PHYSICS AND ASTRONOMY (PHYS)

PHYS 171 Physics I 4 cr.
This course is an algebra/trigonometry-based course on the fundamental concepts of mechanics, fluids, and thermodynamics. The course begins with an introduction to the nature of measurement, scalars, vector arithmetic, and one- and two-dimensional kinematics, continuing on to discuss Newton's laws of motion, energy, and momentum, universal gravitation, with an introduction to the elastic properties of materials. Static and dynamic systems are studied, in the context of both translational and rotational motion. Further topics include fluid statics and dynamics, ideal gases, heat and temperature, the laws of thermodynamics, entropy, and heat engines. Code 5 course fee.
Prerequisite(s): MATH 161

Corequisite(s): MATH 161

PHYS 172 Physics II 4 cr.
This course is a continuation of Physics 171. Physics 172 (algebra/trigonometry based) covers latter topics in mechanics, electromagnetism, optics, and modern physics. The course begins with a study of oscillatory motion, mechanical waves, sound, and a discussion of human hearing. Topics in electromagnetism include sources and properties of electric and magnetic fields and how these interact charged particles and currents, electrical circuits, induction, and electromagnetic waves. The course covers both geometric and physical optics, including image formation, interference, and diffraction. The course ends on an introduction to special relativity and old quantum theory. Code 5 course fee.
Prerequisite(s): PHYS 171

PHYS 180 Introduction to Astronomy 4 cr.
This is an introductory, one-semester course that studies the nature of the Universe: Solar System, stars, galaxies, and the overall Universe. This course investigates the tools and methods of astronomy and the implications of modern astronomical findings. The course examining the nature of the scientific method as applied to a number of key problems from the history of astronomy. It then proceeds to cover the most recent findings as to the nature, origin, and evolution of the planets, stars, galaxies, and the Universe itself. Laboratory work includes observations with the unaided eye and the telescope, and analysis of more complex observations. This course may be used in place of PHYS 181 Astronomy of the Solar System or PHYS 182 Astronomy of Stars and Galaxies. Code 2 course fee.

PHYS 181 Astronomy of the Solar System 4 cr.
This is an introductory course that studies the nature of the solar system: the Sun, planets, moons, and other bodies orbiting the Sun. This course investigates the tools and methods of astronomy; the nature of the scientific method as applied to a number of key problems from the history of astronomy; the motions of the sky; recent findings as to the nature, origin, and evolution of the planets including exoplanets; and life in the universe. Laboratory work includes observations with the unaided eye and analysis of more complex observations. Code 5 course fee.

PHYS 182 Astronomy of Stars and Galaxies 4 cr.
This is an introductory course that studies the nature of the Universe: stars, formation and evolution of stars, death of stars, galaxies, and Cosmology. This course investigates the tools and methods of astronomy and the nature of the scientific method as applied to a number of key problems from stellar and galactic astronomy, and Cosmology. Laboratory work includes analysis of laboratory measurements and complex observations. Code 5 course fee.

PHYS 281 General Physics I 4 cr.
This calculus-based course is a rigorous introduction to the fundamentals of Newtonian mechanics. The course begins with measurements and dimensional analysis, a description of vectors, vector decomposition, and vector arithmetic. The motion of rigid bodies is treated including translational and rotational kinematics, projectile motion, circular and rolling motion; forces, torques, Newton's laws of motion, equilibrium, and dynamics; translational and rotational work and energy; and linear and angular impulse and momentum. Further topics include oscillatory motion, resonance, mechanical waves, sound, standing waves, and superposition; and Newton's law of universal gravitation and orbital motion. Code 5 course fee.
Prerequisite(s): MATH 265

Corequisite(s): MATH 265

PHYS 282 General Physics II 4 cr.
This calculus-based course covers thermodynamics and electromagnetism. The course begins with a discussion of temperature and heat and a description of ideal gases using the kinetic theory and the Maxwell-Boltzmann distribution. A connection between microscopic and macroscopic states is emphasized. The zeroth, first, and second laws of thermodynamics and entropy are discussed as well as their connection to thermodynamic cycles and engines. The second portion of the course deals with electricity and magnetism, including electrostatics, Gauss's law, magnetostatics, Ampere's law, the Biot Savart law, circuit analysis and Kirchhoff's rules, electromagnetic induction and Faraday's law, Maxwell's equations and electromagnetic waves. Code 5 course fee.
Prerequisite(s): PHYS 281, MATH 265, MATH 266

Corequisite(s): MATH 266

PHYS 283 General Physics III 4 cr.
This calculus-based course is a survey of topics in modern physics. The course opens with a discussion of light and its propagation, specifically in different frames of reference. Consequences of relativity are discussed, including time dilation, length contraction, and relative simultaneity, as well as the impacts on the quantities of mechanics, contrasting with relativistic and Newtonian mechanics. The course moves on to addressing the failures of classical physics to explain important observations leading to early quantum theory, including the photoelectric effect, the Bohr model of the atom, atomic spectra and blackbody radiation. Finally, the modern treatment of quantum mechanics is developed, using matter waves, wave functions and quantum mechanical states, the Born interpretation, and Schrodinger's equation, including solving this for simple potentials. Code 5 course fee.
Prerequisite(s): PHYS 282, MATH 266

Corequisite(s): MATH 267