Course Information

COURSE INFORMATION

Course Title	Code	Semester	L+U Hour	Credits	ECTS
Advanced Quantum Mechanics I	FZ5004		3 + 0	3.0	7.5

Prerequisites	None
Language of Instruction	Turkish
Course Level	Second Cycle
Course Type	Elective
Mode of delivery	Face to face
Course Coordinator	Assoc. Prof. Dr. Kıvanç SEL
Instructors	Prof. Dr. İsmail TARHAN Assoc. Prof. Dr. Hüseyin ÇAVUŞ
Assistants	
Course Objectives	General theory of quantum mechanics Schrödinger and Heisenberg representations, the path integral formulation, orbital and spin angular momentums, central potential problems, Wigner-Eckart theorem, symmetry in quantum mechanics, scattering theory, time-independent perturbations and partial waves, phase shift, identical particles and its behavior, time-dependent perturbations, approximation methods for time-independent and time-dependent perturbations, propagators.
Course Content	Mathematical foundation of quantum mechanics, Schrödinger equation, Schrödinger and Heisenberg representations, Path integral, Orbital and spin angular momentums, Central potential problems, Wigner-Eckart theorem, Identical particles and its behaviour, Perturbation theory, Time-independent perturbations, Approximation methods for time-independent and time-dependent perturbations.
Course Learning Outcomes	1) Recognize the fundamental concepts and theories of quantum mechanics 2) Relate the advanced concepts and theories of quantum mechanics and the classical mechanics 3) Apply the mathematical methods 4) Interpret the fundamental physics topics 5) Solve advanced physics problems

WEEKLY COURSE CONTENT

Week	Topics	Teaching and Learning Methods and Techniques	Study Materials
1. Week	Mathematical foundation of quantum mechanics	Lecture and recitation	
2. Week	Mathematical foundation of quantum mechanics	Lecture and recitation	

Quick Access

Physics (Master)
- 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

3. Week	Schrödinger equation, Schrödinger and Heisenberg representations	Lecture and recitation	
4. Week	Path integral	Lecture and recitation	
5. Week	Orbital and spin angular momentums	Lecture, recitation and homework	
6. Week	Orbital and spin angular momentums	Lecture and recitation	
7. Week	Central potential problems	Lecture and recitation	
8. Week	Mid-term exam	Written exam	
9. Week	Central potential problems	Lecture and recitation	
10. Week	Wigner-Eckart theorem	Lecture and recitation	
11. Week	Identical particles and its behaviour	Lecture and recitation	
12. Week	Perturbation theory	Lecture and recitation	
13. Week	Pertürbasyon teorisi	Lecture, recitation and homework	
14. Week	Time-independent perturbations	Lecture and recitation	
15. Week	Approximation methods for time-independent and time-dependent perturbations	Lecture and recitation	
16. Week	Final exam	Written exam	

RESOURCES

Recommended Sources
‘Modern Quantum Mechanics’, J.J. Sakurai, Addison Wesley, 0201539292 (ISBN-13: 978-0201539295), 1993
‘Kuantum Mekaniği’, Tekin Dereli, Türkiye Bilimler Akademisi, 9944252300, 2009
Introduction to Quantum Mechanics, David J. Griffiths. Pearson Prentice Hall, 0131118927 (ISBN-13: 978-0131118928), 2004

ASSESSMENT

Measurement and Evaluation Methods and Techniques		
Written exam, homework and presentations. (60% Final, 30% midterm, 10% homework and presentation)		
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	DK1	DK2	DK3	DK4	DK5
PY1	5	5	5	5	5	5
PY2	3	3	3	3	3	3
PY3	4	4	4	4	4	4
PY4	4	4	4	4	4	4
PY5	4	4	4	4	4	4
PY6	4	4	4	4	4	4
PY7	2	2	2	2	2	2
PY8	5	5	5	5	5	5
PY9	4	4	4	4	4	4
PY10	1	1	1	1	1	1
PY11	2	2	2	2	2	2
PY12	3	3	3	3	3	3
PY13	2	2	2	2	2	2
PY14	3	3	3	3	3	3
PY15	2	2	2	2	2	2

*DK = Course's Contrubution.

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

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ECTS CREDITS AND COURSE WORKLOAD

Event	Quantity	Duration (Hour)	Total Workload (Hour)
Class Hours (14 weeks)	14	3	42
Final Exam Preparation	1	31	31
Mid Term Exam Preparation	1	29.2	29.2
Further Study	14	3	42
Assignment 1	1	21	21
Final Exam	1	2	2
Mid Term Exam 1	1	2	2
Assignment 2	1	22	22
		Total Workload	191.2
		Total Workload / 25.5 (s)	7.50
		ECTS Credit of the Course	8