

Science
Physics

Study Program : Bachelor
Study Plan Type : Major
Academic Year : 2022

The requirements to obtain a Bachelor degree is :-

*** The minimum requirements to get a Bachelor degree in / Physics / is to pass 132 credit hours, according to this study plan.**

*** The credit hours are distributed to get a Bachelor degree as follows :-**

Number of credit hours	
University Requirements	27.000
Compulsory	18.000
Elective	9.000
Faculty Requirements	21.000
Compulsory	21.000
Specialization Requirments	81.000
Compulsory	63.000
Elective	18.000
Free Courses	3.000
	0.000
Pre-requist Courses	0.000
	0.000
Total :	132.000

University Requirements Credit Hours : 27
Requirement type : Compulsory Credit Hours :18

Course Number	Course Name	Credit Hours	Theoretical	Practical	Pre - Requisite	Cours e Type
2116011101	Arabic Communication Skills	3.000	3.000	0.000	121601099	online learning
2116021101	English Communication Skills	3.000	3.000	0.000	121602099	online learning
2214041117	Military Science	3.000	3.000			online learning
1714041118	National Education	3.000	3.000	0.000		in class
2114041123	Leadership and Social Responsibility	2.000	2.000	0.000		online learning
2114041124	Enterpreneurship and Innovation	2.000	2.000	0.000		online learning
2114041125	Life Skills	2.000	2.000	0.000		online learning

University Requirements Credit Hours : 27
Requirement type : Elective Credit Hours :9

Course Number	Course Name	Credit Hours	Theoretical	Practical	Pre - Requisite	Cours e Type
1804001128	Cyber Hygiene	3.000	3.000	0.000	110108099	in class
2210031100	digital culture	3.000	3.000	0.000		online learning
2416031102	Spanish Language (2)	3.000	3.000	0.000		
2416031103	French Language (1)	3.000	3.000	0.000		blended learning
2416031104	French Language (2)	3.000	3.000	0.000		
1916033201	Italian Language (2)	3.000	3.000	0.000	1716031101	blended learning
1916034101	Russian Language (1)	3.000	3.000	0.000		online learning
1916034102	Russian Language (2)	3.000	3.000	0.000		
1916034201	Japanese (2)	3.000	3.000	0.000	1716031102	blended learning
1916035101	Turkish Language (1)	3.000	3.000	0.000		in class
1916036101	Korean Language (1)	3.000	3.000	0.000		in class
1916036102	Korean Language(2)	3.000	3.000	0.000	1916036101	in class
1916037101	German Language (1)	3.000	3.000	0.000		online learning
1916038101	Chinese Language (1)	3.000	3.000			online learning
1916039101	Polish Language (1)	3.000	3.000	0.000		in class
1714041101	University Life of Student	3.000	3.000			online learning
1714041102	Introduction to Psychcology	3.000	3.000			online learning
1714041104	Family and Child Education	3.000	3.000			online learning
1714041107	Citizenship and Human Rights	3.000	3.000			online learning
1714041110	Islam Current Issues	3.000	3.000			online learning
1714041111	Islamic Thought	3.000	3.000			online learning
1714041112	Jerusalem : Histroy and Civilization	3.000	3.000			online learning
1714041113	Citizenship and Human Rights	3.000	3.000	0.000		online learning

University Requirements Credit Hours : 27
Requirement type : Elective Credit Hours :9

Course Number	Course Name	Credit Hours	Theoretical	Practical	Pre - Requisite	Cours e Type
1714041114	Histroy and Civilization of Jordan	3.000	3.000			online learning
1714041115	Sociology	3.000	3.000			online learning
1714041116	Archaeology and Tourism	3.000	3.000			online learning
1714041121	Law and Ordering of Our Life	3.000	3.000			online learning
1714041122	Principles of Sign Language	3.000	3.000			online learning
1714041126	Humanistic Moral and Values Education	3.000	3.000			online learning
1714041127	Conflict Resolution and Accept Others	3.000	3.000			online learning
1714041128	Culutural Heritage in Jordan	3.000	3.000			online learning
1914041130	Integrity Transperancy and anti - Corruption	3.000	3.000	0.000		online learning
1714041193	Palestinian Cause	3.000	3.000			online learning
1714041194	Arabic Language and Current Issues	3.000	3.000			online learning
1814041195	Disability and Healthy Community	3.000	3.000			online learning
1814041197	Selected Topics in National Trends	3.000	3.000			
1814041198	Education for Sustainable Development	3.000	3.000			online learning
1814041199	Adjustment and Mental Health	3.000	3.000			online learning
1814041200	Introduction to Education	3.000	3.000			online learning
1914042111	Media Education	3.000	3.000	0.000		online learning
2101081139	Physical Culture	3.000	3.000	0.000		online learning
2201081140	Development and Environment	3.000	3.000	0.000		online learning
2401081141	Oral and Dental Healthcare	3.000	3.000	0.000		online learning
0110108113	Biotechnology and Society	3.000	3.000	0.000		online learning
0110108115	Computer Ethics	3.000	3.000	0.000		online learning

University Requirements Credit Hours : 27
Requirement type : Elective Credit Hours :9

Course Number	Course Name	Credit Hours	Theoretical	Practical	Pre - Requisite	Cours e Type
0110108130	Health and Nutrients	3.000	3.000	0.000		online learning
0110108131	Health Education and First Aid	3.000	3.000	0.000		online learning
0110108132	Sport and Health	3.000	3.000	0.000		online learning
0140108134	Ethics in Natural Science	3.000	3.000	0.000		online learning
0170108135	Reproductive Health	3.000	3.000	0.000		online learning
0140108166	Pharmaceutical Edification	3.000	3.000	0.000		
0121601105	Applied Arabic Language	3.000	3.000			online learning
0121602102	Applied English Language	3.000	3.000	0.000		online learning
0121602103	Technical Translation	3.000	3.000	0.000		online learning
0141603101	Italian Language	3.000	3.000			in class
0151603102	Japanese Language (Level 1)	3.000	3.000	0.000		blended learning
0121603201	Spanish Language (1)	3.000	3.000			blended learning

Faculty Requirements Credit Hours : 21
Requirement type : Compulsory Credit Hours :21

Course Number	Course Name	Credit Hours	Theoretical	Practical	Pre - Requisite	Cours e Type
0110101102	Calculus (2)	3.000	3.000	0.000	110108101	blended learning
0110102101	General Physics (1)	3.000	3.000	0.000		
0110102102	General Physics (2)	3.000	3.000	0.000	1701081136	in class
0110103101	General Chemistry (1)	3.000	3.000	0.000		
0110104101	General Biology (1)	3.000	3.000	0.000		
0110108101	Calculus (1)	3.000	3.000	0.000		blended learning
0110108112	Computer Programming	3.000	3.000	0.000	(1001103 AND 1001104) OR (110108099 OR 1011100)	blended learning

Specialization Requirments Credit Hours : 81
Requirement type : Compulsory Credit Hours :63

Course Number	Course Name	Credit Hours	Theoretical	Practical	Pre - Requisite	Cours e Type
2201021351	Classical Mechanics (1)	3.000	3.000	0.000	110102281 AND 110102203	
2201021364	Quantum Mechanics (2)	3.000	3.000	0.000	110102362	in class
2201021411	Advnanced Physics Laboratory	2.000	0.000	5.000	110102362	
2201021442	Statistical Mechanics	3.000	3.000	0.000	110102341 AND 110102362	
2201021471	Solid State Physics	3.000	3.000	0.000	110102362	
1801041103	General Practical Biology (1)	1.000	0.000	3.000	110108105 synchronous	in class
0110101203	Ordinary Differential Equations (1)	3.000	3.000	0.000	110101102	blended learning
0110102103	General Physics Laboratory (1)	1.000	0.000	3.000	1701081136 synchronous	in class
0110102104	General Physics Laboratory (2)	1.000	0.000	3.000	110102102 synchronous AND 110102103	in class
0110102141	Thermal and Material Physics	3.000	3.000	0.000	1701081136	in class
0110102203	General Physics (3)	3.000	3.000	0.000	110102102	in class
0110102211	General Physics Laboratory (3)	1.000	0.000	3.000	110102203 synchronous	in class
0110102232	Electronics	3.000	3.000	0.000	110102102	in class
0110102261	Modern Physics (1)	3.000	3.000	0.000	110102102 AND 110101102	in class
0110102262	Modern Physics (2)	3.000	3.000	0.000	110102261	in class
0110102281	Mathematical Physics (1)	3.000	3.000	0.000	110102102 AND 110101102	in class
0110102282	Mathematical Physics (2)	3.000	3.000	0.000	110102281 AND 110101203	in class
0110102283	Computer Applications in Physics Laboratory	1.000	0.000	3.000	110102203	in class
0110102311	Electronics Laboratory	1.000	0.000	3.000	110102232	in class
0110102312	Advanced Physics Laboratory (1)	2.000	0.000	5.000	110102261 AND 110102211	in class
0110102321	Physical Optics	3.000	3.000	0.000	110102203 AND 110102281	in class
0110102331	Electricity and Magnetism (1)	3.000	3.000	0.000	110102282	in class
0110102332	Electricity and Magnetism (2)	3.000	3.000	0.000	110102331	in class
0110102341	Thermodynamics	3.000	3.000	0.000	110102141 AND 110102281	in class

Specialization Requirments Credit Hours : 81
Requirement type : Compulsory Credit Hours :63

Course Number	Course Name	Credit Hours	Theoretical	Practical	Pre - Requisite	Cours e Type
0110102362	Quantum Mechanics (1)	3.000	3.000	0.000	110102261 AND 110102282	in class
0110102491	Seminar	1.000	1.000	0.000		in class
0110103103	General Chemistry Lab. (1)	1.000	0.000	3.000	110103101 synchronous	in class

Specialization Requirments Credit Hours : 81
Requirement type : Elective Credit Hours :18

Course Number	Course Name	Credit Hours	Theoretical	Practical	Pre - Requisite	Cours e Type
2201021352	Classical Mechanics (2)	3.000	3.000	0.000	2201021351	in class
2201021431	Introduction to Accelator Physics	3.000	3.000	0.000	110102331 AND 110102362	
2201021464	Laser Physics	3.000	3.000	0.000	110102362	in class
2201021465	Radiation Physics	3.000	3.000	0.000	110102261	
2201021473	Solar Cells	3.000	3.000	0.000	110102141 AND 110102362	in class
1901021474	Nanophysics	3.000	3.000	0.000	110102362	in class
2201021481	Mathematical Physics (3)	3.000	3.000	0.000	110102282	in class
2201022333	Electric Circuits	3.000	3.000	0.000	110102102 AND 110102281	in class
0110102322	Waves and Vibrations	3.000	3.000	0.000	110102281	in class
0110102329	Astrophysics	3.000	3.000	0.000	110102261	
0110102361	Special Theory of Relativity	3.000	3.000	0.000	110102261	in class
0110102363	Medical Physics	3.000	3.000	0.000	110102262	blended learning
0110102383	Computational Physics	3.000	2.000	3.000	110102282	
0110102433	Plasma Physics	3.000	3.000	0.000	110102332	
0110102461	Atomic and Molecular Physics	3.000	3.000	0.000	110102364	in class
0110102463	Nuclear Physics	3.000	3.000	0.000	110102364	in class
0110102467	Biophysics	3.000	3.000	0.000	110102362	
0110102472	Physics of Semiconductors	3.000	3.000	0.000	110102471 synchronous	
0110102495	Special Topics	3.000	3.000	0.000		blended learning
0110103102	General Chemistry (2)	3.000	3.000	0.000	110103101	in class

Courses - Not Allowed To Study Credit Hours : 0
Requirement type : Compulsory Credit Hours :0

Course Number	Course Name	Credit Hours	Theoretical	Practical	Pre - Requisite	Cours e Type
2210041132	enterepreurship and innovation	2.000	2.000	0.000		online learning

Pre-Requist Courses Credit Hours : 0
Requirement type : Credit Hours :0

Course Number	Course Name	Credit Hours	Theoretical	Practical	Pre - Requisite	Cours e Type
0001001096	Computer Skills Test	0.000	0.000	0.000		in class
0110108099	Computer Skills/ Prerequisite	3.000	3.000	0.000	1001096	online learning
0002110096	Arabic Placement Test	0.000	0.000	0.000		in class
0002120096	English Placement Test	0.000	0.000	0.000		in class
0111405098	Arabic Language / Pre-requisite	3.000	3.000	0.000	2110096	
0111405099	English Language/ pre-requisite	3.000	3.000	0.000	2120096	

free study materials are (3) credit hours, The student chooses it from any of the courses offered by the university departments.

Courses Description

College: Science
Department: Physics

Couse ID: 102791 **Description:** Seminar

Full Course Description: Information research methods, 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.

Couse ID: 110102102 **Description:** General Physics (2)

Full Course Description: *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, Faraday's law.

Couse ID: 110102103 **Description:** General Physics Laboratory (1)

Full Course Description: Students perform some experiments of 3 hrs/week that related to the course content of 0102101. 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, measurement of coefficient of friction, specific heat of metals.□

Couse ID: 110102104 **Description:** General Physics Laboratory (2)

Full Course Description: Students perform some experiments of 3 hrs/week that are related to the course content of 0102102. 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, converging and diverging lenses.□
□

Couse ID: 110102107 **Description:** General Physics

Full Course Description: Mechanics: kinematics and dynamics of motion of particles, circular motion, work and energy. Electricity: electric force, electric field, electric potential, current and resistance, capacitors, Magnetism: magnetic force, magnetic field. Thermal Properties of Matter: coefficient of linear expansion, specific heat and heat capacity, heat transfer, diffusion, first law of thermodynamics. Fluid Mechanics: density, pressure, gas laws, Archimedes principle, continuity equation, Bernoulli equation, viscosity, description of wave motion, velocity of waves, properties of alpha, beta, gamma and x-rays, radioactive decay and half-life period.
□

Couse ID: 110102108 **Description:** General Physics Laboratory

Full Course Description: Students perform some experiments of 3 hrs/week that related to the course content of 0102107. 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, Ohm's law□

Couse ID: 110102109 **Description:** General Medical Physics

Full Course Description: 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, radiation production.□
□

Courses Description

College: Science

Department: Physics

Couse ID: 110102141 **Description:** Thermal and Material Physics

Full Course Description: materials structure, chemeical bondings, heat capacity, specific heat, heat transfer, heat conduction, thermal expansion, heat diffusion

Couse ID: 110102161 **Description:** Physics of Diagnostic Radiation

Full Course Description: *

Couse ID: 110102203 **Description:** General Physics (3)

Full Course Description: 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.□
□

Couse ID: 110102211 **Description:** General Physics Laboratory (3)

Full Course Description: 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.□

Couse ID: 110102232 **Description:** Electronics

Full Course Description: Resistors, capacitors, inductors, AC circuits, diodes, diodes and applications, analysis of transistor circuits for small signals, bipolar junction transistor, small signal dc and ac bipolar amplifier.□
□

Couse ID: 110102261 **Description:** Modern Physics (1)

Full Course Description: Introduction 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. Introduction to quantum mechanics: Schrodinger's equation, some applications.

Couse ID: 110102262 **Description:** Modern Physics (2)

Full Course Description: Hydrogen atom, many electrons atoms, molecules, introduction in: statistical physics, solid state physics, and nuclear physics.

Couse ID: 110102263 **Description:** Applied Radiation Physics

Full Course Description: Radioactivity: radioactive transformations. Interaction of radiation with matter: alpha particles, beta particles, gamma rays. Radiation dosimetry: absorbed dose, exposure dose measurement. Radiation detectors: particle detectors, photon detectors, nuclear track detectors. Radiation protection: shielding.

Couse ID: 110102281 **Description:** Mathematical Physics (1)

Full Course Description: Series, Complex numbers: the complex plane, complex algebra, complex series, complex functions, applications in quantum mechanics. Vector analysis: triple products, application in mechanics (work, torque). Directional derivatives, gradient, line integrals, the divergence theorem. Stoke's theorem, Gauss law in static electricity. Determinants and matrices. Coordinate transformation: linear transformation, orthogonal transformation, eigenvalues and eigenvectors, diagonalisation of matrices. Fourier series: periodic functions, sinusoidal functions, applications on Euler and Lagrange equations.

Courses Description

College: Science

Department: Physics

Couse ID: 110102282 **Description:** Mathematical Physics (2)

Full Course Description: Calculus of variations: Euler equation, Lagrange's equations. Special functions: gamma function, beta function, error function, Legendre function, Laguerre function, Bessel function, Hermite function. Partial differential equations: in cartesian, polar, and cylindrical coordinates. Integral transforms with applications. Laplace transforms. Fourier transforms. Green's functions. Functions of complex variables: Cauchy-Riemann condition. Residue theorem

Couse ID: 110102283 **Description:** Computer Applications in Physics Laboratory

Full Course Description: 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, some simulations in optics and modern physics

Couse ID: 110102311 **Description:** Electronics Laboratory

Full Course Description: Students perform some experiments of 3 hrs/week that are related to the course content of 0102232. 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. Compensated and uncompensated operational amplifiers. □

Couse ID: 110102312 **Description:** Advanced Physics Laboratory (1)

Full Course Description: 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, Kerr effect. □

Couse ID: 110102321 **Description:** Physical Optics

Full Course Description: Light transfer, Doppler effect. Energy transfer: Poynting vector. Superposition, interference and diffraction of light: partial and spatial superposition. Optics in solids: double refraction, optical activity. Optical resonances: frequency resonance. Coherence of light. Lasers: basic principles, types of lasers.

Couse ID: 110102322 **Description:** Waves and Vibrations

Full Course Description: Simple harmonic and damped motion, forced oscillations, critically damped oscillations, motion of longitudinal and transverse waves, waves in transmission lines, electromagnetic waves, Maxwell equations.

Couse ID: 110102329 **Description:** Astrophysics

Full Course Description: 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. □
□

Courses Description

College: Science

Department: Physics

Couse ID: 110102331	Description: Electricity and Magnetism (1)
Full Course Description: 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, linear and nonlinear media.	
Couse ID: 110102332	Description: Electricity and Magnetism (2)
Full Course Description: 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, radiation from a point charge.	
Couse ID: 110102341	Description: Thermodynamics
Full Course Description: Basic principles, Equations of state. Temperature and the Zeroth law. Heat, work and the first law of thermodynamics. Entropy and the second law of thermodynamics. Thermodynamic potentials. Kinetic theory.	
Couse ID: 110102351	Description: Classical Mechanics
Full Course Description: Gravitation: universal law of gravitation, gravitational field, gravitational potential and potential energy, inertial mass and gravitational mass. 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, inelastic collision.	
Couse ID: 110102361	Description: Special Theory of Relativity
Full Course Description: Principles of relativity, the constancy of the velocity of light, Lorentz transformation. Minkowski mapping of the unchanging spacetime. Measurement of length and time. Velocity transformation. Doppler effect. Twin paradox. Relativistic Dynamics: mass, momentum. Equivalence of mass and energy. Collisions. Relativistic electromagnetism	
Couse ID: 110102362	Description: Quantum Mechanics (1)
Full Course Description: Wave functions and uncertainty principle: wave-particle duality, interpretation of the wave function, wave packets, Heisenberg uncertainty principle. Schrodinger's equation: time-dependent Schrodinger's equation, conservation of probability, expectation values and operators, time independent Schrodinger's equation, energy quantization, properties of energy eigenfunctions. One dimensional examples. Formal quantum mechanics: Dirac notation, dynamical variables and operators, commuting observables. Angular momentum. Schrodinger's equation in three dimensions. The hydrogen atom.	
Couse ID: 110102363	Description: Medical Physics
Full Course Description: Forces in the body, physics of the skeleton, energy, work and power in the body, concepts of heat, cold, and pressure, physics of capillary system, electricity in the body, physics of x-ray technology, physics of radiation therapy.	
Couse ID: 110102364	Description: Quantum Mechanics (2)
Full Course Description: Interaction of electrons with electromagnetic fields, operators and spin using determinants, addition of angular momentum and spin, theory of time-independent approximation methods, real hydrogen atom, atomic radiation, theory of time-dependent approximation methods, collision theory in quantum mechanics, identical particles	

Courses Description

College: Science

Department: Physics

Couse ID: 110102383 **Description:** Computational Physics

Full Course Description: Solution of some physics problems with different methods using personal computers, programs for calculus computations, applications of Monte Carlo method, solutions of problems in quantum mechanics, Fourier analysis, matrices and determinants, electrostatic potential, heat flow and the wave equation.

Couse ID: 110102411 **Description:** Advanced Physics Laboratory (2)

Full Course Description: 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, Gamma spectrometry. □

Couse ID: 110102433 **Description:** Plasma Physics

Full Course Description: Maxwell's equations, propagation of electromagnetic waves in conducting media, plasma fluid model, magneto-hydrodynamics, waves in plasma, instabilities in plasma, kinetic theory in plasma

Couse ID: 110102442 **Description:** Statistical Mechanics

Full Course Description: Maxwell-Boltzman statistics and application. Bose-Einstein statistics and application. Fermi-Dirac statistics and application. Concepts of Temperature and entropy, Thermodynamics of gases and application of statistical thermodynamics. Canonical and grand canonical ensemble.

Couse ID: 110102461 **Description:** Atomic and Molecular Physics

Full Course Description: Interaction of one-electron atoms with electromagnetic radiation: mean transition rules within electric dipolar approximation, line spectra and life time, two-electron atoms: two-excitation levels and Auger effect, many-electron atoms: central field approximation, L-S and j-j couplings, interaction with radiation and electromagnetic fields, Wigner-Eckart theorem, x-rays, molecular spectra. □
□

Couse ID: 110102463 **Description:** Nuclear Physics

Full Course Description: Basic nuclear concepts, nuclear forces: the deuteron, scattering theory, conservation laws, nuclear models, electromagnetic interactions, weak interactions, strong interactions, radioactive decay, nuclear fission and fusion.

Couse ID: 110102464 **Description:** Laser Physics

Full Course Description: Quantum theory: properties of operators, density operator. Dipolar transitions: matrix elements and symmetry principle, equation of motion for dipolar transitions, resonance: steady state behavior for dipolar transitions, lasers and their applications

Couse ID: 110102465 **Description:** Radiation Physics

Full Course Description: Radioactivity: radioactive transformations. Interaction of radiation with matter: alpha particles, beta particles, gamma rays. Radiation dosimetry: absorbed dose, exposure dose measurement. Radiation detectors: particle detectors, photon detectors, nuclear track detectors. Radiation protection: shielding. □
□

Couse ID: 110102467 **Description:** Biophysics

Full Course Description: 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, antibody structure and function.

Courses Description

College: Science

Department: Physics

Couse ID: 110102491 **Description:** Seminar

Full Course Description: Information research methods, 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.□
□

Couse ID: 110102495 **Description:** Special Topics

Full Course Description: The content of this course is a study of a new topic in physics that is prepared by faculty member and subject to department approval.

Couse ID: 1901021464 **Description:** Laser Physics

Full Course Description: Quantum theory: properties of operators, density operator. Dipolar transitions: matrix elements and symmetry principle, equation of motion for dipolar transitions, resonance: steady state behavior for dipolar transitions, lasers and their application

Couse ID: 1901021471 **Description:** Solid State Physics

Full Course Description: Crystal lattice: Bravais lattice. Structure of solids: crystal structure. Elastic scattering of waves. Crystal bonding. Phonons. Thermal properties of crystalline solids, electron states: free electron model, nearly-free electron model, band theory, Fermi surfaces

Couse ID: 1901021472 **Description:** Physics of Semiconductors

Full Course Description: Semiconductor crystal structure, crystal impurities, statistical properties of semiconductors. Transport of charge carriers in semiconductors. Diffusion and scattering, semiconductor devices

Couse ID: 1901021474 **Description:** Nanophysics

Full Course Description: Introduces nanotechnology and nanoscience. The material covered includes nanofabrication technology , the interdisciplinary nature of nanotechnology and nanoscience and applications.

Couse ID: 2201021351 **Description:** Classical Mechanics (1)

Full Course Description: Gravitation: universal law of gravitation, gravitational field, gravitational potential and potential energy, inertial mass and gravitational mass. 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, inelastic collision.

Couse ID: 2201021352 **Description:** Classical Mechanics (2)

Full Course Description: Non-inertial frames . Lagrangian mechanics, Hamilton's equations of motion, dynamics of rigid bodies, theory of small oscillations

Couse ID: 2201021354 **Description:** Quantum Mechanics (2)

Full Course Description:

Couse ID: 2201021364 **Description:** Quantum Mechanics (2)

Full Course Description: Interaction of electrons with electromagnetic fields, operators and spin using determinants, addition of angular momentum and spin, theory of time-independent approximation methods, real hydrogen atom, atomic radiation, theory of time-dependent approximation methods, collision theory in quantum mechanics, identical particles.

Couse ID: 2201021411 **Description:** Advnanced Physics Laboratory

Full Course Description: 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, Gamma spectrometry□

Courses Description

College: Science

Department: Physics

Couse ID: 2201021431 **Description:** Introduction to Accelator Physics

Full Course Description: This course covers fundamental physical principles of accelerators; Overview of linear accelerators, storage rings for the generation of light, spallation sources and colliders; Physics of particle beams: longitudinal and transverse beam dynamics, synchrotron radiation, non-linear beam physics, storage ring lattice design; Description of major accelerator components□ including: radio frequency systems, cryogenic systems, vacuum systems, and powering systems; Introduction to applications using accelerators in the field of atomic, nuclear and particle physics, materials science, medical applications; New accelerator technologies□

Couse ID: 2201021442 **Description:** Statistical Mechanics

Full Course Description: Maxwell-Boltzman statistics and application. Bose-Einstein statistics and application. Fermi-Dirac statistics and application. Concepts of Temperature and entropy, Thermodynamics of gases and application of statistical thermodynamics. Canonical and grand canonical ensemble.

Couse ID: 2201021464 **Description:** Laser Physics

Full Course Description: Quantum theory: properties of operators, density operator. Dipolar transitions: matrix elements and symmetry principle, equation of motion for dipolar transitions, resonance: steady state behavior for dipolar transitions, lasers and their applications. □

Couse ID: 2201021465 **Description:** Radiation Physics

Full Course Description: Radioactivity: radioactive transformations. Interaction of radiation with matter: alpha particles, beta particles, gamma rays. Radiation dosimetry: absorbed dose, exposure dose measurement. Radiation detectors: particle detectors, photon detectors, nuclear track detectors. Radiation protection: shielding

Couse ID: 2201021471 **Description:** Solid State Physics

Full Course Description: Crystal lattice: Bravais lattice. Structure of solids: crystal structure. Elastic scattering of waves. Crystal bonding. Phonons. Thermal properties of crystalline solids, electron states: free electron model, nearly-free electron model, band theory, Fermi surfa

Couse ID: 2201021473 **Description:** Solar Cells

Full Course Description: Introduces the solar cell as a simple current generator and defines the performance characteristics which are used to describe and compare solar cells. Describes, in general terms, how light energy is converted into electricity, the basic physics of the semiconductor, the semiconductor transport equations and the processes of light absorption. Different types of junctions which are exploited in photovoltaics. p–n junction, monocrystalline p–n junction devices, practical devices, using crystalline silicon and gallium arsenide cells as examples. Thin film photovoltaic materials.

Couse ID: 2201021481 **Description:** Mathematical Physics (3)

Full Course Description: Dirac delta function, Sturm-Liouville theory, Greens functions calculus of variations s; asymptotic expansions; conformed mapping, integral transforms; Fourier transforms, , Tensor algebra.□

Couse ID: 2201022333 **Description:** Electric Circuits

Full Course Description: Circuit Concepts, Circuit Laws , Analysis Methods(The Branch Current Method , The Mesh Current Method, Matrices and Determinants, The Node Voltage Method, Superposition, The´venin's and Norton's Theorems(, Waveforms and Signals, Transient Analysis, Sinusoidal Steady-State Circuit Analysis , AC Power, Polyphase Circuits. Frequency Response, Filters, and Resonance