Course Information

COURSE INFORMATION

Course Title	Code	Semester	L+U Hour	Credits	ECTS
Quantum Mechanics	FZK339	5. Semester	4 + 2	5.0	6.0

Prerequisites	None
Language of Instruction	English
Course Level	Bacheclor's Degree (First Cycle)
Course Type	Compulsory
Mode of delivery	Face to face
Course Coordinator	Assist. Prof. Dr. Ayşe KÜÇÜKARSLAN
Instructors	Assoc. Prof. Dr. Hüseyin ÇAVUŞ Assoc. Prof. Dr. Kıvanç SEL
Assistants	
Course Objectives	Development of quantum physics, Wave-particle duality, Schrödinger's equation, operators, probability, expectation values, uncertainty principle, time independent Schrödinger's equation.
Course Content	Development of quantum physics: Blackbody radiation, photoelectric effect, compton effect, atomic structure, wave-particle duality, Schrödinger's equation, operators, probability, expectation values, uncertainty principle, time independent Schrödinger's equation, one dimensional systems: Eigenvalue calculation for particle in a box, the step potential, the infinite and square well potentials, the potential barrier and tunneling, bound states of square well potential, delta functions and delta function potentials, harmonic oscillator, general outline of wave mechanics, operators, eigenfuctions and eigenvalues (Hamiltonian), Dirac notation, time dependence and classical limit, operator methods in quantum mechanics
Course Learning Outcomes	1) to have the ability of applying the basic science knowledge. 2) to have the ability of understanding the physical fundamentals and analysis methods of interactions and properties of atomic scale particles 3) to gain the ability of understanding the quantum mechanics and its applications 4) to understand the relationships among the classical physics and quantum physics. 5) to have the ability of explaining the natural phenomena. 6) to gain the ability of associating the obtained information with technology and industry.

WEEKLY COURSE CONTENT

Week	Topics	Teaching and Learning Methods and Techniques	Study Materials
1. Week	Development of quantum physics:Blackbody radiation, photoelectric effect, Compton effect	Oral lectures with interactive discussions and	

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

		presentations	
2. Week	Development of quantum physics:Atomic structure,	Oral lectures with interactive discussions and presentations	
3. Week	Wave-particle duality.	Oral lectures with interactive discussions and presentations	
4. Week	Schrödinger equation	Oral lectures with interactive discussions and presentations	
5. Week	Operators, probability, uncertainty principle, expectation values	Oral lectures with interactive discussions and presentations	
6. Week	Schrödinger’s equation, time independent	Oral lectures with interactive discussions and presentations	
7. Week	One dimensional potentials: The step potential The infinite and square well potentials	Oral lectures with interactive discussions and presentations	
8. Week	The potential barrier and tunneling Bound states of square well potential	Oral lectures with interactive discussions and presentations	
9. Week	Delta functions and delta function potentials	Oral lectures with interactive discussions and presentations	
10. Week	General outline of wave mechanics Operators, eigenfuctions and eigenvalues (Hamiltonian)	Oral lectures with interactive discussions and presentations	
11. Week	General outline of wave mechanics Operators, eigenfuctions and eigenvalues (Hamiltonian)	Oral lectures with interactive discussions and presentations	
12. Week	Dirac notation, Time dependence and classical limit	Oral lectures with interactive discussions and presentations	
13. Week	Operator methods in quantum mechanics Energy spectrum of harmonic oscillator Time dependent operators	Oral lectures with interactive discussions and presentations	
14. Week	Operator methods in quantum mechanics Energy spectrum of harmonic oscillator Time dependent operators	Oral lectures with interactive discussions and presentations	
15. Week	General review	Oral lectures	
16. Week	Final Exam	Written Exam	

RESOURCES

Recommended Sources
Bekir Karaoğlu, 2008, Kuantum Mekaniğine Giriş, Seçkin Yayıncılık
Stephen Gasiorowicz. 2003, Quantum Physics, Wiley
Richard L. Liboff, 2002, Introduction to Quantum Mechanics, Addsion Wesley

ASSESSMENT

Measurement and Evaluation Methods and Techniques		
40% Mid Term Exam 60% 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	DK1	DK2	DK3	DK4	DK5	DK6
PY1	5	5	5	5	5	5	5
PY2	5	5	5	5	5	5	5
PY3	4	4	4	4	4	4	4
PY4	4	4	4	4	4	4	4
PY5	4	4	4	4	4	4	4
PY6	5	5	5	5	5	5	5
PY7	3	3	3	3	3	3	3
PY8	1	1	1	1	1	1	1
PY9	4	4	4	4	4	4	4
PY10	4	4	4	4	4	4	4
PY11	4	4	4	4	4	4	4
PY12	5	5	5	5	5	5	5
PY13	3	3	3	3	3	3	3
PY14	4	4	4	4	4	4	4
PY15	3	3	3	3	3	3	3

*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)
Mid Term Exam Preparation	1	20	20
Final Exam Preparation	1	24	24
Assignment 1	2	2	4
Class Hours (14 weeks)	14	6	84
Further Study	14	1	14
Mid Term Exam 1	1	2	2
Final Exam	1	2	2
Assignment 2	2	2	4
Total Workload			154
Total Workload / 25.5 (s)			6.04
ECTS Credit of the Course			6