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| **Course title** | **Introduction to Quantum Mechanics** |
| **School name and date** | Quantum Dynamics and Open Systems 16.08.2022 - 20.08.2022 |
| **Teaching staff** | dr Adrian Kołodziejski |
| **Forms of classes, the realization and number of hours**  |
| 1. **Forms of classes**
 | Online lectures and problem solving sessions. |
| 1. **The realization of activities**
 | Online |
| 1. **Number of hours**
 | 30 (20 hrs of lectures and 10 hrs of problem solving sessions) |
| **Suggested prerequisite knowledge** |
| Knowledge of quantum mechanics is not required but students will need to be comfortable with vectors and matrices. Prior experience with calculus is helpful but not essential. |
| **Brief description of the course** |
| This is an introductory course in quantum mechanics. It is divides into two parts. In Part 1 we introduce the basic concepts: postulates of quantum mechanics, operators, measurement, pure and mixed states and uncertainty principle. Part 2 deals with solution of the Schrödinger equation for a couple of important systems. These include: spin particle in a magnetic field, a particle in an infinite well and quantum harmonic oscillator. After completing the course you will be well prepared to take a course in Open Quantum Systems. |
| **Course contents** |
| 1. Stern-Gerlach Experiment.
2. Postulates of Quantum Mechanics.
3. Operators and Measurement
4. Operators, Eigenvalues, Eigenvectors.
5. Hermitian and Projection Operators
6. Measurement.
7. Commuting Observables.
8. Uncertainty Principle.
9. Schrödinger Time Evolution.

a) Properties of the Schrödinger Equation.b) Spin Precession.1. Particle in a Box.
2. Quantum Harmonic Oscillator.
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| **Literature** |
| 1. A. C. Phillips, *Introduction to Quantum Mechanics*. John Wiley & Sons, 2003.
2. N. Zettili, *Quantum Mechanics Concepts and Applications 2nd Edition*. John Wiley & Sons, 2009.
3. F. Schwabl, *Quantum Mechanics 4th Edition*. Springer, 2007.
4. J. Pade*, Quantum Mechanics for Pedestrians 1: Fundamentals*. Springer, 2014.
5. D. Griffiths, *Introduction to Quantum Mechanics 2nd Edition*. Pearson Prentice Hall, 2005.
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