PHYSICS (PHY)

PHY 100 - Fundamental Physics Concepts (4.0 hours)
Core Curriculum: NS
Algebra-based course for students with minimal physics background. Topics introduced include Newton's laws of motion, electromagnetism, thermodynamics, optics, and atomic theory. Emphasis is on basic physical principles. Includes laboratory.

PHY 107 - General Physics I (4.0 hours)
Core Curriculum: NS
Algebra- and trigonometry-based introductory physics course which covers Newtonian mechanics and conservation laws; fluid statics and dynamics; vibrations, waves, and sound; laws of thermodynamics. Includes laboratory.
Prerequisite: High school physics or PHY 100.

PHY 108 - General Physics II (4.0 hours)
Core Curriculum: NS
Continuation of PHY 107. Electric and magnetic fields; electromagnetic induction; electromagnetic waves; geometrical and physical optics; the special theory of relativity; quantum theory, atomic physics, and nuclear and particle physics. Includes laboratory.
Prerequisite: PHY 107; MTH 115.

PHY 110 - University Physics I (4.0 hours)
Core Curriculum: NS
A calculus-based introductory physics course for scientists and engineers that covers Newton's laws of motion; conservation laws for momentum, energy, and rotational motion; oscillatory motion. Includes laboratory.
Prerequisite: High school physics or PHY 100; MTH 119 or MTH 121.

PHY 123 - Physical Science, the Basis for A Technical Society (3.0 hours)
Core Curriculum: NS
A course for non-science students with minimal preparation in mathematics and science. Emphasizes basic concepts from the physical sciences and their significance for a scientifically literate society. Topics in physics, chemistry, computing, energy, and astronomy will be covered from an applications perspective. Students with prior college physics courses may not register for this course.

PHY 130 - University Physics I for Scientists (4.0 hours)
Core Curriculum: NS
A calculus-based introductory physics course for scientists and honors students that covers Newton's laws of motion; conservation laws for momentum, energy, and angular momentum, oscillatory motion, fluids, and thermodynamics. Includes laboratory.
Prerequisite: High school physics or PHY 100; MATH 119 or MTH 121

PHY 140 - Physics of the Small World: Nanophysics and Applications (3.0 hours)
The objective of this course is to educate students with all academic backgrounds in the field of nanoscience and technology, starting with discussing the basic principles and definitions associated with the nano world, the basic ideas of quantum mechanics, and the wide variety of applications of nanotechnology. Offered at the 100 level as an introduction to nanophysics and nanotechnology with the goal of introducing the general public to these topics and their applications.

PHY 167 - Introduction to Fluids and Thermodynamics (2.0 hours)
A calculus-based introductory physics course for scientists and engineers that covers elasticity, fluid mechanics, and thermal physics. Calculus used throughout. This course meets twice/week and includes a small lab component consisting of 4-5 lab sessions.
Prerequisite: High school physics or PHY 100; MTH 119 or MTH 121
Corequisite: PHY 110

PHY 199 - Physics Seminar for New Physics Majors (1.0 hour)
Orientation for students interested in a physics career.

PHY 201 - University Physics II (4.0 hours)
Core Curriculum: NS
Continuation of PHY 110 covering electric fields and DC circuits; magnetic fields; electromagnetic induction and AC circuits; Maxwell's equations; electromagnetic waves; and geometrical and physical optics. Includes laboratory.
Prerequisite: PHY 110.
Corequisite: MTH 223.

PHY 202 - Applied Quantum Physics (3.0 hours)
An introduction to relativity and relativistic mechanics; quantum theory with applications to atomic and molecular physics; condensed matter physics; nuclear and particle physics.
Prerequisite: PHY 201.
Corequisite: MTH 223.

PHY 320 - Optics (4.0 hours)
Geometrical optics: matrix methods, mirrors, lenses, fibers, thick optics, optical instruments; physical optics including interference, diffraction, polarization, lasers, and holography. Includes lab component.
Prerequisite: PHY 202 or 303

PHY 330 - Classical Mechanics (3.0 hours)
Particle kinematics; Newtonian mechanics; classical gravitation; Lagrangian and Hamiltonian dynamics; linear oscillations; nonlinear oscillations; central force and planetary motion; collisions between particles; motion in noninertial systems.
Prerequisite: PHY 201; MTH 224.

PHY 355 - Independent Readings (1.0-3.0 hours)
Individually assigned reading assignments of relevant topics in physics or astronomy.
Prerequisite: Junior standing; background appropriate to the study; consent of instructor.

PHY 360 - Electricity and Magnetism (3.0 hours)
Vector calculus, electric field, Gauss' law, scalar potential, magnetic fields, Ampere's and Faraday's Laws, electromagnetic energy, dipole fields, currents, boundary conditions, and Maxwell's equations.
Prerequisite: PHY 201; MTH 224.

PHY 367 - Statistical and Thermal Physics (3.0 hours)
A theoretical treatment of classical thermodynamics with applications of the first and second laws, and an introduction to statistical mechanics, including quantum statistics, canonical and grand canonical ensembles, general properties of the partition function, applications of statistical mechanics to fluid and solid systems, and the Ising model.
Prerequisite: PHY 330; PHY 202 or 380.

PHY 380 - Quantum Physics (3.0 hours)
Foundations of quantum theory: deBroglie's postulate, Bohr model of the atom, and the Schrodinger equation; applications of quantum theory to atoms, solids, nuclei, and particles; relativity.
Prerequisite: PHY 201.

PHY 381 - Quantum Physics Laboratory (2.0 hours)
Laboratory: experiments designed to investigate quantum physics phenomena.
Corequisite: PHY 202 or PHY 380

PHY 399 - Special Problems in Physics (1.0-3.0 hours)
Qualified students work on an individually assigned problem and prepare oral and written reports on the problem solution. Approved for off-campus programs when required. May be repeated for a maximum of 6 hrs. credit.
Prerequisite: Physics preparation sufficient for the problem; consent of instructor and Department Chair.

PHY 440 - Advanced Nanophysics (3.0 hours)
Covers the fundamental principles of quantum scales and the consequences of scale reduction and limitations; quantum mechanical effects of nanostructures and their impacts on the macro world; nanoscale phenomena and applications based on magnetism, spin, and superconductivity; fabrication of nanostructures; introduction to characterization techniques; silicon-based nanoelectronics; latest and future nanoscience and nanotechnological advances and challenges.
Prerequisite: PHY 202 or PHY 380, MTH 223

PHY 441 - Advanced Nanophysics Laboratory (2.0 hours)
Experiments associated with synthesis and characterization of nano-scaled structures: fabrication methods; diffraction techniques; electron spectroscopies; electron microscopy; atomic force microscopy.
Prerequisite: PHY 202 or PHY 380.

PHY 460 - Advanced Electricity and Magnetism (3.0 hours)
Solution to Laplace's equation, method of images, boundary value problems, plane electromagnetic waves in vacuum, magnetic materials, and conductors; reflection and refraction, guided waves, and radiation of electromagnetic waves.
Prerequisite: PHY 360
Corequisite: MTH 414 or a 500-level MTH course

PHY 480 - Quantum Mechanics I (3.0 hours)
Inadequacies of classical physics when applied to problems in atomic and nuclear physics. Development of mathematical formalism used in basic quantum theory, with applications to simple models of physical systems.
Prerequisite: PHY 330; PHY 202 or 380, 306 or consent of instructor. MTH 207 recommended.

PHY 482 - Quantum Mechanics II (3.0 hours)
The mathematical formalism of quantum mechanics with applications to problems of electron spin and many-particle systems will be studied along with the development of approximation techniques with applications to complex physical systems.
Prerequisite: PHY 480.

PHY 568 - Condensed Matter Physics (3.0 hours)
Introduction to the physics of the solid state and other condensed matter especially for students of physics, materials science, and engineering; structure of crystals; molecular binding in solids, thermal properties, introduction to energy band structure and its relation to charge transport in solids, semiconductors, superconductivity.
Prerequisite: Physics majors: PHY 330, 202 or 380; PHY 305. Other majors need instructor consent.