes

1	To be able to explain the differences between the point of views of quantum mechanics and classical mechanics in the meaning of understanding the nature
2	To be able to discuss the meaning of wave function in quantum mechanics
3	To be able to solve the bound state and scattering problems in one dimension
4	To be able to construct the algebra of harmonic oscillator and explain the importance of harmonic oscillator in quantum mechanics
5	To be able to solve the problems approximately by WKB method which can not be solved exactly

Programme Outcomes *(Physics Master)*

1	The student should conceive the concepts in physics and may apply them on her/his own
2	The student should be able to conceive the relationship between the different physics laws and integrity of them and apply them in solving different physics problems

3	The student should know the basic principles of classical, quantum and relativistic physics and use them in the solutions of problems
4	The student should be able to do research in a specific area of physics
5	The student should be able to prepare reports on papers on the subject of her/his research and present her/his research subject in scientific conferences
6	The student should be able to explain the relationship between complicated problems and basic physics laws.
7	The student should be able to use computers for solving complicated physics problems
8	The student should be able to interrelate between the theory and the experiment. If she/he is experimentalist he/she has to explain the theory behind her/his work. If she /he is a theorist she/he should has to know the experiments in her/his subject.

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	5	5	3	5	3
P2	4	4	4	5	4
P3	5	5	4	5	4
P4	3	3	2	4	3
P5	1	1	1	1	1
P6	5	5	3	5	3
P7	1	1	1	2	1
P8	1	4	2	3	2