# PHYS - Physics

PHYS 101 - Physics for Science and Mathematics I (4)

This mathematically intensive course includes vectors, statics, kinematics, Newton's laws, energy, momentum, thermodynamics and wave motion. Lecture and laboratory. 6 contact hours.

General Education Category: Natural Science.

Prerequisite: Completed MATH 120 or appropriate score on the mathematics placement exam.

Offered: Fall, Spring, Summer.

PHYS 102 - Physics for Science and Mathematics II (4)

This mathematically intensive course includes electrostatics, DC and AC circuits, magnetism, electromagnetic waves, optics and an introduction to atomic and nuclear physics. Lecture and laboratory. 6 contact hours.

General Education Category: Advanced Quantitative/Scientific Reasoning.

Prerequisite: PHYS 101.

Offered: Fall, Spring, Summer.

PHYS 103 - Calculus Applications in Mechanics (1)

Students explore calculus-based topics in mechanics including kinematics, work and potential energy, momentum, rotational motion and simple harmonic motion.

Prerequisite: MATH 212, PHYS 101.

Offered: Fall.

PHYS 104 - Calculus Applications in Electricity and Magnetism (1)

Students explore calculus-based topics in electricity and magnetism including force from extended charge distributions, calculation of electric potential, Gauss’s Law, Ampere’s Law, Faraday’s Law and electromagnetic waves.

Prerequisite: MATH 212, PHYS 102.

Offered: Spring.

PHYS 110 - Introductory Physics (4)

This algebra-based course includes vectors, statics, Newton’s Laws, work and energy, electrostatics, DC circuits, magnetism, electromagnetic waves, nuclear radiation, and topics in modern physics. Lecture and Laboratory. 7 contact hours.

General Education Category: Natural Science.

Prerequisite: MATH 120 or appropriate score on the math placement exam.

Offered: Spring, Fall, Summer.

PHYS 118 - Fundamentals of Physics I (4)

This noncalculus-based course includes vectors, statics, kinematics, Newton’s laws, energy, momentum, fluids, thermodynamics and wave motion. Lecture and laboratory.

Offered: As needed.

PHYS 119 - Fundamentals of Physics II (4)

This noncalculus-based course  includes electrostatics, DC and AC circuits, magnetism, electromagnetic waves, optics, and an introduction to atomic and nuclear physics. Lecture and laboratory.

Prerequisite: PHYS 118.

Offered: As needed.

PHYS 120 - The Extraordinary Physics of Ordinary Things (4)

Students will learn about physical principles governing everyday applications and phenomena such as sports, musical instruments, computers, etc. Students will see how various physical principles work together in these technologies.

General Education Category: Advanced Quantitative/Scientific Reasoning (AQSR)

Prerequisite: Completion of any mathematics general education distribution.

Offered: Spring.

PHYS 306W - Quantum Mechanics Laboratory (1)

Students investigate quantum mechanical phenomena both experimentally and computationally, including the failures of classical physics and wave functions are investigated. Lab skills such as laboratory notebook maintenance and data analysis are introduced. Laboratory. 3 contact hours.

Prerequisite: Completed or concurrent enrollment in PHYS 307.

Offered: Spring (odd years).

PHYS 307 - Quantum Mechanics I (3)

Topics include the failures of classical physics, the structure of the atom, and the wave description of matter, including the Schrödinger Equation, the hydrogen atom, angular momentum and spin. Lecture

Prerequisite: PHYS 102 and MATH 212 or CHEM 405.

Offered: Spring (odd years).

PHYS 309 - Nanoscience and Nanotechnology (4)

This course will introduce the basic physics of nanoscience, describe how properties change at the nanoscale and relate this basic science to new nanotechnologies**.**

General Education Category: Advanced Quantitative/Scientific Reasoning

Prerequisite: Any Natural Science General Education course.

Offered: Fall (even years).

PHYS 310W- Thermodynamics Laboratory (1)

Students investigate thermodynamic phenomena both experimentally and computationally, such as ideal gases, entropy and equilibrium. Lab skills such as laboratory notebook maintenance and data analysis are introduced. Laboratory, 3 contact hours.

Prerequisite: Completed or concurrent enrollment in PHYS 311.

Offered: Spring (even years)

PHYS 311 - Thermodynamics (3)

This is an introduction to the laws of thermodynamics and its application to equilibrium systems, such as ideal gases, phase transformations, solutions and chemical reactions, and elementary statistical mechanics. Lecture.

Prerequisite: PHYS 101 and successful completion of or concurrent enrollment in MATH 213, or consent of department chair.

Offered: Spring (even years).

PHYS 312 - Mathematical Methods in Physics (3)

Topics include curvilinear coordinates, complex variables, integral transforms, vectors and matrices, special functions, differential equations, and numerical methods as applied to physics. Lecture.

Prerequisite: MATH 314.

Offered: Fall.

PHYS 315 - Optics (4)

This course covers electromagnetic waves, geometric optics, and physical optics. Topics include: mirrors, lenses, optical systems, thick lenses, aberrations, interference, diffraction, polarization, coherence, and lasers. Laboratory. 6 contact hours.

Prerequisite: PHYS 102 or consent of department chair.

Offered: Spring (odd years).

PHYS 320 - Analog Electronics (4)

Students examine discrete components, including resistors, capacitors, diodes, and transistors, and their applications. Oscilloscopes and other standard laboratory test equipment are used extensively. Integrated circuits are also introduced. 6 contact hours.

Prerequisite: PHYS 102 or consent of department chair.

Offered: Fall (odd years).

PHYS 321 - Digital Electronics (4)

Students explore basic logic chips and combine them to build digital devices including a microcomputer. Devices include multiplexers, counters, adders, flip-flops, and memory buses. Laboratory. 6 contact hours.

Prerequisite: PHYS 102 or consent of department chair.

Offered: Spring (even years).

PHYS 401 - Advanced Electricity and Magnetism I (4)

This is an examination of the theory and application of electrostatic fields, charge, potential, magnetic fields, steady currents, magnetic flux, inductance, transient current, radiation, magnetic energy and Maxwell's Equations. Lecture.

Prerequisite: MATH 314 and PHYS 102.

Offered: Spring (even years).

PHYS 402 - Advanced Electricity and Magnetism II (3)

This course covers the principles of electrodynamics, conservation laws, electromagnetic radiation, and the application of Special Relativity to electrodynamics. Lecture.

Prerequisite: PHYS 401.

Offered: As needed.

PHYS 403 - Classical Mechanics (4)

This course covers, at an advanced level, the classical theory of linear and rotational dynamics of particles and continuous media. An introduction to Lagrangian mechanics and special relativity is included. Lecture.

Prerequisite: MATH 314, PHYS 102.

Offered: Spring (odd years).

PHYS 407 - Quantum Mechanics II (3)

Topics include the structure of solids, approximation techniques, nuclear physics, and particle physics. Lecture.

Prerequisite: PHYS 102 and PHYS 307.

Offered: As needed.

PHYS 409 - Solid State Physics (3)

Topics include crystallography, common crystal structures, the reciprocal lattice, band theory, phonons, metals, and semiconductors. Lecture.

Prerequisite: PHYS 307.

Offered: As needed.

PHYS 413W – Advanced Physics Laboratory (3)

Advanced experiments in mechanics, waves, thermodynamics, optics, electromagnetism, and other topics are conducted. Laboratory. 6 contact hours.

Prerequisite: PHYS 102 and PHYS 313W.

Offered: Fall.

PHYS 467 - Honors Colloquium in Physics ()

Current topics in science at an advanced level are presented through department colloquia with outside speakers and through a series of seminars led by resident experts. This course may be repeated for credit with a change in content. 1 contact hour. Graded S, U.

Prerequisite: PHYS 102 and consent of department chair.

Offered: Fall, Spring.

PHYS 490 - Directed Study in Physics (3)

Designed to be a substitute for a traditional course under the instruction of a faculty member. An area of physics is studied on the basis of the interest of the student and the instructor.

Prerequisite: Consent of instructor, department chair and dean.

Offered: As needed.

PHYS 491-493 - Research in Physics (1)

The student conducts original research in an area selected after consulting with the instructor and prepares a report on the work. A maximum of 6 credit hours may be earned in these courses.

Prerequisite: Consent of instructor, department chair and dean.

Offered: As needed.