

PHYSICS (PHYS)

PHYS 101 - General Physics w/Lab (4 Credits)

An introductory course focused on the fundamentals of physics. Primarily for non-science majors. Emphasis is on building concepts and applying principles to make quantitative measurements. Among the topics covered are classical mechanics, thermodynamics, electricity and magnetism, optics, and the rudiments of modern physics. Facility with algebra and trigonometry is required. Laboratory. Only in sequence. Credit for only one introductory physics course (101 or 105) can be counted towards degree requirements.

PHYS 102 - General Physics w/Lab (4 Credits)

Prerequisite: PHYS 101 for PHYS 102. An introductory course focused on the fundamentals of physics. Primarily for the non-science majors. Emphasis is on building concepts and applying principles to make quantitative measurements. Among the topics covered are classical mechanics, thermodynamics, electricity and magnetism, optics, and the rudiments of modern physics. Facility with algebra and trigonometry is required. Laboratory. Only in sequence. Credit for only one introductory physics sequence (101-102, 103-104, or 105-106) can be counted toward degree requirements.

PHYS 103A - Elementary Astronomy w/Lab (4 Credits)

Historical introduction, description of the solar system, stars, galaxies, and the universe as a whole, and their properties, together with the rudiments of physics underlying these subjects.

PHYS 104 - Elementary Astronomy (3 Credits)

Prerequisite: PHYS 103A. A continuation of introductory astronomy emphasizing the study of stars and stellar evolution, quasars and galaxies. The cosmology of the universe for non-science majors starts with detailed descriptions of our Sun and ends with the search for dark energy, dark matter and the accelerating universe. Recent developments covered.

PHYS 105 - University Physics, w/Lab (4 Credits)

Co-requisite: MATH 121. Calculus based introductory course primarily for science students. Topics covered: classical mechanics, thermodynamics, electricity, magnetism, optics and some modern physics. Laboratory. Only in sequence. Credit for only one introductory physics course (101 or 105) can be counted toward degree requirements.

PHYS 106 - University Physics w/Lab (4 Credits)

Prerequisite: PHYS 105, or PHYS 101 and MATH 121 with permission of department. Co-requisite: MATH 122. Calculus based introductory course primarily for science students. Topics covered: classical mechanics, thermodynamics, electricity, magnetism, optics, and some modern physics. Laboratory. Credit for only one introductory physics sequence (101-102, 105-106) can be counted toward degree requirements.

PHYS 150 - Music and the Laws of Nature (4 Credits)

Exploration of musical patterns found in physical systems and physical laws manifested in music. Course investigates music fundamentals (pitch/frequency, rhythm/meter, color/timbre, and harmony/symmetry) and searches for similar patterns in the behavior of atoms, molecules, stars, and the universe as a whole using the laws of physics. Laboratory.

PHYS 190 - Physics PEER Journey (1 Credits)

The course provides an introductory overview to the discipline of physics and its applications. Particularly, physics and engineering are explored as fields that support other science fields, and that use computation. This course has a significant collaborative component. PEER stands for persist, engage, explore, relate, essential qualities for all scientists.

PHYS 211 - Modern Physics (3 Credits)

Prerequisite: PHYS 106, MATH 122. Covers development of 20th – 21st centuries physics – special relativity, introduction to quantum mechanics, wave particle duality, nuclear, atomic, molecular structure, and recent 21st century physics development

PHYS 220 - Materials, Fluids, & Thermodynamics (3 Credits)

Prerequisite: PHYS 106. Provides an introduction to the application of classical mechanics within various matter phases and bulk interactions. Material stress/strain, fluid continuity, turbulent/laminar flow, and classical thermodynamics will all be broadly introduced. Classical (and quantum) thermodynamics will be introduced within the context of solids, fluids, and engines.

PHYS 271 - Introductory Selected Topics in Physics (1-4 Credits)

Introductory topics and/or applications in physics that are not offered on a regular basis.

PHYS 283 - Electronics w/Lab (4 Credits)

Prerequisite: PHYS 106 and MATH 122. Basic DC and AC circuit theory, network filters, power supplies, non-linear devices and basic digital circuit theory; experiments using linear and non-linear elements. Laboratory.

PHYS 300 - Optics w/Lab (4 Credits)

Prerequisite: PHYS 106, MATH 122. Introduction to topics in geometrical and physical optics: reflection, refraction, superposition, interference, diffraction, polarization, laser systems, and holography. Laboratory.

PHYS 302 - Methods of Mathematical Physics (3 Credits)

Prerequisite: PHYS 106, MATH 122. Development of methodologies needed to study advanced physics: vectors and matrix algebra, vector calculus, differential equations, orthogonal functions, complex numbers, Fourier series, probability distributions, and numerical methods.

PHYS 310 - Nuclear & Particle Physics (3 Credits)

Prerequisite: PHYS 211, PHYS 290. Topics include: nuclear structure, static and dynamic properties of the nucleus, radioactive decay, nuclear fission and fusion, foundations of the standard model, and particle interactions.

PHYS 319 - Astrophysics (4 Credits)

Prerequisite: PHYS 211, PHYS 290. We use the laws of physics to study the birth and evolution of the universe, followed by the life cycle of its most dynamic occupants - stars. Finally we study the death of stars in violent supernovae, sometimes creating mysterious objects you may have heard of - black holes.

PHYS 320 - Classical Mechanics w/Lab (4 Credits)

Prerequisite: PHYS 211, PHYS 290. General kinematics and dynamics of single particles and systems of particles in three dimensions, harmonic motion, central forces, conservation laws, Lagrange and Hamiltonian mechanics. Laboratory.

PHYS 360 - Statistical Mechanics w/Lab (4 Credits)

Prerequisite: PHYS 211, PHYS 290. Statistical Mechanics is the branch of physics that tackles the questions of atomic behavior between the micro- and macroscopic regimes as they relate to temperature and entropy. Specifically, the macroscopic phenomenon of magnetism is explored.

PHYS 384 - Advanced Physics Laboratory (3 Credits)

Prerequisite: PHYS 211. Experiments relevant to 20th century physics: electron's charge and mass, charge quantization, atomic spectra, microwave properties, speed of light, intensity and attenuation of radiation.

PHYS 399 - Science Careers After UMW (1 Credits)

This course will prepare students for careers in scientific industry or graduate school with a focus on chemistry or physics. Students will learn about the job search/graduate school application process and how to prepare application materials needed for these positions. Cross-listed as CHEM 399.

PHYS 400 - Electromagnetism w/Lab (4 Credits)

Prerequisite: PHYS 211, PHYS 290. Development of electric and magnetic static properties in vacuum and matter, electrodynamics and Maxwell's equations. Laboratory.

PHYS 410 - Quantum Mechanics w/Lab (4 Credits)

Prerequisite: PHYS 211, PHYS 290. Introduction to basic principles of non-relativistic quantum mechanics: wave packets, uncertainty principle, wave functions, Schrodinger equation, harmonic oscillator and hydrogen atom. Laboratory.

PHYS 471 - Selected Topics in Physics (1-4 Credits)

Prerequisite: Permission of Instructor. Specialized topics in physics not offered on a regular basis.

PHYS 482 - Physics Seminar (2 Credits)

A capstone course for senior physics majors only, except by permission of department. Students conduct research and give oral presentations on selected topics in physics.

PHYS 491 - Individual Study (1-4 Credits)

Open to junior and senior physics majors. Four credits when taken for Honors in Physics.

PHYS 492 - Individual Faculty-Mentored Research (1-4 Credits)

Prerequisite: URES 197. Open to physics majors who are actively engaged in faculty-mentored research. Can be repeated in multiple semester. Four credits when taken for Honors in Physics.

PHYS 499 - Internship (1-12 Credits)

Supervised off-campus experience, developed in consultation with the department.