The University of Jordan

الجامعة الاردنية

Form: Study Plan- Bachelors	Form Number	EXC-01-03-02A
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1.	School	**Science**
2.	Department	**Physics**
3.	Program title (Arabic)	**البكالوريوس في الفيزياء**
4.	Program title (English)	**Bachelor of Physics**

5. Components of Curriculum:

The curriculum for the bachelor's degree in Physics consists of (132) credit hours distributed as follows

Number	**Type of requirement**	**credit hours**
First	University Requirements	27
Second	Faculty Requirements	21
Third	Specialty Requirements	84
Total		**132**

6. Numbering System:

A- Department number

Department	**Number**
Mathematics	1
Physics	2
Chemistry	3
Biological Sciences	4
Geology	5
Medical Sciences	8

Basic Sciences	9

B- Course number

Domain title	Domain number	Domain title	Domain number
0	General Physics	5	Mechanics
1	Practical Physics	6	Modern Physics
2	Waves and Optics	7	Solid State Physics
3	Electronics and Electricity and Magnetism	8	Mathematical and Computational Physics
4	Thermal and Statistical Physics	9	Special Topics and Research Methods

C- Course number consists of 7 digits

Serial number		Level	Department		School	
		1	**0**	**2**	**0**	**3**

First: University Requirements:

Preparation Program Requirements

All students admitted to the university must apply for a degree examination in Arabic and English and the computer is prepared or approved by the university to determine their level. Based on the results of the examinations, either the student will study one or more of the requirements of the preparatory program

(0 - 15 Credit Hours)

No.	Course Title	Course No.	Credit Hours	Prerequisites	Notes
1	**Community service**	**0700150**	**0**		
2	**Computer skills placement test**	**1902098**	**0**		
3	**Basics of computing**	**1932099**	**3**	**1902098**	
4	**Arabic Language (level 1)**	**3201001**	**3**	**3211098**	
5	**Arabic Language (level 2)**	**3201002**	**3**	**3201001**	
6	**English language (level 1)**	**3202001**	**3**	**3212098**	
7	**English language (level 2)**	**3202002**	**3**	**3202001**	

8	Arabic placement test	3211098	0		
9	English placement test	3212098	0		

Compulsory Requirements (18 Credit Hours)					
No.	Course Title	Course No.	Credit Hours	Prerequisites	Notes
1	Military sciences	2220100	3		
2	English language (level 3)	3202003	3	3202002	
3	National culture	3400100	3		
4	Ethics and Social Responsibility	3420100	3		
5	Entrepreneurship, Innovation, and Leadership	3420101	3		
6	Communication and Soft Skills (in English language)	3420103	3	3202003 or 3202103	

Electives (9 Credit Hours)					
Elective courses: (9) credit hours to be chosen from the first, second and third groups mentioned below. The student has to choose one course from each of the groups.					
(First Group)					
No.	Course Title	Course No.	Credit Hours	Prerequisites	Notes
1	Environmental culture and development	0310102	3		blended
2	Islamic culture	0400102	3		blended
3	Health Culture	0309100	3		bended
4	Legal culture	1000102	3		Face to face
5	Physical fitness culture	1100100	3		blended
6	Introduction to philosophy and critical thinking	3400103	3		online
7	Tourism culture	3400111	3		blended
(Second Group) (3 credits hour)					

No.	Course Title	Course No.	Credit Hours	Prerequisites	Notes
1	Islam and contemporary issues	0400101	3		blended
2	Social media	0309101	3		blended
3	Appreciation of arts	2000100	3		blended
4	Foreign language	2200103	3		blended
5	Arab-Islamic civilization	2300101	3		blended
6	Jordan: history and civilization	2300102	3		blended
7	Special subject	3400106	3		blended
8	Great books	3400107	3		blended
9	Jerusalem	3400108	3		blended
Electives (3) credits hour					
(Third Group)					
No.	Course Title	Course No.	Credit Hours	Prerequisites	Notes
1	Specialized Topics in Digital Skills	0309104	3	0309103	

Second: School courses: distributed as follows:

A. Obligatory school courses: (21) credit hours
B. Elective school courses: (None) credit hours

A. Obligatory school courses: (21) credit hours:

Course Number	Course Title	Type of learning (face-to-face | blended | online)	Contact Hours		Credit Hours	Pre-requisite
			Theoretical	Practical		
0319101	Calculus-1	face-to-face	3	-	3	-
0319131	Principles of Statistics	online	3	-	3	-
0329101	General Physics-1	face-to-face	3	-	3	-
0339101	General Chemistry-1	face-to-face	3	-	3	-
0349101	General Biology-1	face-to-face	3	-	3	-
0305101	General Geology-1	face-to-face	3	-	3	-
0309103	Modern Digital Skills	blended	3	-	3	1932099

B. Elective school courses: (None) credit hours:

Course Number	Course Title	Type of learning (face-to-face | blended | online)	Contact Hours		Credit Hours	Pre-requisite
			Theoretical	Practical		

Third: Specialty courses: (84) credit hours distributed as follows:

A. Obligatory specialty courses: (66) credit hours
B. Elective specialty courses: (18) credit hours:

A. Obligatory specialty courses: (66) credit hours:

Course Number	Course Title	Type of learning (face-to-face | blended | online)	Contact Hours		Credit Hours	Pre-requisite
			Theoretical	Practical		
0319102	Calculus-2	face-to-face	3	-	3	0319101
0319201	Calculus-3	face-to-face	3	-	3	0319102
0329102	General Physics-2	face-to-face	3	-	3	0329101
0302104	General Physics-3	face-to-face	3	-	3	0329102
0329111	Practical Physics-1	face-to-face	-	3	1	0329101 or concurrent
0329112	Practical Physics-2	face-to-face	-	3	1	0329102 or concurrent + 0329111
0302215	Practical Physics-3	face-to-face	1	3	2	0302221 + 0329112
0302221	Optics-1	face-to-face	3	-	3	0329102
0302231	Electronics	face-to-face	3	-	3	0329112
0302261	Modern Physics	face-to-face	3	-	3	0302104
0302280	Software Packages in Physics	face-to-face	1	3	2	0302261
0302281	Mathematical Physics-1	face-to-face	3	-	3	0319102 + 0329102
0332282	Mathematical Physics-2	face-to-face	3	-	3	0302281
0302312	Practical Electronics	face-to-face	-	3	1	0302231 or concurrent
0302315	Practical Modern Physics	face-to-face	-	6	2	0302215 + 0302261
0302331	Electricity and Magnetism-1	face-to-face	3	-	3	0332282
0342332	Electricity and Magnetism-2	face-to-face	3	-	3	0302331
0332341	Thermal Physics	face-to-face	3	-	3	0302261

0302351	Classical Mechanics-1	face-to-face	3	-	3	0302281
0332352	Classical Mechanics-2	face-to-face	3	-	3	0302351
0302363	Quantum Mechanics-1	face-to-face	3	-	3	0302281 + 0302261
0302415	Practical Advanced Physics	face-to-face	1	6	3	0302315 + 0302363
0302364	Quantum Mechanics-2	face-to-face	3	-	3	0302363
0302392	Employability Readiness	face-to-face	4	6	6	90 credit hours

B. Elective specialty courses: (18) credit hours: The student is required to select 6 credit hours from the package of 200-level courses; 6 credit hours from the package of 300-level courses; 6 credit hours from the package of 400-level courses.

The first package: the 200-level courses						
Course Number	Course Title	Type of learning (face-to-face | blended | online)	Contact Hours		Credit Hours	Pre-requisite
			Theoretical	Practical		
0301221	Ordinary Differential Equations-1	face-to-face	3	-	3	0319102
0302200	Medical Physics	blended	3	-	3	0302104
0302202	Energy Sources	online	3	-	3	0302104
0302265	Radiation Physics	blended	3	-	3	0302261
0332271	Polymer Physics	face-to-face	3	-	3	0302104
The second package: the 300-level courses						
Course Number	Course Title	Type of learning (face-to-face | blended | online)	Contact Hours		Credit Hours	Pre-requisite
			Theoretical	Practical		
0302300	Environmental Physics	face-to-face	3	-	3	0302221
0302321	Optics-2	face-to-face	3	-	3	0302221
0302330	Digital Electronics	face-to-face	3	-	3	0302231

0302371	Physics of Materials	blended	3	-	3	0302261
0302380	Computational Physics	face-to-face	3	-	3	0319131 + 0302280
The third package: the 400-level courses						
Course Number	Course Title	Type of learning (face-to-face | blended | online)	Contact Hours		Credit Hours	Pre-requisite
			Theoretical	Practical		
0302447	Statistical Physics	face-to-face	3	-	3	0332341
0302462	Atomic and Molecular Physics	face-to-face	3	-	3	0302363
0302463	Nuclear Physics	face-to-face	3	-	3	0302363
0302464	Astrophysics	face-to-face	3	-	3	0302351 + 0342332
0342466	Elementary Particles	blended	3	-	3	0302363
0302471	Solid State Physics	face-to-face	3	-	3	0302363
0302472	Physics of Semiconductors	face-to-face	3	-	3	0302363
0302496	Special Topics	face-to-face	3	-	3	Department approval

Transition Plan for Physics Program (Similar Courses)

2024 Plan (Old)			2025 Plan (New)		
0302101	GENERAL PHYSICS I	3	0329101	GENERAL PHYSICS I	3
0302102	GENERAL PHYSICS II	3	0329102	GENERAL PHYSICS II	3
0302111	PRACTICAL PHYSICS I	1	0329111	PRACTICAL PHYSICS I	1
0302112	PRACTICAL PHYSICS II	1	0329112	PRACTICAL PHYSICS II	1
0332113	EXPERIMENTAL GENERAL PHYSICS FOR LIFE SCIENCES	1	0329113	EXPERIMENTAL GENERAL PHYSICS FOR LIFE SCIENCES	1
0342103	GENERAL PHYSICS FOR LIFE SCIENCES	3	0329103	GENERAL PHYSICS FOR LIFE SCIENCES	3
0342105	PHYSICS FOR MEDICINE AND DENTISTRY	3	0329105	PHYSICS FOR MEDICINE AND DENTISTRY	3

Fourth: Courses offered by other faculties/schools and departments

Course Number	Course Title	Contact Hours		Credit Hours	Pre-requisite
		Theoretical	Practical		
0319102	Calculus-2	3	-	3	0319101
0319201	Calculus-3	3	-	3	0319102
0301221	Ordinary Differential Equations-1	3	-	3	0319102

Transition plan

Old plan			New plan		
Course Number	Course Title	Credit Hours	Course Number	Course Title	Credit Hours
0332361	Quantum Mechanics-1	3	0302363	Quantum Mechanics-1	3
0342461	Quantum Mechanics-2	3	0302364	Quantum Mechanics-2	3
0302301	Alternative Energy Resources	3	0302202	Energy Resources	3
0352311	Practical Physics-4	2	0302315	Practical Modern Physics	2

Fifth: Advisory Study Plan

First Year

First Semester			Second Semester		
Course Number	Course Title	Credit Hours	Course Number	Course Title	Credit Hours
0319101	Calculus-1	3	0319102	Calculus-2	3
0329101	General Physics-1	3	0329102	General Physics-2	3
0329111	Practical Physics-1	1	0329112	Practical Physics-2	1
0305101	General Geology-1	3	0339101	General Chemistry-1	3
	University Requirement	3	0309103	Modern Digital Skills	3
	University Requirement	3		University Requirement	3
Total		16	Total		16

Second Year

First Semester			Second Semester		
Course Number	Course Title	Credit Hours	Course Number	Course Title	Credit Hours
0302221	Optics-1	3	0302231	Electronics	3
0302281	Mathematical Physics-1	3	0302261	Modern Physics	3
0319201	Calculus-3	3	0332282	Mathematical Physics-2	3
0319131	Principles of Statistics	3	0302215	Practical Physics-3	2
0302104	General Physics-3	3	0302280	Software Packages in Physics	2
	University Requirement	3		University Requirement	3

Total	18	Total	16

Third Year

First Semester			Second Semester		
Course Number	Course Title	Credit Hours	Course Number	Course Title	Credit Hours
0302312	Practical Electronics	1	0302315	Practical Modern Physics	2
0332341	Thermal Physics	3	0342332	Electricity and Magnetism-2	3
0302331	Electricity and Magnetism-1	3	0302363	Quantum Mechanics-1	3
0302351	Classical Mechanics-1	3	0332352	Classical Mechanics-2	3
0349101	General Biology-1	3	03022xx	Elective Specialization Requirement (200 –level)	3
03022xx	Elective Specialization Requirement (200 –level)	3	0302315	University Requirement	3
Total		16	Total		17

Fourth Year

First Semester			Second Semester		
Course Number	Course Title	Credit Hours	Course Number	Course Title	Credit Hours
0302364	Quantum Mechanics-2	3	0302415	Practical Advanced Physics	3
0302392	Employability Readiness	6	03024xx	Elective Specialization Requirement (400 –level)	3
03023xx	Elective Specialization Requirement (300 –level)	3	03024xx	Elective Specialization Requirement (400 –level)	3
03023xx	Elective Specialization Requirement (300 –level)	3		University Requirement	3
	University Requirement	3		University Requirement	3
Total		18	Total		15

Course Description

Course Number (0329101)	Course Title General Physics-1	Credit Hours
Prerequisite: (None)		3
Motion in one dimension; vectors; motion in two dimensions; the laws of motion; circular motion; conservation of energy; linear momentum and collisions; rotation of a rigid object about a fixed axis; angular momentum; static equilibrium; universal gravitation.		

Course Number (0329102)	Course Title General Physics-2	Credit Hours
Prerequisite: (0329101)		3
Electric field; Gauss's law; electric potential; capacitance and dielectrics; current and resistance; direct current circuits; magnetic field; sources of the magnetic field; Faraday's law; inductance; the nature of light and the principles of ray optics; image formation.		

Course Number (0329103)	Course Title General Physics for Biological Sciences Students	Credit Hours
Prerequisite: (None)		3
Motion in one dimension; motion in two dimensions; Newton's laws of motion; statics; work; energy and power; linear momentum; temperature and the behavior of gases; thermodynamics; thermal properties of matter; electric forces; radioactivity; interaction of radiation with matter; radiation units; harmful effects of radiation; applications of radiation in medicine.		

Course Number (0302104)	Course Title General Physics-3	Credit Hours
Prerequisite: (0329102)		3
Fluid mechanics; Oscillatory motion; Wave motion; Superposition and standing waves; The first law of thermodynamics; The kinetic theory of gases; Entropy and the second law of thermodynamics; Alternating-current circuits; Electromagnetic waves.		

Course Number (0302105)	Course Title General Physics for Medical and Dentistry Student	Credit Hours
Prerequisite: (None)		3
Velocity and acceleration; Newton's laws of motion; static equilibrium; work and energy; temperature and behavior of gases; the first law of thermodynamics; thermal properties of matter; mechanics of non-viscous fluids; mirrors; lenses: the human eye; radioactivity; interaction of radiation with matter; radiation units; harmful effects of radiation; applications of radiation in medicine.		

Course Number (0302108)	Course Title Physics for Computer Science	Credit Hours
Prerequisite: (None)		2
Physical quantities and their applications for motion; forces and fields; potentials and energy; DC circuit theory (using resistors and capacitors networks); AC circuits concepts (RC-circuit); the pn-junction; diodes and transistors; characteristics of diodes and transistors.		

Course Number (0329111)	Course Title Practical Physics-1	Credit Hours
Prerequisite: (0329101 or concurrent)		1
11 experiments each of 3 hrs/week duration: collection and analysis of data; measurements and uncertainties; vectors: force table; kinematics of rectilinear motion; force and motion; collision in two dimensions; rotational motion; simple harmonic motion: simple pendulum; gas's Laws; ballistic pendulum; specific heat capacity of metals.		

Course Number (0329112)	Course Title Practical Physics-2	Credit Hours
Prerequisite: (0329102 or concurrent + 0329111)		1
12 experiments each of 3 hrs/week duration: electric field mapping; specific charge of copper ions; power transfer; potentiometer; capacitors: RC time constant; Kirchhoff's laws; magnetic field of a current; lenses; Young's double slit experiment; electromagnetic induction; Ohm's law; Wheatstone bridge		

Course Number (0329113)	Course Title Practical Physics for Biological Sciences Students	Credit Hours
Prerequisite: (0329103 or concurrent)		1
11 experiments each of 3 hrs/week duration: collection and analysis of data; measurements and uncertainties; vectors: force table; Newton's second law of motion; simple harmonic motion: simple pendulum; the laws of gases; Ohm's law; Wheatstone bridge; the potentiometer; Joule's heat.		

Course Number (0302116)	Course Title Physics for Computer Science-Lab	Credit Hours
Prerequisite: (0302108 or concurrent)		1
10 experiments each of 3 hrs/week duration: Collection and Analysis of Data; Electric Field Mapping; Measurement of Resistance - Ohm's Law; Motion in One Dimension; Low-Pass and High-Pass Filter; Vectors; RC Time Constant; Kirchhoff's Laws; Diode characteristics; Rectifiers.		

Course Number (0302200)	Course Title Medical Physics	Credit Hours
Prerequisite: (0302104)		3
Forces on and in the body; Heat and cold in medicine; The physics of the lungs and breathing; Electricity within the body; Applications of electricity and magnetism in medicine; Sound in medicine; Physics and applications (Diagnostic) of X-rays; Physics of nuclear medicine (Radioisotopes in medicine); Physics of radiotherapy and Physics and applications (diagnostic) of magnetic resonance imaging.		

Course Number (0302202)	Course Title Energy Sources	Credit Hours
Prerequisite: (0302104)		3
Solar cells and solar energy convertors; water; wind; bio-fuel; nuclear energy: fission, fusion.		

Course Number (0302215)	Course Title Practical Physics-3	Credit Hours
Prerequisite: (0302221 + 0329112)		2
Theoretical lectures (one hour/weak) that describe the tools and techniques which are used in analyzing experimental data and errors. The topics include: error analysis, data fitting, graphs; statistical distributions. The experimental part consists of 12 experiments each of 3 hrs/week duration: single slit diffraction; RC circuit; RLC circuit; measurement of e/m; Michelson interferometer; Newton's rings; thermal conductivity; polarization of light and polarimetry; prism spectrometer; speed of light; double slit interference; quantitative reflectivity measurements for dielectrics and metals; Millikan's Oil- Drop experiment.		

Course Number (0302221)	Course Title Optics-1	Credit Hours
Prerequisite: (0329102)		3
Nature of light; Huygens's principle; Fermat's principle; wave equation; superposition of waves; interference of light; optical interferometry; production of polarized light; Fraunhofer diffraction; diffraction grating.		

Course Number (0302231)	Course Title Electronics	Credit Hours
Prerequisite: (0329112)		3
Fundamental concepts: semiconductors; diodes and application; bipolar junction; transistor; small signal bipolar amplifier; field effect transistors; operational amplifier; operational amplifier applications; digital electronics.		

Course Number (0302261)	Course Title Modern Physics	Credit Hours
Prerequisite: (0302104)		3
Relativity of simultaneity; inertial frames of reference; Lorentz transformation; length contraction and time dilation; transformation of mass and energy; Quantum nature of radiation: Blackbody radiation; photoelectric effect; Compton effect; wavelike properties of particles: De Broglie waves, particle diffraction; atomic structure: spectral series of hydrogen, Bohr's model; nuclear structure: Rutherford scattering; Schrödinger's equation in one dimension: particle in a box.		

Course Number (0302265)	Course Title Radiation Physics	Credit Hours
Prerequisite: (0302261)		3
Atomic and nuclear structure; radiation sources; radioactivity and radiation; interaction of radiation with matter; radiation units and limits; radiation detection and measurement; radiation protection; radiation hazard and dosimetry; biological effects of radiation; application of radiation in medicine and engineering.		

Course Number (0332271)	Course Title Polymer Physics	Credit Hours
Prerequisite: (0302104)		3
Macromolecules; molecular weight; molecular conformation; tactility; molecular elasticity; crystalline and amorphous polymers; crystal orientation; drawing; structural studies; fiber and lamella structure; commercial polymers; mechanical properties and mechanical testing; annealing and heat treatments; melting and glass transition temperatures.		

Course Number (0302280)	Course Title Software Packages in Physics	Credit Hours
Prerequisite: (0302261)		2
Mathematica software will be used as a computational and programming tool. Students will be trained to solve problems in real and complex algebra, trigonometry, linear algebra, differential equations, and special functions.		

Course Number (0302281)	Course Title Mathematical Physics-1	Credit Hours
Prerequisite: (0319102 + 0329102)		3
Complex numbers; linear equations; vectors; matrices and determinants; partial differentiation; multiple integrals; vector analysis; Fourier series; ordinary differential Equations.		

Course Number (0332282)	Course Title Mathematical Physics-2	Credit Hours
Prerequisite: (0302281)		3
Coordinate Transformations; tensor analysis; gamma; beta and error functions; asymptotic series; Stirling's formula; elliptic integrals and functions; integral transforms; series solution of differential equations; Legendre polynomials; Bessel functions; set of orthogonal functions; partial differential equations; functions of a complex variable.		

Course Number (0302300)	Course Title Environmental Physics	Credit Hours
Prerequisite: (0302221)		3
Elements of the environment; pollution (in water; soil; and air) and methods of handling pollution levels; transport processes (micro scale, local, regional and global); introduction to atmospheric aerosols: formation; deposition and removal; physical properties; population of aerosol particles and concentrations; dynamics of single aerosol particles (motion in the fluid; drag force; settling; etc.); transformation of atmospheric aerosols: condensation, coagulation, impacts of air pollution.		

Course Number (0302312)	Course Title Practical Electronics	Credit Hours
Prerequisite: (0302231 or concurrent)		1
12 experiments each of 3 hrs/week duration: measurements; diode and transistor characteristics; rectification and filtering; Zener diode and regulation; transistor biasing; transistor amplifiers; operational amplifiers; comparators; sine wave oscillators; relaxation oscillators; logic gates; A/D and D/A using operational amplifiers.		

Course Number (0302315)	Course Title Practical Modern Physics	Credit Hours
Prerequisite: (0302215 + 0302261)		2
This laboratory consists of ten experiments, each of 4-5 practical hours per week. The experiments covered in this laboratory are: Photoelectric effect, measurement of (e/m), Diffraction Grating, Frank-Hertz, Black Body radiation, Electron Spin Resonance, Kerr Effect, Statistical nature of nuclear radiation, Electron Diffraction, Mechanical Oscillator.		

Course Number (0302321)	Course Title Optics-2	Credit Hours
Prerequisite: (0302221)		3
Matrix treatment of polarization; Fresnel diffraction; theory of multilayer films; Fresnel equations; laser basics; laser applications; nonlinear optics and the modulation of light; optical properties of materials.		

Course Number (0302330)	Course Title Digital Electronics	Credit Hours
Prerequisite: (0302231)		3
Number systems and codes; digital electronic signals and switches; basic logic gates; Boolean algebra and reduction techniques; exclusive-OR and Exclusive-NOR gates; arithmetic operations and circuits; code converters; multiplexers and de-multiplexers; flip-flops and registers; practical considerations for digital design; counter circuits; shift registers; multi-vibrators and 555 timer; interfacing to the analog world; microprocessor fundamentals.		

Course Number (0302331)	Course Title Electricity and Magnetism-1	Credit Hours
Prerequisite: (0332282)		3
Electrostatics: electrostatic field; electrostatic potential; work and energy in electrostatics; conductors; calculation of electrostatic potentials: Laplace's equation; the method of images; separation of variables; multipole expansion; electrostatic fields in matter; magnetostatics; magnetostatic fields in matter.		

Course Number (0342332)	Course Title Electricity and Magnetism-2	Credit Hours
Prerequisite: (0302331)		3
Electrodynamics: electromotive force; Faraday's law; Maxwell's equations; potential formulations; energy and momentum; electromagnetic waves: The wave equation; electromagnetic waves in nonconductors and conductors; dispersion; electromagnetic radiation; electrodynamics and special relativity.		

Course Number (0332341)	Course Title Thermal Physics	Credit Hours
Prerequisite: (0302261)		3
Binary model system; entropy; temperature; thermal equilibrium; laws of thermodynamics; Boltzmann distribution; thermal radiation; chemical potential; Gibbs distribution; ideal Gas; Fermi-Dirac and Bose-Einstein distributions; thermodynamic functions; heat and work; heat engines; phase transformations; Van der Waals' equation of state; kinetic theory.		

Course Number (0302351)	Course Title Classical Mechanics-1	Credit Hours
Prerequisite: (0302281)		3
Newtonian mechanics; oscillations: simple harmonic oscillator, damped oscillations, forced oscillations; gravitation; central force motion; rotating frames.		

Course Number (0332352)	Course Title Classical Mechanics-2	Credit Hours
Prerequisite: (0302351)		3
Lagrangian mechanics; Hamiltonian mechanics; dynamics of systems of particles; dynamics of rigid bodies; coupled oscillators.		

Course Number (0302363)	Course Title Quantum Mechanics-1	Credit Hours
Prerequisite: (0302281 + 0302261)		3
Wave function and statistical interpretation; time-Independent Schrödinger equation, one-dimensional problems: infinite square well, harmonic oscillator (operator method), free particle, Dirac delta-function and finite well; Formalism: Hilbert space, Hermitian operators, Dirac notation; Matrix quantum mechanics; Schrödinger equation in spherical coordinates; The Hydrogen atom, quantum theory of angular momentum; spin-1/2 particle.		

Course Number (0302364)	Course Title Quantum Mechanics-2	Credit Hours
Prerequisite: (0302363)		3
Time-independent perturbation theory (nondegenerate and degenerate); fine structure of Hydrogen atom; Stark effect; Zeeman effect; time-dependent perturbation theory: emission and absorption of radiation; variational method; quantum theory of scattering: scattering amplitude and cross section, Born approximation.		

Course Number (0302371)	Course Title Physics of Materials	Credit Hours
Prerequisite: (0302261)		3
Atomic structure and interatomic bonding; crystalline solids; imperfections in solids; diffusion; mechanical properties of metals; dislocations and strengthening mechanisms; phase diagrams; phase transformations in metals; structure and properties of ceramics; polymer structures; composites.		

Course Number (0302380)	Course Title Computational Physics	Credit Hours
Prerequisite: (0319131 + 0302280)		3
Basics of Python programing language and its scientific libraries; Simulation methods such as Monet Carlo and Molecular dynamics simulation methods; Data analysis using classification and clustering algorithms, decision trees, linear and logistic regression.		

Course Number (0302415)	Course Title Practical Advanced Physics	Credit Hours
Prerequisite: (0302315 + 0302363)		3
This laboratory consists of at least ten experiments, each of 6 practical hours per week. The experiments that can be covered in the laboratory are: Measurement of (e/kB), Zeeman effect, γ-ray spectroscopy, Absorption of Radiation, Thermionic emission, X-ray diffraction, Hall effect, Dielectric Constant, Faraday effect, Nuclear Magnetic Resonance, β-ray spectroscopy.		

Course Number (0302447)	Course Title Statistical Physics	Credit Hours
Prerequisite: (0332341)		3
Macroscopic and microscopic descriptions of a system; classical postulate of statistical mechanics; microcanonical ensemble; ideal gases; bosons; fermions; canonical and grand canonical ensemble; partition functions; thermodynamic functions; applying Bose - Einstein (BE) distribution to a photon gas; derivation of Planck's law for Blackbody radiation; Bose-Einstein condensation.		

Course Number (0302462)	Course Title Atomic and Molecular Physics	Credit Hours
Prerequisite: (0302363)		3
Review of one-electron atoms; electron spin; addition of angular momenta; fine structure; Hyperfine structure; interaction of one-electron atoms with electromagnetic radiation; electric dipole transitions; interaction of one-electron atoms with external electric and magnetic fields; two-electron atoms; molecular structure and spectra of diatomic molecules.		

Course Number (0302463)	Course Title Nuclear Physics	Credit Hours
Prerequisite: (0302363)		3
Basic nuclear properties; nuclear force between nucleons: the deuteron; nuclear models: liquid-drop model, shell model; radioactivity; units for measuring radiation; alpha, beta and gamma decays; energetics of nuclear reactions, isospin, conservation laws; reaction cross sections; nuclear fission and nuclear fusion; brief introduction to particle physics: the standard model.		

Course Number (0302464)	Course Title Astrophysics	Credit Hours
Prerequisite: (0302351 + 0342332)		3
Basic concepts of astrophysics; matter and radiation in stars; heat transfer in stars and nucleosynthesis; stellar structure; stellar evolution and the cosmology of the universe; astrophysics and general relativity; neutron stars; black holes; galaxies and the universe.		

Course Number (0342466)	Course Title Elementary Particles	Credit Hours
Prerequisite: (0302363)		3
Particle phenomenology; accelerators and detectors; scattering and Feynman rules; the quark model; introduction to the standard model; the Higgs mechanism; Large Hadron Collider (LHC) and the frontiers of scientific knowledge.		

Course Number (0302471)	Course Title Solid State Physics	Credit Hours
Prerequisite: (0302363)		3
Crystal lattice and structure; reciprocal lattice; crystal binding; lattice vibrations; elastic scattering of waves; thermal properties of solids; free-electron gas, energy bands in solids.		

Course Number (0302472)	Course Title Physics of Semiconductors	Credit Hours
Prerequisite: (0302363)		3
Semiconductor crystal structure; the energy band structure of crystals; transport of carriers in semiconductors; semiconductor diode devices and frequency speed behavior; and the bipolar junction transistor (BJT).		

Course Number (0302392)	Course Title Employability Readiness	Credit Hours
Prerequisite: (90 credit hours)		6
The course aims to provide students with the necessary skills to prepare them for academic and professional challenges and to be adaptable to the demands of the job market. The course covers the following topics: academic, scientific, and technological skills (methods of teaching physics, experimental and analytical skills, programming and simulation); professional and personal development skills (writing a resume, conducting job interviews, effective communication, teamwork, and collaboration); personal skills (critical thinking and problem-solving, resilience and adaptability, continuous learning, self-development). The student is required to compose a mini thesis and present a defense before a departmental committee.		

Course Number (0342496)	Course Title Special Topics	Credit Hours
Prerequisite: (Department Approval)		3
This course covers topics of special interest in Physics that are not covered in the other courses. The syllabus to be taught should be approved by the Department council.		

Inclusion rates in the program:

A. Courses that will be taught on the principle of full online:

Total average hours that will be taught on the principle of full online in this program: (12 hour).

The percentage achieved for the subjects that will be taught on the principle of full online in this program: (9 %)

B. Subjects to be taught on the blended learning principle:

The total average number of hours that will be taught on the principle of blended learning in this program: (24 hours)

Percentage achieved for subjects that will be taught on the principle of blended learning in this program: (18 %)

C. Face-to-face learning courses:

Number of hours of face-to-face education: (96 hours).

Percentage	Number of Hours	Elective Specialty Requirement	Obligatory Specialty Requirement	Obligatory School Requirement	Elective University Requirement	Obligatory University Requirement	
73%	96	9	66	15	0	6	Face – to - face
9%	12	3	0	3	0	6	On line
18%	24	6	0	3	9	6	Blended
100%	132	18	66	21	9	18	Number of Hours