



Çanakkale Onsekiz Mart University

Education Information System

[DEGREE PROGRAMMES](#)[BOLOGNA](#)[THE INSTITUTION](#)[INFO FOR STUDENTS](#)You are here : [Home](#) [Bachelor's Degree \(First Cycle\)](#) [Physics](#) [Quantum Mechanics](#) **[Course Information](#)**

Course Information

COURSE INFORMATION

Course Title	Code	Semester	L+U Hour	Credits	ECTS
Quantum Mechanics	FZK354	6. Semester	4 + 2	5.0	9.0

Prerequisites	None
----------------------	------

Language of Instruction	English
--------------------------------	---------

Course Level	Bachelor's Degree (First Cycle)
---------------------	---------------------------------

Course Type	Compulsory
--------------------	------------

Mode of delivery	Face to face
-------------------------	--------------

Course Coordinator	Assist. Prof. Dr. Ayşe KÜÇÜKARSLAN
---------------------------	------------------------------------

Instructors	Assist. Prof. Dr. Mustafa KURT Assoc. Prof. Dr. Kıvanç SEL
--------------------	---

Assistants	
-------------------	--

Course Objectives	Angular Momentum, The Schrodinger Equation in Three Dimension, Hydrogen Atom, The Interaction of Charged Particles with the Electromagnetic Field, Matrix Representation of Operators, Spin, The Interaction of Charged Particles with the Electromagnetic Field, Time-Independent Perturbation Theory, Identical Particles.
--------------------------	--

Course Content	Angular Momentum, The Angular Momentum Commutation Relations, Raising and Lowering Operators for Angular Momentum, The Schrodinger Equation in Three Dimensions and the Hydrogen Atom, The Central Potential, The Hydrogen Atom, The Energy Spectra, The Free Particle, Particle in an Infinite Spherical Well, The Interaction of Charged Particles with the Electromagnetic Field, Classical Electrodynamics, The Schrodinger Equation for an Electron in Interaction with an Electromagnetic Field, Midterm exam, Matrix Representations of Angular Momentum Operators, General Relations in Matrix Mechanics, Spin, Eigen states of Spin 1/2, The Intrinsic Magnetic Moment of Spin 1/2 Particles, Paramagnetic Resonance, Addition of Two Spins, The Addition of Spin 1/2 and Orbital Angular Momentum, Matrix Representation of Operators, Matrices in Quantum Mechanics, Degenerate perturbation theory, Stark effect, Time independent perturbation theory, energy Eigen values and degenerate Eigen states, Final
-----------------------	--

Course Learning Outcomes	1) Apply the operator notation in solutions 2) Solve the problems of potentials and the harmonic oscillators 3) Explain the properties of general formalism of quantum mechanics 4) Define three dimensional quantum systems 5) Make calculation with approximation methods 6) Explain the concepts of angular momentum and spin 7) Solve the problems related to symmetry and transformations in quantum mechanics
---------------------------------	---

WEEKLY COURSE CONTENT

Week	Topics	Teaching and Learning Methods	Study Materials
------	--------	-------------------------------	-----------------

Quick Access

Physics

[Qualification Awarded](#)[Level of Qualification](#)[Qualification Requirements and Regulations](#)[Specific Admission Requirements](#)[Recognition of Prior Learning](#)[Profile of the Program](#)[Program Key Learning Outcomes](#)[Occupational Profile of Graduates](#)[Access to Further Studies](#)[Course Structure & Credits](#)[Exam Regulations & Assessment & Grading](#)[Graduation Requirements](#)[Mode of Study](#)[Programme Director\(or Equivalent\)](#)[Evaluation Questionnaire](#)[TYYÇ](#)

Course Information

[Course Information](#)[Weekly Course Content](#)[Resources](#)[Assessment](#)[Course Category](#)[CONTRIBUTION OF COURSE LEARNING OUTCOMES TO PROGRAMME OUTCOMES](#)[ECTS credits and course workload](#)

		and Techniques	
1. Week	Angular Momentum, The Angular Momentum Commutation Relations	Lecture, Problem solving, Homework	
2. Week	Raising and Lowering Operators for Angular Momentum	Lecture, Problem solving, Homework	
3. Week	The Schrodinger Equation in Three Dimensions and the Hydrogen Atom, The Central Potential	Lecture, Problem solving, Homework	
4. Week	The Hydrogen Atom, The Energy Spectra	Lecture, Problem solving, Homework	
5. Week	The Free Particle, Particle in an Infinite Spherical Well	Lecture, Problem solving, Homework	
6. Week	The Interaction of Charged Particles with the Electromagnetic Field, Classical Electrodynamics	Lecture, Problem solving, Homework	
7. Week	The Schrodinger Equation for an Electron in Interaction with an Electromagnetic Field	Lecture, Problem solving, Homework	
8. Week	Midterm exam	Exam	
9. Week	Matrix Representations of Angular Momentum Operators, General Relations in Matrix Mechanics	Lecture, Problem solving, Homework	
10. Week	Spin, Eigen states of Spin 1/2	Lecture, Problem solving, Homework	
11. Week	The Intrinsic Magnetic Moment of Spin 1/2 Particles, Paramagnetic Resonance	Lecture, Problem solving, Homework	
12. Week	Addition of Two Spins, The Addition of Spin 1/2 and Orbital Angular Momentum	Lecture, Problem solving, Homework	
13. Week	Matrix Representation of Operators, Matrices in Quantum Mechanics	Lecture, Problem solving, Homework	
14. Week	Degenerate perturbation theory, Stark effect	Lecture, Problem solving, Homework	
15. Week	Time independent perturbation theory, energy Eigen values and degenerate Eigen states	Lecture, Problem solving, Homework	
16. Week	Final Exam	Exam	

RESOURCES

Recommended Sources
Stephen Gasiorowicz, "Quantum Physics", 2003, John Wiley & Sons Inc., America
R.L.Liboff, "Introductory Quantum Mechanics", 2003, Pearson Education, Inc., San Francisco
R. H. Dicke and J. P. Wittke, " Introduction to Quantum Mechanics " , 1992, Addison Wesley, San Francisco
D. J. Griffiths, " Introduction to Quantum Mechanics", 2005, Pearson Education Inc., America

ASSESSMENT

Measurement and Evaluation Methods and Techniques		
Midterm exam, Homework, Final exam		
In-Term Studies	Quantity	Percentage
Mid Term Exam 1	1	40
Total	1	40
End-Term Studies	Quantity	Percentage
Final Exam	1	60
Total	1	60

Contribution Of In-Term Studies To Overall Grade	40
End-Term Studies	60
Total	100

COURSE CATEGORY

Course Category	Percentage
Core Courses	% 100

CONTRIBUTION OF COURSE LEARNING OUTCOMES TO PROGRAMME OUTCOMES

Programme Outcomes	Contribution Level	Contribution Level						
		DK1	DK2	DK3	DK4	DK5	DK6	DK7
PY1	4	4	4	4	4	4	4	4
PY2	3	3	2	4	3	4	2	3
PY3	3	3	3	2	4	3	3	3
PY4	3	3	4	2	3	3	3	3
PY5	3	4	2	4	2	3	3	3
PY6	0	0	0	0	0	0	0	0
PY7	0	0	0	0	0	0	0	0
PY8	0	0	0	0	0	0	0	0
PY9	3	2	4	3	3	4	3	2
PY10	0	0	0	0	0	0	0	0
PY11	0	0	0	0	0	0	0	0
PY12	0	0	0	0	0	0	0	0
PY13	3	2	4	4	2	4	2	3
PY14	0	0	0	0	0	0	0	0
PY15	3	4	3	2	4	4	2	2

*DK = Course's Contribution.

	0	1	2	3	4	5
Level of contribution	None	Very Low	Low	Fair	High	Very High

ECTS CREDITS AND COURSE WORKLOAD

Event	Quantity	Duration (Hour)	Total Workload (Hour)
Class Hours (14 weeks)	14	7	98
Final Exam Preparation	1	30	30
Mid Term Exam Preparation	1	25	25
Further Study	14	3	42
Assignment 1	2	14	28
Final Exam	1	3	3
Mid Term Exam 1	1	3	3
Total Workload			229
Total Workload / 25.5 (s)			8.98

ECTS Credit of the Course

9