

PHYSICS (PHYS)

PHYS 100 Perspectives in Physics 3 Credit Hours

An introductory look at the concepts and methods of physics as well as the role of physics in society today. Examines some of the problems facing physicists and the ways they go about tackling them. Problem solving includes the use of mathematics in physical situations. The course is designed for non-concentrators interested in physics. Three hours lecture. (S).

PHYS 125 Introductory Physics I 4 Credit Hours

Part I of a non-calculus, introductory, survey of physics. The concepts of physics are presented with an emphasis on the methods of solving physical problems. Topics are drawn from mechanics, waves, and thermal physics. This course and PHYS 126 are normally taken by students in biological science, preprofessional and computer science programs. Three hours lecture, one hour discussion, three hours laboratory. (F).

Prerequisite(s): MATH 105* or Mathematics Placement with a score of 113

Corequisite(s): PHYS 125L

PHYS 126 Introductory Physics II 4 Credit Hours

A continuation of PHYS 125. Topics are drawn from electricity and magnetism, optics, and modern physics. Three hours lecture, one hour discussion, three hours laboratory. (W).

Prerequisite(s): PHYS 125 or PHYS 150

Corequisite(s): PHYS 126L

PHYS 150 General Physics I 4 Credit Hours

Part I of an integrated, two-semester, calculus-based treatment of physics, with emphasis on the solution of physical problems through the understanding of a few basic concepts. Topics are drawn from mechanics. This course and PHYS 151 are normally taken by concentrators in physics, chemistry, biochemistry, mathematics, and engineering. Three hours lecture, one hour discussion, three hours laboratory. (FW).

Prerequisite(s): MATH 115* or Mathematics Placement with a score of 116

Corequisite(s): PHYS 150L

PHYS 151 General Physics II 4 Credit Hours

A continuation of PHYS 150. Topics are drawn from electricity and magnetism, and optics. Three hours lecture, one hour discussion, three hours laboratory. (FW).

Prerequisite(s): PHYS 150 and (MATH 116* or Mathematics Placement with a score of 215)

Corequisite(s): PHYS 151L

PHYS 305 Contemporary Physics 3 Credit Hours

An introduction to contemporary topics in physics of interest to science, mathematics and engineering students. Topics include relativity, and quantum mechanics and their applications to atoms, molecules, nuclei, solid state phenomena, and cosmology. Three hours lecture. (W).

Prerequisite(s): (PHYS 126 or PHYS 151) and (MATH 116 or Mathematics Placement with a score of 215)

PHYS 314 Computational Physics 3 Credit Hours

An introduction to numerical and computational techniques in physics and astronomy. Topics include an introduction to scientific computing, fitting data to a model, visualizing results, plotting, error analysis, and writing software to solve physical problems. Applications will be selected from a variety of subfields, including: classical mechanics, statistical physics, quantum physics, electromagnetism, chaos, biophysics, and astrophysics. Three hours lecture.

Prerequisite(s): PHYS 151 and (MATH 205* or MATH 215*)

PHYS 320 Environmental Physics 3 Credit Hours

A survey of the applications of physical principles to the environment, and to the conversion, transfer, and use of energy. Problems of transportation, meteorology, and thermal pollution are included. Three hours lecture. (OC).

Prerequisite(s): PHYS 126 or PHYS 151

PHYS 360 Instrumentation for Scientists 4 Credit Hours

An introduction to the principles of electronic instrumentation used in scientific research. Methods of converting physical measurements into electronic signals by means of electrical circuits, transistors, digital and analog integrated circuits will be discussed. Digital computers as general purpose laboratory instruments will be explored. Students will complete individual projects. Three hours lecture, four hours laboratory. (F).

Prerequisite(s): PHYS 126 or PHYS 151

PHYS 370 Intro to Mathematical Physics 3 Credit Hours

As introduction to those mathematical methods that are widely used in understanding the physical phenomena exhibited by Nature. Topics include vector analysis, linear algebra, complex variables, Fourier analysis, and differential equations. Emphasis is on the application of these techniques to physical problems of interest to students in mathematics, engineering, and the physical sciences. Three hours lecture. (AY).

Prerequisite(s): (MATH 205 or MATH 215 or Mathematics Placement with a score of 215) and PHYS 151

PHYS 390 Current Topics in Physics 3 Credit Hours

A lecture course in a topic of current interest in physics. Topics vary and are announced in the current Schedule of Classes. Three hours lecture. (OC).

Prerequisite(s): PHYS 305*

PHYS 401 Mechanics 3 Credit Hours

A study of the classical physics of the motions of single particles, systems of particles, and rigid bodies. Topics include central force laws and planetary motion, collisions and scattering, rigid body motion, oscillations, Lagrange's equations, and Hamilton's principle. Three hours lecture. (F).

Prerequisite(s): (MATH 205 or MATH 215 or Mathematics Placement with a score of 215) and PHYS 151

PHYS 403 Electricity and Magnetism 3 Credit Hours

The study of electrostatics, magnetostatics and electrodynamics using Maxwell's equations. Of interest to engineers and physical scientists, the course focuses on the logical development of Maxwell's equations from experimental laws and on their application to electromagnetic phenomena. Three hours lecture. (W).

Prerequisite(s): (MATH 205 or MATH 215 or Mathematics Placement with a score of 215) and PHYS 151

PHYS 405 Optics 3 Credit Hours

An introduction to wave and ray optics for students in engineering, mathematics, and the physical sciences. Topics of discussion include reflection and refraction at dielectric surfaces, lenses and mirrors, fiber optics, polarization, interference, and Fraunhofer and Fresnel diffraction. Additional material on coherence, Fourier optics and spatial filtering, and holography is presented as dictated by students' needs and interests, and as time permits. Three hours lecture. (AY).

Prerequisite(s): (MATH 205 or Mathematics Placement with a score of 215 or MATH 215) and PHYS 151

PHYS 406 Thermal and Statistical Physics 3 Credit Hours

A study of thermodynamic phenomena using the methods of statistical mechanics. Designed for engineering students and concentrators in mathematics and the physical sciences; extensive application is made to physical, chemical and biological systems and phenomena, including solids, liquids, gases, paramagnets, thermal radiation, DNA, hemoglobin, semiconductors, heat engines, chemical reactions, and phase transitions. Three hours lecture. (F).

Prerequisite(s): (MATH 205 or MATH 215 or Mathematics Placement with a score of 215) and PHYS 151

PHYS 416 Biological Physics 3 Credit Hours

A course based on the methodology of physics with particular emphasis on the applications of theoretical models and experimental methods to biological objects and systems. Topics may include bioelectricity, membranes, polymers, and physical chemistry of macromolecules. Three hours lecture. (OC).

Prerequisite(s): MATH 205 or (MATH 215 and PHYS 151)

PHYS 421 Astrophysics 3 Credit Hours

A calculus-based introduction to several major areas of modern astrophysics for students concentrating in the physical sciences, mathematics, and engineering. Topics to be covered include observable properties of stars and star systems, stellar structure and evolution, binary systems and galactic x-ray sources, galaxies and quasars, and cosmology. Three hours lecture. (AY).

Prerequisite(s): (PHYS 305 or ASTR 301 or ASTR 330) and (MATH 205 or MATH 215)

PHYS 453 Quantum Mechanics 3 Credit Hours

Concepts of quantum mechanics with applications of the Schrodinger wave equation to the simpler atoms, molecules, and nuclei. Topics of current interest to physicists, chemists, and biologists are discussed. Three hours lecture. (F).

Prerequisite(s): PHYS 305 and MATH 228

PHYS 457 Atomic and Nuclear Physics 3 Credit Hours

Topics in modern atomic physics such as optical and radio-frequency spectroscopy and scattering of atoms and electrons are considered. An introduction to nuclear physics, including nuclear interactions and structure, radioactive decay, fission, and fusion. Three hours lecture. (AY).

Prerequisite(s): (MATH 205 or MATH 215 or Mathematics Placement with a score of 215) and PHYS 305

PHYS 460 Advanced Physics Laboratory 3 Credit Hours

Experiments in both classical and modern physics using contemporary techniques. Commercial apparatus is used in several experiments. Advanced students are encouraged to initiate and conduct their own experiments. Instruction in the planning of experiments and the presentation of oral and written reports is included. One hour recitation, six hours laboratory. Course may be repeated for credit. (W).

Prerequisite(s): PHYS 305* and PHYS 360

PHYS 463 Solid State Physics 3 Credit Hours

A study of the structure and properties of the solid state of matter with emphasis on crystalline solids, crystal structures, lattice dynamics, electrons in metals and semiconductors, and dielectric and magnetic properties of solids. Three hours lecture. (AY).

Prerequisite(s): (MATH 205 or MATH 215 or Mathematics Placement with a score of 215) and PHYS 305

PHYS 490 Topics in Physics 1 to 3 Credit Hours

A lecture course in a topic of current interest in physics. Topics vary and are announced in the current Schedule of Classes. One to three hours lecture. (OC).

PHYS 495 Off-Campus Research 1 to 3 Credit Hours

Participation in ongoing experimental research at an off-campus laboratory. Assignments made by cooperative or internship agreement between the research laboratory, the student, and the physics concentration advisor. Course may be repeated for credit. Four to twelve hours laboratory. Permission of concentration advisor. (F,W,S).

PHYS 497 Seminar in Physics 1 to 3 Credit Hours

Current topics from various areas in pure and applied physics are reported upon by students, faculty, and guest lecturers. Topics presented will vary from year to year. Course may be repeated for credit. One to three hours seminar. (W).

PHYS 498 Directed Studies in Physics 1 to 3 Credit Hours

Special topics in physics chosen by agreement between student and instructor. Course may be repeated for credit. Permission of instructor. (F,W,S).

PHYS 499 Laboratory Studies in Physics 1 to 3 Credit Hours

Experimental studies in physics selected by agreement between student and instructor. Four to twelve hours laboratory. Course may be repeated for credit. Permission of instructor. (F,W,S).

*An asterisk denotes that a course may be taken concurrently.

Frequency of Offering

The following abbreviations are used to denote the frequency of offering: (F) fall term; (W) winter term; (S) summer term; (F, W) fall and winter terms; (YR) once a year; (AY) alternating years; (OC) offered occasionally