Course number	U-LAS12 20020 LE57		
Course title (and course title in English)	Introduction to Quantum Physics-E2 Introduction to Quantum Physics-E2	Instructor's name, job title, and department of affiliation	Graduate School of Engineering Senior Lecturer,Arseniy Aleksandrovich, Kuzmin
Group	Natural Sciences	Field(Classification)	Physics(Development)
Language of instruction	English	Old group	Group B
Number of credits	2		
Number of weekly time blocks	1	Class style	Lecture (Face-to-face course)
Year/semesters	2026 • Second semester		
Days and periods	Tue.4	Target year	Mainly 2nd year students
Eligible students	For science students		

[Overview and purpose of the course]

Quantum mechanics is one of the most successful theories in physics. It describes the physics of the microscopic world: molecular, atomic and subatomic processes. At first, we will follow the history of the quantum mechanics, and start with the black body radiation. The necessity of quantization arises from the failure to describe the black body radiation using classical physics. We will then examine the experimental evidences of the particle-wave duality. The Schrodinger equation is then introduced to describe simplest quantum systems. This course aims to show the necessity of quantum mechanics and to give listeners tools to describe the basic quantum systems.

[Course objectives]

To understand the fundamental concepts of quantum mechanics.
To learn mathematical methods which describe quantum objects.

[Course schedule and contents)]

In this course the following topics are covered:

1. Brief overview of relativistic energy and momentum. When classical physics was not enough anymore.
2. Black body radiation. Classical and quantum approaches.
3. Quantum properties of electro-magnetic radiation: photoelectric effect, Bothe experiment, Compton effect.
4. Rutherford model of atom.
5. Bohr model of atom.
6. Wave properties of particles: De Broglie's wave hypothesis.
7. Experimental conformations of De Broglie's hypothesis. Uncertainty principle.
8. Wave function and Schrodinger equation.
9. Particle in the infinite potential well.
10. One dimensional quantum system: harmonic oscillator.
11. Quantum tunneling of particles through potential barriers.
12. Physical states and operators.
13. Postulates of quantum mechanics.
14. Quantization of angular momentum.
15. Feedback

[Course requirements]

It is desirable to take introduction to physics A and B courses. Knowledge of mechanics and wave theory is

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Introduction to Quantum Physics-E2(2)

welcome.

[Evaluation methods and policy]

Evaluation will be based on:
30% homework, attendance, and participation
20% quiz
50% final exam

[Textbooks]

I. V. Savelyev 『Physics, a general course (vol. 3)』 （Mir Publishers） ISBN:5-03-000900-0

[References, etc.]

（References, etc.）
Introduced during class

[Study outside of class (preparation and review)]

Preparation for lectures will include revision of class materials and homework assignments. Detailed instructions will be given during the class.

[Other information (office hours, etc.)]

[Essential courses]