



Subject card

| | | | | | | | |
|---|---|--|--|-------------------------------------|--|------------|-----|
| Subject name and code | Introduction to physics of atom and atomic nucleus, PG_00047937 | | | | | | |
| Field of study | Biomedical Engineering | | | | | | |
| Date of commencement of studies | October 2023 | | Academic year of realisation of subject | | 2025/2026 | | |
| Education level | first-cycle studies | | Subject group | | Optional subject group Subject group related to scientific research in the field of study | | |
| Mode of study | Full-time studies | | Mode of delivery | | at the university | | |
| Year of study | 3 | | Language of instruction | | Polish | | |
| Semester of study | 5 | | ECTS credits | | 4.0 | | |
| Learning profile | general academic profile | | Assessment form | | exam | | |
| Conducting unit | Katedra Fizyki Atomowej, Molekularnej i Optycznej -> Faculty of Applied Physics and Mathematics | | | | | | |
| Name and surname of lecturer (lecturers) | Subject supervisor | | dr hab. Mateusz Zawadzki | | | | |
| | Teachers | | | | | | |
| Lesson types and methods of instruction | Lesson type | Lecture | Tutorial | Laboratory | Project | Seminar | SUM |
| | Number of study hours | 30.0 | 15.0 | 15.0 | 0.0 | 0.0 | 60 |
| | E-learning hours included: 0.0 | | | | | | |
| Learning activity and number of study hours | Learning activity | Participation in didactic classes included in study plan | | Participation in consultation hours | | Self-study | SUM |
| | Number of study hours | 60 | | 4.0 | | 36.0 | 100 |
| Subject objectives | Lectures and seminars are designed to present concepts , selected mathematical methods and experimental physics of atoms and molecules. | | | | | | |
| Learning outcomes | Course outcome | | Subject outcome | | Method of verification | | |
| | [K6_W02] knows and understands, to an advanced extent, selected laws of physics and physical phenomena as well as methods and theories explaining the complex relationships between them, constituting the basic general knowledge in the field of technical sciences related to the field of study | | Student knows the basic issues in the field of atomic and particle physics. Student solves physical problems and applies known quantum calculation methods, and analyzes and interprets the results of calculations. | | [SW1] Assessment of factual knowledge | | |
| | [K6_U02] can perform tasks related to the field of study in an innovative way as well as solve complex and nontypical problems, applying knowledge of physics, in changing and not fully predictable conditions | | Student can describe physical phenomena necessary to solve specific biomedical problems. The student describes important experiences in atomic and molecular physics and interprets their results. | | [SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject | | |
| Subject contents | <div>1. Quantum properties of radiation</div> <div>2. Experimental evidence of the quantum nature of radiation</div> <div>3. Wave properties of particles of material</div> <div>4. Schrodinger equation</div> <div>5. Structure of the atom</div> <div>6. The angular momentum of the atom</div> <div>7. Construction of electron shells</div> <div>8. Atom in a magnetic field: linear and quadratic Zeeman effect</div> <div>9. X-ray</div> <div>10. Atomic Optics</div> | | | | | | |

| | | | |
|--|--|--|-------------------------------|
| Prerequisites and co-requisites | | | |
| Assessment methods and criteria | Subject passing criteria | Passing threshold | Percentage of the final grade |
| | Tutorial - tests | 40.0% | 40.0% |
| | Exam | 50.0% | 40.0% |
| | Lab reports | 100.0% | 20.0% |
| Recommended reading | Basic literature | 1. B.H. Bransden, C.J. Joachain, Physics of atoms and molecules, Longman, 1983 2. R. Resnick, D. Halliday, and J. Walker, Fundamentals of Physics, 7th ed., John Wiley & Sons, 2005 | |
| | Supplementary literature | 1. H. Haken, H.Ch. Wolf, Atomic and quantum physics: an introduction to the fundamentals of experiment and theory, Springer-Verlag, 1984 | |
| | eResources addresses | Adresy na platformie eNauczanie: | |
| Example issues/ example questions/ tasks being completed | Derivation of Schrödinger equation. Populating the electron orbitals. Drawing diagrams of energy for the atom in presence of the magnetic field . Reflection of a particle from the potential barrier at the specified boundary conditions . Calculating the reflectance and transmission coefficients for particles encountering a barrier potential. | | |
| Work placement | Not applicable | | |

Document generated electronically. Does not require a seal or signature.