DEPARTMENT OF PHYSICS CATALOGUE

SEPTEMBER 2018

VI.II. Department of Physics

VI.II.I. Introduction

The Department of Physics at the Hashemite University was one of the first to be established among the university's departments. The principal aim of the Department of Physics is to offer academic programs and high quality research, and to raise students' educational standards to qualify them to fill academic post at universities, in the industry and in the governmental sector.

Courses offered by the Department of Physics are prepared to offer the best opportunities for future scientists to pursue the ever-changing scientific vistas and to give them the best training to compete in the highly competitive job market in our region and the world. The completion of the bachelor's program and the conferring of the degree require passing 132 credit hours. At present, the department has staff of (20) faculty members, (4) teaching assistant, and (4) technicians. The department has seven teaching labs in addition to four research labs.

VI.II.II. Department requirements

Eighty-one (81) credit hours of coursework are required to fulfill the department requirements as follows:

VI.II.II.I. Compulsory courses

Sixty–three (63) credit hours of coursework are required to fulfill the department requirements:

Course Number	Course Title	Weekly Hours		Credit Hours	Prerequisites
		Lecture	Laboratory		
110101203	Ordinary Differential Equations (1)	3	0	3	110101102
110102103	General Physics Laboratory (1)	0	3	1	1701081136 or concurrent
110103103	General Chemistry Laboratory (1)	0	3	1	1701081138 or concurrent
1801041103	Practical General Biology (1)	0	3	1	110108105 or concurrent
110102104	General Physics Laboratory (2)	0	3	1	110102102 or concurrent and 110102103
110102141	Thermal and Material Physics	3	0	3	110102102
110102203	General Physics (3)	3	0	3	110102102
110102211	General Physics Laboratory (3)	0	3	1	110102203 or concurrent
110102232	Electronics	3	0	3	110102102
110102261	Modern Physics (1)	3	0	3	110102102 and 110101102
110102262	Modern Physics (2)	3	0	3	110102261
110102281	Mathematical Physics (1)	3	0	3	110102102 and 110101102
110102282	Mathematical Physics (2)	3	0	3	110102281 and 110101203
110102283	Computer	0	3	1	110102203

	Applications in Physics Laboratory				
110102311	Electronics Laboratory	0	3	1	110102232
110102312	Advanced Physics Laboratory (1)	0	6	2	110102211 and 110102261
110102321	Physical Optics	3	0	3	110102203 and 110102281
110102331	Electricity and Magnetism (1)	3	0	3	110102282
110102332	Electricity and Magnetism (2)	3	0	3	110102331
110102341	Thermodynamics	3	0	3	110102141 and 110102281
110102351	Classical Mechanics	3	0	3	110102281 and 110101203
110102362	Quantum Mechanics (1)	3	0	3	110102261 and 110102282
110102364	Quantum Mechanics (2)	3	0	3	110102362 and 110102262
110102411	Advanced Physics Laboratory (2)	0	6	2	110102364
110102442	Statistical Mechanics	3	0	3	110102341 and 110102364
110102471	Solid State Physics	3	0	3	110102364
110102491	Seminar	1	0	1	Student has finished 90 credit hours

VI.II.II.II. Elective courses

A minimum of eighteen (18) credit hours of coursework are required and selected from the following list:

Course Number	Course Title	Weekly Hours		Credit Hours	Prerequisites
		Lecture	Laboratory		
110102322	Waves and Vibrations	3	0	3	110102281
110102329	Astrophysics	3	0	3	110102261
110102361	Special theory of Relativity	3	0	3	110102261
110102363	Medical Physics	3	0	3	110102262
110102383	Computational Physics	2	3	3	110102282
110102433	Plasma Physics	3	0	3	110102332
110102461	Atomic and Molecular Physics	3	0	3	110102364
110102463	Nuclear Physics	3	0	3	110102364
110102464	Laser Physics	3	0	3	110102364
110102465	Radiation Physics	3	0	3	110102262
110102467	Biophysics	3	0	3	110102262
110102472	Physics of Semiconductors	3	0	3	110102471

110102495	Special Topics	3	0	3	Student has finished 90 credit hours
110103102	General Chemistry (2)	3	0	3	1701081138

VI.II.II.III. Free elective courses

Physics Students can choose any (3) credit hours course from courses offered by the University's faculties including the Faculty of Science, except the following two courses.

1. General physics (110102107)
2. General physics laboratory (110102108)

VI.II.II.IV. Courses offered by the department

The following table represents the whole courses offered by the Department of Physics:

Course Number	Course Title	Weekly Hours		Credit Hours	Prerequisites
		Lecturer	Laboratory		
110102099	Principles of General Physics	3	0	3	-
1701081136	General Physics* (1)	3	0	3	Given by the department of basic sciences and taught by physics faculty members
110102102	General Physics (2)	3	0	3	1701081136
110102103	General Physics Laboratory (1)	0	3	1	1701081136 or concurrent
110102104	General Physics Laboratory (2)	0	3	1	110102102 or concurrent and 110102103
110102107	General Physics	3	0	3	-
110102108	General Physics Laboratory	0	3	1	110102107 or concurrent
110102109	General Physics for Medical Students	3	0	3	-
110102141	Thermal and Material Physics	3	0	3	110102102
110102203	General Physics (3)	3	0	3	110102102
110102211	General Physics Laboratory (3)	0	3	1	110102203 or concurrent
110102232	Electronics	3	0	3	110102102
110102261	Modern Physics (1)	3	0	3	110102102 and 110101102
110102262	Modern Physics (2)	3	0	3	110102261
110102281	Mathematical Physics (1)	3	0	3	110102102 and 110101102
110102282	Mathematical Physics (2)	3	0	3	110102281 and 110101203
110102283	Computer	0	3	1	110102203

	Applications in Physics Laboratory				
110102311	Electronics Laboratory	0	3	1	110102232
110102312	Advanced Physics Laboratory (1)	0	6	2	110102211 and 110102261
110102321	Physical Optics	3	0	3	110102203 and 110102281
110102322	Waves and Vibrations	3	0	3	110102281
110102329	Astrophysics	3	0	3	110102261
110102331	Electricity and Magnetism (1)	3	0	3	110102282
110102332	Electricity and Magnetism (2)	3	0	3	110102331
110102341	Thermodynamics	3	0	3	110102281 and 110102141
110102351	Classical Mechanics	3	0	3	110102281 and 110101203
110102361	Special theory of Relativity	3	0	3	110102261
110102362	Quantum Mechanics (1)	3	0	3	110102261 and 110102282
110102363	Medical Physics	3	0	3	110102262
110102364	Quantum Mechanics (2)	3	0	3	110102362 and 110102262
110102383	Computational Physics	2	3	3	110102282
110102411	Advanced Physics Laboratory (2)	0	6	2	110102364
110102433	Plasma Physics	3	0	3	110102332
110102442	Statistical Mechanics	3	0	3	110102341 and 110102364
110102461	Atomic and Molecular Physics	3	0	3	110102364
110102463	Nuclear Physics	3	0	3	110102364
110102464	Laser Physics	3	0	3	110102364
110102465	Radiation Physics	3	0	3	110102262
110102467	Biophysics	3	0	3	110102262
110102471	Solid State Physics	3	0	3	110102364
110102472	Physics of Semiconductors	3	0	3	110102471 or concurrently
110102491	Seminar	1	0	1	Student has finished 90 credit hours
110102495	Special Topics	3	0	3	Student has finished 90 credit hours

*** See Department of Basic Sciences for course description**

VI.II.III. Course descriptions

110102099 Principles of General Physics; 3 CH (3+0)

This course introduces the students to general principles in physics such as units and measurements, density and atomic mass, conversion of units, dimensional analysis. In addition, it explains the concepts of mechanics like Vectors, one-dimensional motion, Newton's laws and applications of Newton's laws. The course also explains the basics of electricity by discussing Coulomb's law, the electric field for point charges, electric potential for point charges, current and resistance, resistors in series and in parallel, Ohm's law, electric circuits for direct current and capacitors and their connection in series and in parallel. Finally, the course covers several topics in magnetism such as magnetic field, motion of a charge in a magnetic field and magnetic force on a conductor carrying current.

110102102 General Physics (2); 3 CH (3+0) Prerequisites: 1701081136

This course explains the principles of charge and matter, electric field, Gauss's Law and its applications, electric potential, capacitance and dielectrics, current and resistance, electromotive force and circuits, magnetic force on a charge and on a wire carrying current, sources of magnetic field, Biot-Savart law, Ampere's law, electromagnetic induction and Faraday's law.

110102103 General Physics Laboratory (1); 1 CH (0+3) Prerequisites: 1701081136 or concurrently

Students perform some experiments of 3 hrs/week that related to the course content of 1701081136. These experiments include: Collection and analysis of data, measurements and errors, vectors, kinematics of rectilinear motion, force and motion, collision in two dimensions, rotational motion, simple pendulum, measurement of acceleration of gravity and measurement of coefficient of friction and specific heat of metals.

110102104 General Physics Laboratory (2); 1 CH (0+3) Prerequisites: 110102102 or concurrently and 110102103

Students perform some experiments of 3 hrs/week that are related to the course content of 110102102. These experiments include: electric field mapping, specific charge of copper ions, Wheatstone bridge, power transfer, potentiometer, capacitors in series and parallel, analysis of RC circuits for dc current, Kirchhoff's rules, Ohm's law, magnetic field of a current, electromagnetic induction, mechanical equivalent of heat and converging and diverging lenses.

110102107 General Physics; 3 CH (3+0)

This course introduces the students to the basics of mechanics, which include kinematics and dynamics of motion of particles, circular motion,

work and energy. In addition, it elucidates the principles of electricity such as electric force, electric field, electric potential, current and resistance and capacitors. Furthermore, the course covers the basics of magnetism like magnetic force and magnetic field as well as the basics of thermal properties of matter such as coefficient of linear expansion, specific heat and heat capacity, heat transfer, diffusion and first law of thermodynamics. Finally, the course explains the elements of fluid mechanics which include: density, pressure, gas laws, Archimedes principle, continuity equation, Bernoulli equation, viscosity, description of wave motion, velocity of waves, properties of (α, β, γ) rays, x-rays, radioactive decay and half-life period.

110102108 General Physics Laboratory; 1 CH (0+3) Prerequisites: 110102107 or concurrently

Students perform some experiments of 3 hrs/week that related to the course content of 110102107. These experiments include: Collection and analysis of data, measurements and errors, vectors, kinematics of rectilinear motion, force and motion, simple pendulum, Charles and Boyles laws of gases, specific heat for metals, viscosity, surface tension, electric field mapping, specific charge of copper ions, power transfer and Ohm's law.

110102109 General Physics for Medical Students; 3 CH (3+0)

This course discusses several concepts related to mechanics of motion and levers, light, sound waves and its medical applications, dynamics of fluids and its medical applications, electrostatic force, direct current, current in biological cells, principles of radiation and radiation production.

110102141 Thermal and Material Physics; 3 CH (3+0) prerequisites: 110102102

This course introduces students to basic concepts in thermal physics and material physics. Topics covered in this course include temperature, internal energy, heat, entropy, first and second laws of thermodynamics, kinetic theory of gases, energy transfer by conduction, convection, and radiation, atomic structure, electron configurations in atoms, periodic table, bonding in solids, types of primary and secondary interatomic bonds, crystalline solids, crystal structure and unit cell, simple three dimensional crystal structures (SC, BCC, and FCC), Miller indices, x-ray diffraction and Bragg's law.

110102203 General Physics (3); 3 CH (3+0) Prerequisites: 110102102

This course introduces students to the basics of general physics, which include fluid mechanics, simple harmonic motion, wave motion, sound waves, interference of sound waves, alternating current, electromagnetic waves, geometrical optics, interference, diffraction and polarization in optics.

110102211 General Physics Laboratory (3); 1 CH (0+3) Prerequisites: 110102203 or concurrently

Students perform some experiments of 3 hrs/week. The experiments include: Diffraction grating, single slit diffraction, prism spectrometer, Young's double slit, Newton's rings, polarization of light, inverse square law and the propagation of light, mirrors, concave and convex lenses, thermocouples, temperature coefficient of Resistance and thermostat.

110102232 Electronics; 3 CH (3+0) Prerequisites: 110102102

This course introduces the students to the principles of passive and active elements of electric circuits, DC and AC circuits analysis, introduction to semiconductors, p-n junction, rectifying diode models, diode applications, zener diode and its applications, bipolar junction transistor, transistor biasing circuits and small signal bipolar transistor amplifier.

110102261 Modern Physics (1); 3 CH (3+0) Prerequisites: 110102102 and 110101102

This course introduces students to several fundamentals related to special relativity, structure of matter, atomic structure, models of the atom, Quantum theory of radiation, Planck's radiation law, Compton Effect, wave nature of matter, x-ray diffraction, particle diffraction, De Broglie postulate. In addition, it introduces quantum mechanics by explaining Schrodinger's equation and some of its applications.

110102262 Modern Physics (2); 3 CH (3+0) Prerequisites: 110102261

This course describes the structure of hydrogen atom, many electrons atoms and molecules. It also introduces the concepts of statistical physics, solid state physics and nuclear physics.

110102281 Mathematical Physics (1); 3 CH (3+0) Prerequisites: 110102102 and 110101102

The course explains for the students the concepts of series and complex numbers, which include complex plane, complex algebra, complex series, complex functions and applications in quantum mechanics. The course also elucidates how to perform vector analysis: triple products and application in mechanics (work, torque). In addition, it discusses several subjects like directional derivatives, gradient, line integrals, the divergence theorem, Stoke's theorem, Gauss law in static electricity, determinants and matrices. The course also covers the different types of coordinate transformation, which include linear transformation, orthogonal transformation, eigenvalues and eigenvectors, and diagonalisation of matrices. Finally, the course expands on different topics like Fourier series such as periodic functions, sinusoidal functions and applications on Euler and Lagrange equations.

110102282 Mathematical Physics (2); 3 CH (3+0) Prerequisites: 110102281and 110101203

This course covers several concepts related to special functions like Gamma function, Beta function, Error function, Elliptic integrals. Also, it explaines the series solution of differential equations, Legendre

polynomials, associated Legendre polynomials, Bessel functions, Hermite polynomials, Laguerre polynomials, Partial differential equations in Cartesian and spherical and cylindrical coordinates. Furthermore, it expands on functions of a complex variable: Cauchy-Riemann conditions, Laurent series, Residue theorem and evaluating integrals using the residue theorem.

110102283 Computer Application in Physics Laboratory; 1 CH (0+3) Prerequisites: 110102203

This course introduces students to the principles of personal computer application in simulation programs in one and two dimensional motions, Newton's laws of motion, potential and kinetic energies, work and energy, conservation of mechanical energy, momentum and collision, rotational motion, electric field, Gauss's law, electric potential, capacitance, capacitors, current and resistance, magnetic field, Faraday's law, inductors and some simulations in optics and modern physics.

110102311 Electronics Laboratory; 1 CH (0+3) Prerequisites: 110102232

Students perform some experiments of 3 hrs/week that are related to the course content of 110102232. The experiments include measurement techniques using the oscilloscope, analysis of RC for AC circuits, RLC circuit analysis, properties of diodes & transistors, using diodes in rectifiers and filters, Zener diode, Diode circuits, clippers and clamps, transistor response, transistor as amplifier and Compensated and uncompensated operational amplifiers.

110102312 Advanced Physics Laboratory (1); 2 CH (0+6) Prerequisites: 110102261 and 11**0102211**

Students perform some experiments of 6 hrs/week that are related to modern physics, optics, quantum optics and solid state physics. The experiments include: velocity of sound in liquids, electrical conductivity, tangent galvanometer, polarization, Michelson interferometer, measurement of charge of the electron to Boltzmann constant, Hall effect, Roland grating, measurement of dielectric constant for liquids, laser diode, Faraday's effect and Kerr effect.

110102321 Physical Optics; 3 CH (3+0) Prerequisites: 110102203 and 110102281

This course introduces the students to several concepts related to wave equation, Poynting vector, superposition of waves, interference of light, optical interferometry, diffraction of light, Fraunhofer and Fresnel diffraction, coherence and polarization

110102322 Waves and Vibrations; 3 CH (3+0) Prerequisites: 110102281

This course introduces the students to principles of simple harmonic motion with applications to include additions, subtractions and modulations. The course also explains the damped harmonic motion to

include the variables of this motion and energy dissipation, the quality factor and forced oscillations to include the concept of impedance, resonance and the resonance power curve. Moreover, it describes coupled oscillations to include mechanical and electrical systems, the coupling strength to introduce the concept of degrees of freedom and coupling in extended systems as a prerequisite to wave motion. Finally, the course put emphasis on transverse waves by studying wave variables, wave equation, impedance and group and phase velocities. The course also covers wave propagation in periodic structures, reflection and transmission of waves, longitudinal waves and waves in more than one dimension.

110102329 Astrophysics; 3 CH (3+0) prerequisites: 110102261

This course describes for students the basics of photosphere, chromospheres and corona, sun spots and magnetic fields on the sun, solar activity, solar wind and solar-terrestrial relationship, main sequence stars, collapsed stars, Pulsars, interstellar medium, galaxies and active galaxies.

110102331 Electricity and Magnetism (1); 3 CH (3+0) Prerequisites: 110102282

This course introduces students to the fundamentals of electrostatics, electrostatic field, divergence and curl of electrostatic fields, electric potential, work and energy in electrostatics, conductors and insulators, special techniques for calculating potentials, Laplace's equation, method of images, multipole expansion, electrostatic fields in matter, polarization and dipole moment density, field of a polarized object, electric displacement, linear dielectrics, magnetostatics, Lorentz force law, Biot-Savart law, divergence and curl of the magnetic field, magnetic, vector potential, magnetostatic field in matter, magnetization, field of a magnetized object and linear and nonlinear media.

110102332 Electricity and Magnetism (2); 3 CH (3+0) Prerequisites: 110102331

This course introduces the students to the basics of propagation of electromagnetic waves; Maxwell's equations; electromagnetic waves; plane electromagnetic waves: propagation, reflection and transmission of waves; Boundary conditions in conductors and insulators; electromagnetic radiation: dipole and quadrupole radiation, wave guides and cavities, retarded potentials and radiation from a point charge and applications: antennas, diffraction theory, waveguides, nonlinear optics and synchrotrons.

110102341 Thermodynamics; 3 CH (3+0) Prerequisites: 110102141 and 110102281

This course introduces students to the concepts of mathematical review, equation of state, zeroth law of thermodynamics, first law in thermodynamic, entropy and the second law of thermodynamics, combination of the first and second laws of thermodynamics, thermodynamic potentials and applications of thermodynamics to simple systems.

110102351 Classical Mechanics; 3 CH (3+0) Prerequisites: 110102281and 110101203

This course introduces students to the fundamentals of Gravitation: universal law of gravitation, gravitational field, gravitational potential and potential energy, inertial mass and gravitational mass; Lagrangian dynamics: principle of least action: Euler's equation, generalized coordinates and generalized momenta, generalized forces, Lagrangian equations of motion and Hamilton's equations of motion; Central forces: reduced mass, energy equation, effective potential, equations of central motion, planetary motion and Kepler laws; Dynamics of many-particle system: center of mass, linear momentum, angular momentum, energy, elastic collision and inelastic collision; Dynamics of rigid bodies: motion of a point particle in an inertial and accelerated frames, motion of rigid bodies in inertial and accelerated frames, moment of inertia tensor of a rigid body, angular momentum and kinetic energy tensors.

110102361 Special Theory of Relativity; 3 CH (3+0) Prerequisites: 110102261

This course describes the principles of Galilean relativity, Einstein's relativity principle, time dilation, length contraction, Lorentz transformations, spacetime interval and Minkowski diagrams, Doppler effect, twin paradox, light cone, causality, relativistic dynamics (mass and momentum), equivalence of mass and energy, four vectors, energy-momentum four vector, Collisions and relativistic electromagnetism.

110102362 Quantum Mechanics (1); 3 CH (3+0) Prerequisites: 110102261 and 110102282

This course introduces students to basic topics in quantum mechanics and applications. Topics to be covered in this course include: the emergence of quantum physics, wave particle duality, probability, the Schrödinger equation, eigenvalues, eigefunctions, expansion postulate, one-dimensional potentials, the general structure of wave mechanics, operator methods in quantum mechanics and angular momentum

110102363 Medical Physics; 3 CH (3+0) Prerequisites: 110102262

This course introduces students to the basics of forces in the body, physics of the skeleton, energy, work and power in the body, concepts of heat, cold, pressure, physics of capillary system, electricity in the body, physics of x-ray technology and physics of radiation therapy.

110102364 Quantum Mechanics (2); 3 CH (3+0) Prerequisites: 110102362 and 110102262

This course introduces students to advanced topics in quantum mechanics and applications. Topics covered in this course include: angular momentum and commutation relations, raising and lowering operators of angular momentum, the Schrodinger equation in three dimensions, the free particle, central potentials, the hydrogen atom and its energy spectrum, the infinite spherical potential well, matrix representation of angular

momentum operator, spin ½ Pauli theory, general rules for addition of angular momenta, time-independent perturbation theory (degenerate and non-degenerate), the stark effect, the real hydrogen atom, relativistic kinetic energy, spin-orbit coupling, the anomalous Zeeman effect and the hyperfine structure

110102383 Computational Physics; 3 CH (2+1) Prerequisites: 110102282

This course explains the basics of programming, basics of numerical analysis, python programming language as the main programming tool, numerical interpolation, numerical fitting, root finding using numerical techniques, numerical differentiations, numerical integration and numerical solution of first and second order differential equations. The course also illustrates solutions of some physics problems with different methods using numerical techniques.

110102411 Advanced Physics Laboratory (2); 2 CH (0+6) Prerequisites: 110102364

Students perform some advanced experiments of 6 hrs/week that are related to solid state physics, optics and atomic physics. The experiments include: electron diffraction, Rutherford backscattering, Zeeman effect, x-ray diffraction, electron spin resonance, Frank-Hertz experiment, Balmer series, measurement of specific charge of the electron (e/m), Millikan oil-drop experiment, Planck's constant and Gamma spectrometry.

110102433 Plasma Physics; 3 CH (3+0) Prerequisites: 110102332

This course elucidates the principles of Maxwell's equations, propagation of electromagnetic waves in conducting media, plasma fluid model, magneto-hydrodynamics, waves in plasma, instabilities in plasma and kinetic theory in plasma.

110102442 Statistical Mechanics; 3 CH (3+0) Prerequisites: 110102341 and 110102364

This course describes the basic concepts in thermodynamics, the statistical approach and Boltzmann statistics, the canonical ensemble, the grand canonical ensemble, quantum statistics and quantum ensembles, the Fermi gas, The Bose gas and Bose-Einstein condensation

110102461 Atomic and Molecular Physics; 3 CH (3+0) Prerequisites: 110102364

This course describes the fundamentals of application of quantum theory to atomic structure and the interaction of electromagnetic radiation with one-electron atom by describing electric-dipole approximation and transition rules, transition rates, line spectra and lifetimes, static perturbations including fine structure and Stark effect and Zeeman effect. The course also explains the basics of two-electron atoms: two-excitation levels and Auger effect as well as many-electron atoms: central field approximation, L-S and j-j couplings, interaction with radiation and

electromagnetic fields including Fermi's golden rule, lifetimes of excited states, transition selection rules and Wigner-Eckart theorem. Furthermore, the course elucidates the principles of simple molecules by describing electronic structure, molecular spectra, vibrations and rotations of diatomic molecules.

110102463 Nuclear Physics; 3 CH (3+0) Prerequisites: 110102364

This course describes the basic nuclear concepts and nuclear forces such as the deuteron, scattering theory, conservation laws, nuclear models, electromagnetic interactions, weak interactions, strong interactions, radioactive decay, nuclear fission and fusion.

110102464 Laser Physics; 3 CH (3+0) Prerequisites: 110102364

This course describes the principles of ray tracing, optical cavity, Gaussian beam, resonant optical cavity, atomic radiation, laser oscillations & amplification, general characteristics of lasers, laser Excitation and laser types.

110102465 Radiation Physics; 3 CH (3+0) Prerequisites: 110102262

This course illustrates the basics of radioactivity: radioactive transformations; Interaction of radiation with matter: alpha particles, beta particles and gamma rays; Radiation dosimetry: absorbed dose and exposure dose measurement; Radiation detectors: particle detectors, photon detectors and nuclear track detectors and radiation protection: shielding.

110102467 Biophysics; 3 CH (3+0) Prerequisites: 110102262

This course explains the basics of molecular structure, function of biological macromolecules, measurement of fluorescence lifetime, molecular spectroscopes, fluorescence polarization, singlet oxygen, physics of traps, solute-solvent interactions, mechanisms and dynamics of solvent relocation, electrostatic forces, charged ions, molecular modeling, structure and fluorescence of protein and antibody structure and function.

110102471 Solid State Physics; 3 CH (3+0) Prerequisites: 110102364

This course describes the basics of crystal lattice: Bravais lattice; structure of solids: crystal structure; elastic scattering of waves; crystal bonding; phonons; thermal properties of crystalline solids and electron states: free electron model, nearly-free electron model, band theory and Fermi surfaces.

110102472 Physics of Semiconductors; 3 CH (3+0) Prerequisites: 110102471 or concurrently

This course explains the basics of semiconductor crystal structure, crystal impurities and statistical properties of semiconductors. It also describes the transport of charge carriers in semiconductors, diffusion and scattering and semiconductor devices.

110102491 Seminar; 1 CH (1+0) Prerequisites: Student has finished 90 credit hours and departmental approval

This course explains the information research methods and presentation of information. The student chooses, by agreement with the instructor, a subject in one of the branches of physics to write a report and presents a seminar to students.

110102495 Special topics; 3 CH (3+0) Prerequisites: Student has finished 90 credit hours and departmental approval

This course studies a new topic in physics that is prepared by a faculty member and subjected to department approval.