School			
Major	Bachelor in Physics		

Major Requirements			
Code	Title	Credits	Description
PHYS430	Thermal Physics I	3	The laws of thermodynamics, statistical basis of thermodynamics, ensemble theory, equilibrium statistical mechanics and its application to physical systems of interest, Gibbs energy, irreversibility, transport, and the approach to equilibrium. Prerequisite(s): PHYS330+PHYS340.
PHYS450	Solid State Physics	3	This course is designed to develop an understanding of the basic principles of solid state physics; the course gives an introduction to crystal structures, x-ray diffraction, band theory, overview of semi-conductors, and other solid state topics. Prerequisite(s): Senior/Consent of Instructor
PHYS420	Quantum Mechanics	3	Operators and observables, hermitian operators and unitary transformations, one dimensional potential, harmonic oscillator, uncertainty relations, mathematics of quantum theory, linear algebra and Hilbert spaces, postulates of quantum theory.
PHYS490	Physics Seminar	1	Physics Seminar. Prerequisite(s): PHYS380+PHYS340+ENGL251.
PHYS380	Electromagnetic Fields and Waves II	3	Waves and phasors, transmission lines, Maxwell□s equation for time varying fields, plane waves, guided waves, radiation and antennas, reflection and refraction at oblique surfaces, ionized media, anisotropic materials, approximate methods in electromagnetic, and scattering of electromagnetic waves. Prerequisite(s): PHYS 330.
PHYS360	Analytical Mechanics	3	Advanced Newtonian mechanics, Kepler□s laws, Lagrangian, Hamiltonian, central forces, oscillations, coupled oscillations, motion of rigid bodies. Prerequisite(s): PHYS 210+ MATH 220+ MATH 270.
PHYS350L	Physical Optics Lab	1	Observation of reflection, refraction, index of refraction of liquids, interface, double slit experiment using laser, prisms, light dispension. Also application on Brewster angle, polarization, dispersion & resolving power of the prism & grating spectroscope. Co-requisite(s): PHYS 350
PHYS350	Physical Optics	3	Wave phenomena with specific applications to waves in media and electromagnetic phenomena, Wave equations, propagation, radiation, coherence, interference, diffraction, scattering Light and its interaction with matter. Topics in geometrical and physical optics including interference diffraction, polarization, and laser physics. Prerequisite(s): PHYS 250
PHYS340L	Atomic Physics Lab	1	Speed of light, frank hertz experiment, photo electric effect, ruther ford experiment, specific charge of the electron e/m, fine structure-one e- & two e- spectra-, Balmer series/ Determination of Rydberg□s constant. Co-requisite(s): PHYS340
PHYS340	Modern Physics	3	Special Theory of Relativity, experimental foundations of modern physics, dual nature of light and particles, Bohr model of the atom, Hydrogen atom spectrum, tunneling phenomena, Atomic Structure, Schrodinger equation, quantum numbers and spin of the electron. Prerequisite(s): PHYS 250
PHYS300	Mathematical Physics	3	Vector Calculus, Complex Variables, Sturm-Liouville Systems, Special Functions, Partial Differential Equations, Fourier Analysis. Prerequisite(s):MATH220+MATH270+MATH225
PHYS470	Advanced Quantum Mechanics	3	quantum theory, linear algebra and Hilbert spaces, postulates of quantum theory, one dimensional applications, the harmonic oscillator, uncertainty relations, systems with N degrees of freedom, multi-particle states, identical particles, approximation methods, classical symmetries, quantum symmetries, rotations and angular momentum, spin, addition of angular momentum, the hydrogen atom, quantum paradoxes and Bells theorem.

Code	Title	Credits	Description
PHYS480	Thermal Physics II	3	Einstein statistics are reviewed. These principles are then applied to applications such as electronic specific heats, Einstein condensation, chemical reactions, phase transformations, mean field theories, binary phase diagrams, paramagnetism, ferromagnetism, defects, semiconductors and fluctuation phenomena. Prerequisite(s):PHYS430.

General Education Requirements

Code	Title	Credits	Description
ENGL251	Communication Skills	3	The objectives of this course are to improve students⬜ writing skills for academic purposes by developing effective use of grammatical structures; analytical and critical reading skills; a sensitivity to rhetorical situation, style, and level of diction in academic reading and writing; and competence in using various methods of organization used in formal writing.
ENGL201	Composition and Research Skills	3	This course focuses on the development of writing skills appropriate to specific academic and professional purposes; the analysis and practice of various methods of organization and rhetorical patterns used in formal expository and persuasive writing; the refinement of critical reading strategies and library research techniques; and the completion of an academically acceptable library research paper. Prerequisites: ENGL150, ENGL151.
CULT200	Introduction to Arab - Islamic Civilization	3	The purpose of this course is to acquaint students with the history and achievements of the Islamic civilization. Themes will include patterns of the political and spiritual leadership; cultural, artistic, and intellectual accomplishments Prerequisites: ENGL051, ENGL101, ENGL151.
CSCI200	Introduction to Computers	3	The course aims at making students competent in computer-related skills. It is supposed to develop basic computer knowledge by providing an overview of the computer hardware and basic components as well as hands-on practice on common software applications such as Word, Excel, Power Point, Internet and Email. The student will learn how to use the new features of Microsoft Office 2010 mainly Word documents, Excel spreadsheets and PowerPoint presentations. On the surface, MS Office 2010 looks a lot different than previous versions (no more menus_toolbars!), but by learning to understand the dramatically changed, Ribbon-based interface, you'll quickly get back on the road to productivity.
ARAB200	Arabic Language and Literature	3	This course is a comprehensive review of Arabic Grammar, Syntax, major literature and poetry styles, formal and business letters.

Core Requirements

Code	Title	Credits	Description
PHYS330	Electromagnetic Fields and Waves I	3	Electrostatics, Electric fields in matter, method of images, Magnetostatics, Magnetic fields in matter, electric field intensity, energy and potential, conductors, dielectrics, and capacitance, Maxwell s Equations, Poisson s and Laplace s equations, steady magnetic fields, and multipole expansion. Prerequisite(s): PHYS 250
PHYS250L	Thermodynamic and Waves Lab	1	Students apply Hooke⬜s law, archemides principle, speed of sound, free fall, simple pendulum, torsium pendulum, cabrimetry, viscosity of liquids, frictional forces. Co-requisite(s): PHYS 250
PHYS250	Thermodynamic and Waves	3	Temperature, heat, laws of thermodynamics, heat engines, waves, sound waves, geometrical optics, interference and diffraction. Prerequisite(s): PHYS 200
PHYS280L	Electricity and Magnetism Lab	1	Kitchoff⬜s law, capacitors in series, resistors in series, faraday⬜s law, use of oscilloscope, magnetic fields, electric fields are explored and applied. Co-requisite(s): PHYS 280

MATH375	Numerical Methods for Scientists & Engineers	3	Bases and number representation, analysis of error propagation and error correction, roots for non-linear equations, computational linear algebra, polynomial interpolation, approximation of functions by polynomials, numerical differentiation and integration, numerical methods for solving differential equations, Runge-Kutta method, numerical methods for solving systems of equations and differential equations. Prerequisite: MATH 265 and CSCI 250.
PHYS280	Electricity and Magnetism	3	Electricity, electric field and electric potential, Electric current, Gauss law, capacitors, resistance, Ohm□s law, Kirchoff□s laws, magnetism, Ampere□s law, Biot-Savarat law, Faraday□s law, and RLC circuits. Prerequisite(s): ENGL 150
PHYS210	Mechanics	3	Vectors, motion in one and two dimensions, Circular motion, Conservation of Energy and momentum, Gravitational Laws, Kepler□s Laws, Fluids. Prerequisite(s): ENGL 150
MATH270	Ordinary Differential Equations	3	First-order equations, linear and non-linear differential, linearization, numerical and qualitative analysis, second-order equations, existence-uniqueness theorem, series solutions, Bessel s and Legendre s functions, Laplace transforms, systems of differential equations, applications and modeling of real phenomena. Prerequisite: MATH 220.
MATH225	Linear Algebra with Applications	3	Introduction to the systems of linear equations and matrices, Gaussian eliminations, matrix operations, inverses, types of matrices, determinants and their applications, vector spaces, subspaces, linear independence, basis and dimension, rank and nullity, inner product spaces and orthogonal bases, eigenvalues and eigenvectors, applications from other disciplines such as physics, computer science, and economics.
MATH220	Calculus III	3	This text covers basic topics on infinite series, lines and planes in space, cylinders and quadric surfaces, functions of several variables, limits and continuity, Partial derivatives, chain rule, directional derivatives, Gradient vector, tangent planes, double and triple integrals, areas, moments, center of mass, volumes, double integrals in polar forms, triple integrals in cylindrical and spherical coordinates, line integrals, vector fields Green□s theorem, surface integrals, Stokes theorem, and the divergence theorem. Students are required to solve extensive number of problems and computer assignment using the mathematical software package Maple.
CSCI250	Introduction to Programming	3	This course introduces the basic concepts and principles of structured programming in Java. It starts by an introduction to Java showing its syntax and the structure of a program in Java then teaches simple data types, control structures, methods, arrays, and strings.
CSCI250L	Introduction to Programming Lab	1	This course is a co-requisite for the Introduction to Programming course (CSCI250). The students apply in the lab the fundamentals of programming, explained in CSCI250, by solving lab exercises. The objective of the lab is to implement programming problems using basic data types, selection and repetition structures, methods and arrays.
CHEM200	General Chemistry	3	Basic principles of chemistry, electronic structure of the atom, chemical periodicity, molecular structure and bonding, acids and bases and the states of matter, rates of chemical reactions, and chemical equilibrium are covered in this course. Prerequisites: ENGL 150; CHEM, or S grade on the Chemistry Placement Test Prerequisites: CHEM160, ENGL101. Co-requisites: CHEM200L.
MATH210	Calculus II	3	The course material includes hyperbolic functions and their inverses and their derivatives integration techniques, improper integrals, sequences, infinite series, power series, Taylor and Maclaurin series and application of power series. The mathematical software Maple will be introduced and used in support of the comprehension of the material. Prerequisites: MATH160

MATH305	Programming Languages for Scientist	3	Programming Languages for Scientist