

## 1<sup>st</sup> Semester Courses

| Code   | Course Name                                 | Weekly Teaching Hours |   |   |      |
|--------|---|-----------------------|---|---|------|
|        |   | T                     | A | C | ECTS |
| FIZ500 | Master Thesis                               | 0                     | 0 | 0 | 30   |
| FIZ503 | *Advanced Quantum Mechanics I               | 3                     | 0 | 3 | 7,5  |
| FIZ505 | *Advanced Classical Mechanics I             | 3                     | 0 | 3 | 7,5  |
| FIZ507 | *Special Functions in Physics I             | 3                     | 0 | 3 | 7,5  |
| FIZ509 | *Advanced Statistical Mechanics I           | 3                     | 0 | 3 | 7,5  |
| FIZ511 | Structural Properties of Solids             | 3                     | 0 | 3 | 7,5  |
| FIZ513 | Solar Energy                                | 3                     | 0 | 3 | 7,5  |
| FIZ515 | Advanced Plasma Physics                     | 3                     | 0 | 3 | 7,5  |
| FIZ517 | Methods of Calculation of Molecule Physics  | 3                     | 0 | 3 | 7,5  |
| FIZ519 | Physics of Detectors                        | 3                     | 0 | 3 | 7,5  |
| FIZ521 | History of Science I                        | 3                     | 0 | 3 | 7,5  |
| FIZ523 | Interactions of Laser Radiation with Matter | 3                     | 0 | 3 | 7,5  |
| FIZ525 | Introduction to High Energy Physics I       | 3                     | 0 | 3 | 7,5  |

\*Compulsory courses (minimum 9 credits must be taken)

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|--------|---|-----------------------|---|---|------|
|        |   | T                     | A | C | ECTS |
| FIZ500 | Thesis  | 0                     | 0 | 0 | 30   |
| FIZ503 | *Advanced Quantum Mechanics I   | 3                     | 0 | 3 | 7,5  |
|        | Mathematical formalism of quantum mechanics- Postulas of Mechanics- Examples, Linear vector spaces- Postulas of Quantum Mechanics   |                       |   |   |      |
| FIZ505 | *Advanced Classical Mechanics I   | 3                     | 0 | 3 | 7,5  |
|        | Elementary Concepts of the Classical Mechanics and Conservation Laws, Variational Principles and Lagrange Equations, Hamilton's Equations, The Two-Body Central Force Problem, The Kinematics of Rigid Body Motion.   |                       |   |   |      |
| FIZ507 | *Special Functions in Physics I   | 3                     | 0 | 3 | 7,5  |
|        | A differential equation for special functions. Separation of variables. Solution of second-order equations. Introduction to Sturm-Liouville problems. Auxiliary functions. Geometric function theory. Legendre functions. Spherical harmonics. Bessel functions. Hermitte function. Laguerre function. Calculations of the special solutions with Green function. |                       |   |   |      |
| FIZ509 | *Advanced Statistical Mechanics I   | 3                     | 0 | 3 | 7,5  |
|        | Fundamental principles of Statistical Mechanics. Basic applications of the Statistical Mechanics. Equilibrium between phase and chemical states. Quantum statistics of ideal gases. Interacting particle systems. The kinetic theory of transport processes. Transport theory with the relaxation time approach.  |                       |   |   |      |
| FIZ511 | Structural Properties of Solids   | 3                     | 0 | 3 | 7,5  |
|        | Linear defects. Holes. Annealing. Solid solutions. Diffusion in solids. Phases. Binary phase diagrams. Solidification of metals. Martesit reactions.  |                       |   |   |      |
| FIZ513 | Solar Energy  | 3                     | 0 | 3 | 7,5  |

|        |  |   |   |   |     |
|--------|--|---|---|---|-----|
|        | Source of the solar energy and development of solar cell. Areas of usage for solar energy, Advantages and disadvantages of solar energy. Fundamental properties of semiconductors. Interaction of light with semiconductors, Electrical characteristic of solar cell under dark and light. Efficiency calculations and efficiency loss. Technology of developed solar cell. Design of Silicon solar cell. Other semiconductor solar cell structures. |   |   |   |     |
| FIZ515 | Advanced Plasma Physics  | 3 | 0 | 3 | 7,5 |
|        | Single particle motion, Particle distribution and fluids equations, Collisions, Electromagnetic waves in the plasma and radiation emission, Thermonuclear fusion.  |   |   |   |     |
| FIZ517 | Calculation methods in of Molecular Physics  | 3 | 0 | 3 | 7,5 |
|        | Methods for the determination of state wave functions of molecules.  |   |   |   |     |
| FIZ519 | Physics of Detectors   | 3 | 0 | 3 | 7,5 |
|        | Technics of the Nuclear Particle Physics Experiments. Interpretation and statistical study of the experimental data. General characters of detectors.  |   |   |   |     |
| FIZ521 | History of Science I   | 3 | 0 | 3 | 7,5 |
|        | Importance of science and its value, The contents and limits of scientific method, Scientific approach and scientific laws, Causality in science, Relation between science and formal disciplines, Scientific research methodology, Structure of scientific revolution, Science and philosophy, Science in ancient civilizations.  |   |   |   |     |
| FIZ523 | Interactions of Laser Radiation with Matter  | 3 | 0 | 3 | 7,5 |
|        | Interaction with atom. The electron in the laser fields. Induced polarization, Shifting in atomic energy levels, Multi-photon ionization.  |   |   |   |     |
| FIZ525 | Introduction to High Energy Physics I  | 3 | 0 | 3 | 7,5 |
|        | Elementary particles and classification of particles. Fundamental interactions.  |   |   |   |     |

