Course Information								
Course Code	**T**	**P**	**L**	**C**	**ECTS**	**Type** C/E	**Language** TR/ENG etc.	**Year/Semester**
FİZ3001	**4**	**2**	**0**	**5**	**6**	**C**	**TR**	**3/FALL**
Course Name (Turkish**)**	**Kuantum Fiziği**							
Course Name (English**)**	**Quantum Physics**							

Unit/Program	Physics Department/Undergraduate Program
Course Prerequisite	No
Course Objectives	To introduce the principles and formalism of quantum mechanics and to make their applications.
Course Outline	Historical overview of the inadequacies of classical physics, matter and waves, propositions of quantum mechanics, potential barrier, finite potential well, some applications with two or three degrees of freedom, general formalism of quantum mechanics.
Textbook/ Material / Resources	1. E.H.Wichmann, Quantum Physics, Berkeley Physics Lectures-Vol. 4, Translated from the III Edition: Prof.Dr. Tahsin Nuri Durlu, Prof.Dr. Yalçın Elerman, Bilim Publications:46. 2. Karaoğlu, B., "Introduction to quantum mechanics", Seçkin Publishing, Ankara, 2008.
Internship Status	No

Course Precedents

University Name	**Program Name**	**Course Name**	**T-P-L-C; ECTS**	**Type**
Osmangazi University	**Physics**	**Quantum mechanics**	**4-0-0-4; 7**	**C**
Middle East Technical University (METU)	**Physics**	**Quantum mechanics**	**4-0-0-4; 8**	**C**

The instructor who proposed the course (Title, Name and Surname)	*Signature*
Instructors who can teach the course (Title, Name and Surname)	*Signature*

Academic justification for the opening of the course? (The effect of course outcomes on program outcomes, etc.)

Brief explanation of the course (theoretical lecture, applications, laboratory, studio, off-campus activity, using software, etc.)
Face-to-face courses will be taught under the supervision of the relevant faculty member.

External Stakeholder Opinions About the Course (It is expected that the opinions to be obtained from the business world that will employ your graduates or from real or legal persons outside the University who have expertise on the subject of the course will be specified. Proof documents must be attached to this form.)	
Stakeholder Name	**Opinion** (It should be given as a summary, it should not exceed two lines.)

Weekly Course Content Distribution		
Week	**Theory**	**Application/Laboratory**
1	The concept and scope of quantum, atoms and elementary particles, the limits of the application of classical theory.	
2	Discovery of Planck's constant and related problems, Photoelectric phenomenon, black body radiation, stability problem and size of atoms, Bohr's atomic model and quantum, problems.	
3	Physical quantities, units, physical constants, energy, quantities in molecular and atomic physics in quantum physics.	
4	Basic phenomena and applications in nuclear physics, hydrogen energy levels according to the Bohr model, quantum, gravity and electromagnetic forces, problems.	
5	Energy levels and terminology schemes, finitude of energy level widths, natural expansion.	
6	Doppler expansion and collision expansion of spectral lines, particle distribution by levels, applications of Boltzman distribution.	
7	Photons, photons as waves and particles, photon momentum, the most general energy-momentum relation.	
8	Compton phenomenon, electron-nucleus interaction, formation of x-rays, annihilation, pair formation, applications, problems.	
9	Midterm Exam	
10	Material particles, wave character of particle motion, de Broglie waves, neutron and electron waves, diffraction, electron diffraction, matter waves, Klein-Gordon wave equation.	
11	Uncertainty principle, Heisenberg's uncertainty relations, amplitude-intensity concepts, half-life, half-life, average life, atomic energies with uncertainty principle, spring-mass simulation in atoms and particles, problems.	
12	Schrodinger wave mechanics, Schrodinger's non-relativistic wave equation, some obstacle problems, obstacle crossing phenomenon, probability concept, probability density.	
13	Alpha radioactivity theory and applications, the concept of normalization and normation of wave functions, normalization, problems. Steady-state theory and stable energy levels, the concept of stability, quantization as a self-worth problem.	
14	Application of the Schrodinger wave equation to various potential wells, solutions and obtaining energy levels, applications, problems.	
15	Final Exam	
16		

Assessment			
Evaluation Criteria	**Activity**	**Custom**	**Contribution to Success Grade (%)**
	Midterm Exams	1	40
	Quizzes		
	Assignments		
	Projects		
	Term Paper		
	Laboratory		
	Other		
	Final Exam	1	60
		Sum:	100
Remarks			

Content Design and Subject Weight	Mathematics and Basic Sciences	90

(%)	Engineering Sciences	10
	Social Sciences	
	Health Sciences	
	Educational Sciences	
	Culture and Art Sciences	
	Design Information	

Workload (ECTS) Calculation			
Events	**Number**	**Duration (Hours)**	**Total workload (Hours)**
Fieldwork			
Midterm Exam Application	1	2	2
Self-Study (including pre-class and exam preparation)	14	2	28
Make-up Exam	1	2	2
Experiment and Observation			
Class Participation (Theory)	14	6	84
Homework			
Final Exam Practice	1	2	2
Laboratory			
Article Review			
Writing an Article			
Reading			
Case Study			
Performance			
Problem Solution	14	2	28
Project Preparation			
Project Submission			
Quiz			
Report Preparation			
Submitting Reports			
Role/Drama Work			
Seminar			
Oral Exam			
Team/Group Work			
Argument	4	1	4
Application/Practice			
Other			
TOTAL WORKLOAD:			**150**
ECTS CREDİTS OF THE COURSE: *(The number obtained as a result of Total Workload/25 is calculated by rounding to the whole number.)*			**6**

Program Outcomes (PO) / **Learning Outcomes (LO)** *(Course Outcomes)*		1	2	3	4	5	6	7	8	9	10	11
1	Comprehend the basic principles and concepts of quantum physics.	**5**	**5**	**5**	**4**	**3**	**3**	**5**	**5**	**5**	**1**	**1**
2	Comprehend natural phenomena from a quantum mechanical point of view.	**5**	**5**	**5**	**4**	**3**	**3**	**5**	**5**	**5**	**1**	**1**
3	To be able to relate and apply information between disciplines.	**5**	**5**	**5**	**4**	**3**	**3**	**5**	**5**	**5**	**1**	**1**

Organizer: Assoc. Prof. Dr. Seda HEKİM
Preparation Date: 20.05.2024