

PHY - PHYSICS

PHY 101

Applied Physics

4 credit hours (lecture: 3 | lab: 3)

Course introduces physics. Content includes mechanical systems, electrical systems, thermal systems, fluid mechanics, and electromagnetic waves. Intended for students in technical programs.

Prerequisite: Successful completion of MAT 070 or higher, except MAT 111.

Delivery mode: Face-to-Face | Online

Fee: \$30

PHY 131

College Physics I

4 credit hours (lecture: 3 | lab: 2)

Course introduces physics. Algebra and trigonometry are used throughout the course. Content includes kinematics, Newton's laws of motion, energy, momentum, gravity, rotational dynamics, simple harmonic motion, fluid mechanics, and heat. Intended for liberal arts, life science and health science students.

Prerequisite: MAT 122 or concurrent enrollment in MAT 122 or consent of instructor.

IAI General Education: P1 900L

Delivery mode: Face-to-Face | Online

Fee: \$35

PHY 132

College Physics II

4 credit hours (lecture: 3 | lab: 2)

Course continues PHY 131. Content includes sound, mechanical waves, electrostatic forces, capacitance, electric current, voltage, resistance, magnetism, Faraday's law, electrical instruments and electrical safety; light, geometric and physical optics, and optical instruments.

Prerequisite: PHY 131.

Delivery mode: Face-to-Face | Online

Fee: \$35

PHY 140

Fundamentals of Nanotechnology I

4 credit hours (lecture: 3 | lab: 3)

Course introduces nanoscience and nanotechnology, incorporating topics in physics, chemistry and biology at the nanoscale. These include forces, fluidics, atoms and molecules, nanoscale structures and biological function at the nanoscale. Practical nanotechnology applications of pharmaceutical biotechnology and drug delivery will be highlighted that are relevant to local industry. Hands-on laboratory activities make use of dip-pen nanolithography, atomic force microscopy, fluorescence microscopy, scanning electron microscopy and nanoparticle characterization.

Prerequisite: MAT 070 or placement into MAT 095, and one year of high school biology and one year of high school chemistry.

Delivery mode: Face-to-Face | Hybrid | Online

Fee: \$50

PHY 141

Fundamentals of Nanotechnology II

4 credit hours (lecture: 3 | lab: 3)

Course continues discussion of topics covered in PHY 140 at greater depth, including nanophysics and nanobiology, such as forces, fluidics, the wave nature of light, photonics, atomic and molecular bonds, nanoscale structures, quantum mechanics and conductivity. Locally pertinent nanotechnology applications such as development and delivery of small molecules, nanoparticles and biologics for theradiagnostic uses will be examined. Hands-on laboratory activities make use of dip-pen nanolithography, atomic force microscopy, fluorescence microscopy, nanoparticle characterization, scanning electron microscopy, UV-Vis spectroscopy, nanoparticle synthesis and carbon nanotube synthesis.

Prerequisite: PHY 140 with minimum grade of C.

Delivery mode: Face-to-Face | Hybrid | Online

Fee: \$50

PHY 142

Nanotechnology Projects

4 credit hours (lecture: 2 | lab: 4)

Course uses project-based learning and team-building techniques to study topics in electronics, photonics, thin films, biotechnology, and procedures for troubleshooting instrumentation. Instrumentation and techniques include, atomic force microscopy, fluorescence microscopy, nanoparticle characterization, scanning electron microscopy, energy dispersive X-ray analysis, ultraviolet-visible and Fourier-transform infrared spectroscopy, basic photonics, photolithography, profilometry, and ellipsometry.

Prerequisite: PHY 141 with minimum grade of C.

Delivery mode: Face-to-Face | Hybrid | Online

Fee: \$50

PHY 143

Nanotechnology Internship

3 credit hours (lecture: 2 | lab: 10)

Course consists of direct work experience in a nanotechnology-related environment at an approved business or industrial firm applying knowledge and skills learned to daily assigned responsibilities. The student will meet with a nanotechnology instructor who will evaluate their on-the-job technical skills. Arrangements for the work experience will be worked out in conjunction with the nanotechnology coordinator. In addition, the student will discuss work-related situations with the instructor.

Prerequisite: PHY 141 with minimum grade of C

Delivery mode: Face-to-Face | Online

PHY 221

General Physics I

5 credit hours (lecture: 4 | lab: 3)

Course presents fundamental elements of physics with quantitative methods utilizing vectors, and differential and integral calculus. Content includes kinematics and dynamics, conservation of energy and momentum, angular momentum, elastic properties of matter, simple harmonic motion, resonance, kinetic theory of gasses, and thermodynamics. Intended for engineering and physical science students.

Prerequisite: MAT 250 with minimum grade of C or consent of instructor.

IAI General Education: P2 900L

IAI Major: PHY 911

Delivery mode: Face-to-Face | Online

Fee: \$35

PHY 222

General Physics II

5 credit hours (lecture: 4 | lab: 3)

Course continues PHY 221. Content includes quantitative methods utilizing differential and integral calculus; mechanical waves and sound, charge, electric field and potential, Gauss's Law, Ampere's Law, Faraday's Law, magnetic properties of matter, inductance, capacitance, electromagnetic radiation, geometrical optics, and physical optics.

Prerequisite: PHY 221 with minimum grade of C and MAT 251 or concurrent enrollment in MAT 251.

IAI Major: PHY 912

Delivery mode: Face-to-Face | Online

Fee: \$35

PHY 223

Modern Physics

4 credit hours (lecture: 3 | lab: 2)

Course continues PHY 222. Content includes special relativity, classic experiments leading to the development of quantum mechanics, waveparticle duality, wave motion and wave packets, uncertainty principle, Bohr model of hydrogen, Schrödinger equation, infinite and finite square well, quantum harmonic oscillator, tunneling, angular momentum and hydrogen atom, atomic structure, and basic nuclear physics.

Prerequisite: PHY 222 with minimum grade of C.

Delivery mode: Face-to-Face | Online

Fee: \$30

PHY 230

Optics

4 credit hours (lecture: 3 | lab: 3)

Course is designed to introduce students to the mathematics and applications of physical optics. Topics include the mathematics of waves, electromagnetic waves, photons, various ways that light interacts with matter, the principle of superposition, basic geometric optics, polarization, diffraction, interference and Fourier optics.

Prerequisite: PHY 222 with minimum grade of C or consent of instructor.

Delivery mode: Face-to-Face

Fee: \$30

PHY 290

Topics in Physics

1-4 credit hours (lecture: 1-4 | lab: 1-4)

Course is designed to meet the special interest needs of physics students. Topics will be offered for variable credit from one to four semester credit hours. Students may repeat PHY 290 up to three times on different topics for a maximum of nine semester credit hours. Fee Varies. Prerequisite may vary by topic.

Delivery mode: Face-to-Face