

# PHYSICS (PHY)

## PHY 100. Patterns In Nature. (3 Units)

Unifying principles of elastic, sound, light and matter waves. Models of nature. Successes and failures of wave and particle models and their synthesis. Designed for non-science students. Partially meets the lower division General Education requirement in Natural Sciences.

Offered Fall, Spring

## PHY 110. Computer Methods in Applied Physics. (3 Units)

Prerequisite: MAT 151 or MAT 153. Introduction to programming with physics applications. Students will gain insight into physical phenomena. They will learn to relate theory to experiment through the use of interactive physics simulations.

Offered All terms, Spring

## PHY 120. Elements Of Physics I. (4 Units)

Prerequisite: High school or college algebra. Motion, energy, waves and heat treated from a non-calculus point of view. Three hours of lecture and three hours of laboratory per week.

Offered Fall, Spring, Summer

## PHY 122. Elements Of Physics II. (4 Units)

Prerequisite: PHY 120. Electricity, magnetism and light. Nuclear radiation. Quantum phenomena. Atomic structure. Three hours of lecture and three hours of laboratory per week.

Offered Fall, Spring

## PHY 130. General Physics I. (5 Units)

Prerequisite: MAT 191 or concurrent enrollment. Kinematics and dynamics of particles, rigid bodies and fluids. Kinetic theory, temperature and thermodynamics. Calculus-based course. Four hours of lecture and three hours of laboratory per week.

Offered Fall, Spring

## PHY 132. General Physics II. (5 Units)

Prerequisites: MAT 193 or concurrent enrollment, and PHY 130. Waves, light, electricity and magnetism. Four hours of lecture and three hours of laboratory per week.

Offered Fall, Spring

## PHY 134. General Physics III. (4 Units)

Prerequisite: PHY 132 or consent of instructor. Twentieth century physics, including concepts of relativity and quantum theory and particle classification. Applications to radiation, atoms, elementary particles and nuclei. Three hours of lecture and three hours of laboratory per week.

Offered Fall, Spring

## PHY 195. Selected Topics in Physics. (1-4 Units)

Prerequisites: Consent of instructor. The study of an area of Physics that is not normally available in other courses. Repeatable course.

Offered As needed

## PHY 201. Experimental Methods. (3 Units)

Fabrication techniques applicable in the laboratory per week. Properties of materials. Three hours of laboratory per week.

Offered Infrequent

## PHY 207. Physics W/Clin Sci App. (4 Units)

Prerequisites: High school algebra, CHE 110 and CHE 112. Electricity, magnetism and electromagnetic waves. Light, including the photon model. Laboratory emphasis on solid state devices and electronic instrumentation. Designed for students in the Clinical Sciences. Three hours of lecture and three hours of laboratory per week.

Offered Infrequent

## PHY 210. Physical Science for Teachers. (4 Units)

Prerequisite: Admission to the Liberal Studies major. Designed specifically for future elementary and middle school teachers. Emphasis on the fundamental concepts of physical science and their applications. Laboratory experiments use mostly low cost everyday objects. Topics include mechanics, fluids, heat, waves, electromagnetism, light, atoms, periodic table and chemical bonding. Three hours of lecture and three hours of laboratory per week.

Offered Fall, Spring, Summer

## PHY 295. Selected Topics in Physics. (3 Units)

Prerequisites: Consent of instructor. The study of an area of Physics that is not normally available in other courses. Repeatable course.

Offered As needed

## PHY 302. Wrkshp Phys Sci Fr Teachr. (3 Units)

Lecture-demonstration-laboratory covering fundamental concepts in physical science, designed especially for in-service teachers (K-12). Class emphasizes on hands-on activities using everyday objects. Two hours of lecture and three hours of laboratory per week. Not for physics majors or minors. CR/NC grading.

Offered Infrequent

## PHY 306. Math Methods In Physics. (3 Units)

Prerequisite: MAT 211. Application of the following techniques to physics: vectors, Gauss' and Stokes' theorems, series solutions of differential equations, Sturm - Liouville theory, and Fourier Series.

Offered Fall, Spring

## PHY 310. Theoretical Mechanics I. (3 Units)

Prerequisites: PHY 130, PHY 306 and MAT 211. Newtonian dynamics of one and two particles. Introduction to Lagrange's equations. Includes computer simulations.

Offered Fall

## PHY 320. Physical Optics. (3 Units)

Prerequisite: PHY 132 or consent of instructor. Scalar wave equations, interference and diffraction, spacial filtering, coherence and holography.

Offered Spring

## PHY 331. Audio Electronics. (3 Units)

Prerequisite: PHY 100 or consent of instructor. Selection and utilization of electronic components and instrumentation. Solid state circuit design and construction. Fundamental electronics through linear amplifiers, power supplies, filters and feedback. A project is required. Designed for students interested in audio techniques. Two hours of lecture and three hours of laboratory per week.

Offered Infrequent

## PHY 333. Analog Electronics. (3 Units)

Prerequisite: PHY 122 or PHY 132 or consent of instructor. Selection and utilization of electronic components and instrumentation. Solid state circuit design and construction. Amplifiers, feedback techniques, operational amplifiers, SCRs, FETs, etc. A project is required. Two hours of lecture and three hours of laboratory per week.

Offered Fall, Spring

## PHY 335. Digital Electronics. (3 Units)

Prerequisites: PHY 122 or PHY 132 or consent of instructor is required, PHY 333 is recommended. Design and use of systems employing digital integrated circuits. Gates, Boolean algebra, combinatorial and sequential design. Multiplexers, flip-flops, shift registers, ALUs and memories. Two hours of lecture and three hours of laboratory per week.

Offered Spring

**PHY 337. Microprocessors. (3 Units)**

Prerequisite: PHY 335 or consent of instructor. Architecture, programming and interfacing of microcomputers. Input/output, instruction sets, subroutines, interrupts, serial communications and process control. Two hours of lecture and three hours of laboratory per week.  
Offered Infrequent

**PHY 339. Instrumentation. (3 Units)**

Prerequisite: PHY 333. Measurement techniques, transducers, noise reduction, signal processing in the analog and digital domains. Computer controlled instrumentation and data acquisition. Bus configurations and interfacing. Two hours of lecture and three hours of laboratory per week.  
Offered Infrequent

**PHY 341. Advanced Laboratory. (2 Units)**

Prerequisites: PHY 132 (or 122) and 333. Advanced experimental work, including data acquisition and error analysis techniques. Experiments are taken from several of the major areas of physics, such as optics and spectroscopy, solid state, acoustics, nuclear physics and electronics. Course may be repeated for credit with instructor's approval. One hour of lecture and one three hours laboratory period per week.  
Offered Spring

**PHY 346. Thermal Physics. (3 Units)**

Prerequisites: PHY 130 and MAT 211. Laws of thermodynamics. Equations of state, entropy, free energies, kinetic theory and concepts of statistical physics.  
Offered Spring

**PHY 350. Electromagnetic Theory I. (3 Units)**

Prerequisites: PHY 132, PHY 306 and MAT 211 are required; MAT 213 is recommended. Electro- and magnetostatics. Electromagnetic properties of matter, Faraday's law of induction, direct and alternating currents. Includes computer simulations.  
Offered Fall

**PHY 352. Electromagnetic Theory II. (3 Units)**

Prerequisite: PHY 350. Derivation and applications of Maxwell's equations in vacuum and material media. Electromagnetic radiation. Includes computer simulations.  
Offered Spring

**PHY 356. Astrophysics. (3 Units)**

Prerequisites: PHY 132 and PHY 134. Quantitative study of stellar astronomy with emphasis on stellar evolution and cosmology. Includes computer simulations.  
Offered Spring even

**PHY 380. Non-Linear Phenomena. (3 Units)**

Prerequisites: MAT 311 or PHY 306; PHY 310 recommended. Linear systems, iterated maps, differential flows, conservative systems, routes to chaos, strange attractors, fractals, coherent structures, and pattern formation. Visits to computer lab will be included.  
Offered Spring

**PHY 395. Selected Topics in Physics. (1-4 Units)**

Prerequisites: Consent of instructor. The study of an area of Physics that is not normally available in other courses. Repeatable course.  
Offered As needed

**PHY 460. Quantum Mechanics I. (3 Units)**

Prerequisites: PHY 134, PHY 306 and MAT 211. Quantum phenomena; postulates and interpretation; Schroedinger's equation in one, two and three dimensions. Applications to atoms and barrier penetration.  
Offered Fall

**PHY 462. Quantum Mechanics II. (3 Units)**

Prerequisite: PHY 460. Spin, identical particles. Applications of quantum mechanics to problems of current interest in physics, such as solid state, nuclear, astrophysics and particle physics.  
Offered Spring odd

**PHY 494. Independent Study. (3 Units)**

Prerequisites: Upper division standing and completion of an independent study contract are required. A reading program on a specialized topic in Physics under the supervision of a faculty member. Repeatable course.  
Offered Fall, Spring

**PHY 495. Selected Topics Physics. (3 Units)**

Prerequisites: Upper division standing and consent of instructor. The study of an area of Physics that is not normally available in other courses. Repeatable course.  
Offered As needed

**PHY 498. Directed Research. (1-3 Units)**

Prerequisites: Upper division standing and consent of instructor. Advanced laboratory work in an area related to physics or instrumentation. The student participates in an independent investigation under faculty supervision. Repeatable course. Three to nine hours of laboratory per week.  
Offered Fall, Spring

**PHY 595. Special Topics in Physics. (1-4 Units)**

Prerequisite: Consent of instructor. Advanced course of special interest to graduate students. Topic and content will vary as announced.  
Offered As needed