

Physics (PHY)
Physical Sciences & Mathematics Department
School of Natural & Social Sciences
Carhart Science Building

Objectives: The courses in Physics are designed for those students who (1) plan to pursue further work in the field of physics, (2) plan to apply physics in the pre-professional program, (3) plan to teach physics in an academic setting, (4) have the intellectual curiosity to know and understand the physical world around them. Emphasis is placed upon the concepts of physical principles and how they interact with each other in the real world.

Minor in Physics: 21 hours

A minor must include a minimum of 12 hours unduplicated by the student's major(s) and minor(s).

PHY 201 General Physics I or	
301 University Physics I.....	3-4
202 General Physics II or	
302 University Physics II.....	3-4
321 Physics Laboratory I.....	1
322 Physics Laboratory II.....	1
Upper-level Physics electives selected by	
advisement to total 21 hours.....	11-13

Undergraduate Courses

PHY 115 Professionalism in Science (2) A course presenting professional issues pertinent to engineers and scientists along with an overview of the various engineering and science disciplines. A course intended primarily for pre-engineers. Case studies based upon actual technical problems will be presented by practicing engineers and scientists.

PHY 201 General Physics I (3) Prerequisite: 2 years of algebra. An algebra-based general physics course intended primarily for health professions, life science and education students. Topics include vectors, kinematics and dynamics, equilibrium, rotational motion, energy, momentum, oscillations, fluids, and thermodynamics. PHY 321 required.

PHY 202 General Physics II (3) Prerequisite: PHY 201 or 301. A second semester algebra-based general physics course intended primarily for health professions, life science, and education students. Topics include electricity, magnetism, optics, and modern physics. PHY 322 required.

PHY 209 General Physics I Recitation (1) Concurrent enrollment in PHY 201. A complementary course for PHY 201 that focuses on mathematics review and physics studying, exam-taking, and problem-solving techniques.

PHY 210 General Physics II Recitation (1) Concurrent enrollment in PHY 202. A complementary course for PHY 202 that focuses on mathematics review and physics studying, exam-taking, and problem-solving techniques.

PHY 214 Applied Statics (3) Prerequisites: MAT 140, PHY 301. The study of rigid bodies in static equilibrium. A course intended primarily for pre-engineers. Topics include static equilibrium, couples, two- and three-dimensional force systems, trusses, frames and machines, friction, centroids, and moments of inertia.

PHY 215 Applied Dynamics (3) Prerequisites: PHY 214, PHY 302. Newton's laws of motion are applied to particles and rigid bodies. A course intended primarily for pre-engineers. Topics include absolute and relative motion, forces, acceleration, work and energy, momentum, torque, and angular momentum.

PHY 301 University Physics I (4) Prerequisites: High school physics and MAT 140 or equivalent calculus class. A calculus-based general physics course intended primarily for scientists, pre-engineers, computer and math majors and advanced health professional students. Topics include vectors, kinematics and dynamics, equilibrium, rotational motion, energy, momentum, oscillations, fluids, and thermodynamics. PHY 321 required.

PHY 302 University Physics II (4) Prerequisite: PHY 301. A second semester calculus-based general physics course intended primarily for scientists, pre-engineers, computer and math majors, and advanced health professional students. Topics include electricity, magnetism, optics, and modern physics. PHY 322 concurrent enrollment by advisement.

PHY 321 Physics Laboratory I (1) Concurrent enrollment in PHY 201/301 recommended but not required. This laboratory is a required course for both PHY 201 and PHY 301. Experiments, appropriate to the level of lecture, include topics in mechanics, momentum, work and energy, and fluids. (3 hrs lab).

PHY 322 Physics Laboratory II (1) This laboratory is a required course for PHY 202, but may be taken in a subsequent semester. It is optional for PHY 302, depending on the student's program. Experiments, appropriate to the level of the lecture, include topics in electricity, magnetism, and basic optics (3 hrs lab).

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PHY 326 Electronics (3) An introduction to fundamental principles in electronics. Topics include components of electronic circuits, circuit analysis, analog and digital circuits, and electrical safety. (4 hours of lecture-lab combined).

PHY 336 Classical Mechanics (3) Prerequisite: 1 year of Physics. An upper level course in classical mechanics. Topics include a vector language description of motion, dynamics of a particle, mechanical energy, periodic motion, systems of interacting particles, dynamics of a rigid body and Lagrangian dynamics.

PHY 345 Thermodynamics (3) Prerequisite: 1 year of Physics. An upper level course in thermodynamics. Topics include energy conservation, the first and second laws of thermodynamics, energy and entropy, work and heat, thermodynamic systems analysis, and properties of state. Application of these fundamentals to energy conversion systems will be presented.

PHY 356 Electricity and Magnetism (3) Prerequisite: 1 year of Physics. An upper level course in electricity and magnetism. Topics include electrostatics, a microscopic analysis of current and circuits, theories of dielectrics, magnetic properties of matter, and Maxwell's equations.

PHY 393 Physics Laboratory Techniques (1-2) Prerequisite: PHY 201 or 301. Introduction to the direction of students in physics laboratories. Course includes instruction in the setup of equipment, supervision of laboratory activities, evaluation of laboratory reports, and laboratory safety. (3 to 6 hours a week).

PHY 410 Physics for Teachers I (3) Prerequisite: 1 year of Physics. An upper-level general physics course intended primarily for science education students. The course reviews many of the topics from general physics I, including mechanics, with a deeper focus on conceptual understanding, problem-solving techniques, and demonstration development.

PHY 420 Physics for Teachers II (3) Prerequisite: PHY 410. An upper-level general physics course intended primarily for science education students. The course reviews many of the topics from general physics II, including electricity and optics, with a deeper focus on conceptual understanding, problem-solving techniques, and demonstration development.

PHY 440 Astrophysics (3) Prerequisites: 1 year of Physics and EAS 401. An upper level course in astrophysics. Topics include a more detailed survey of the sun, the solar system, stellar properties, stellar systems, interstellar matter, galaxies, and cosmology.

PHY 457 Modern Physics (3) Prerequisite: 1 year of Physics or by permission of instructor. An upper level course in modern physics. Topics include special and general relativity, quantum mechanics, atomic physics, particle physics, and nuclear physics. Cross-listed as CHE 457 Physical Chemistry II.

PHY 465 Optics (3) Prerequisite: 1 year of Physics. An upper level course in modern optics. Topics include the electromagnetic nature of light, Huygen's principle, interference, diffraction, polarization, dispersion, absorption and scattering.

Graduate Courses

PHY 611 Contemporary Physics for Teachers I (3) Selected topics from physics with emphasis on Newtonian mechanics, wave motion, heat, energy and harmonic motion. Lab will emphasize the use of computers. Lecture-lab combined.

PHY 661 Contemporary Physics for Teachers II (2) Selected topics from physics with emphasis on electricity, magnetism, light, and physics of the atom. Lecture-lab combined.