

# Physics (PHYS)

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## Courses

### ***PHYS 1100 Essentials of Physics: 4 semester hours.***

A survey of basic physics principles; motion, gravitation, electricity and magnetism, light, atoms and nuclei. Includes lecture, demonstrations and elementary problem solving. COREQ: MATH 1108 or equivalent. Partially satisfies Objective 5 of the General Education Requirements. F, S

### ***PHYS 1101 Elements of Physics: 3 semester hours.***

A survey of basic physics principles; motion, gravitation, electricity and magnetism, light, atoms and nuclei. Includes lecture, demonstrations, elementary problem solving. PREREQ: Permission of the College of Technology. COREQ: MATH 1108 or equivalent; PHYS 1101L. Partially satisfies Objective 5 of the General Education Requirements. F, S

### ***PHYS 1101L Elements of Physics Laboratory: 1 semester hour.***

Laboratory-based application of PHYS 1101, to demonstrate basic physics principles; motion, gravitation, electricity and magnetism, light, atoms and nuclei. PREREQ: Permission of the College of Technology. PRE-or-COREQ: MATH 1108 or equivalent; PHYS 1101. Partially satisfies Objective 5 of the General Education Requirements. F, S

### ***PHYS 1103 Tools for Scientists I: 1 semester hour.***

Personal computer, Internet and WWW, and HP graphics calculator applications in the sciences. Familiarizes students with the capabilities of these computing tools. Emphasizes problems frequently encountered in science and engineering courses. D

### ***PHYS 1111 General Physics I: 3 semester hours.***

Introductory physics course for students in scientific and technical fields, particularly the biological sciences; mechanics, wave motion, thermodynamics. PREREQ: MATH 1143 or MATH 1147 or equivalent. Partially satisfies Objective 5 of the General Education Requirements. F

### ***PHYS 1112 General Physics II: 3 semester hours.***

Introduction to optics, electricity and magnetism and selected topics from atomic and nuclear physics. PREREQ: PHYS 1111 or equivalent, and MATH 1143 or MATH 1147 or equivalent. Partially satisfies Objective 5 of the General Education Requirements. S

### ***PHYS 1113 General Physics I Laboratory: 1 semester hour.***

Demonstrating principles of physics. PRE-or-COREQ: PHYS 1111. Partially satisfies Objective 5 of the General Education Requirements. F, S

### ***PHYS 1114 General Physics II Laboratory: 1 semester hour.***

Demonstrating principles of physics. PREREQ: PHYS 1113. PRE-or-COREQ: PHYS 1112. Partially satisfies Objective 5 of the General Education Requirements. F, S

### ***PHYS 1152 Descriptive Astronomy: 3 semester hours.***

Survey of the historical and modern observation of the sky. Physical relationships in the solar system; planets, satellites, comets, etc., and theories of the creation of the universe and life in the universe. Partially satisfies Objective 5 of the General Education Requirements. F, S, Su

### ***PHYS 1153 Descriptive Astronomy Laboratory: 1 semester hour.***

Use of astronomical equipment, telescopes, cameras, etc. Partially satisfies Objective 5 of the General Education Requirements. F, S, Su

### ***PHYS 1199 Experimental Courses: 1-6 semester hours.***

The content of this course is not described in the catalog. Title and number of credits are announced in the Class Schedule. Experimental courses may be offered no more than three times with the same title and content. May be repeated.

### ***PHYS 2211 Engineering Physics I: 4 semester hours.***

Mechanics of particles and rigid bodies; kinetic theory and thermodynamics; electricity and magnetism; wave motion; optics. PRE-OR-COREQ: MATH 1175. Partially satisfies Objective 5 of the General Education Requirements. F, S

### ***PHYS 2212 Engineering Physics II: 4 semester hours.***

A calculus-based course in electricity, magnetism, and light. It is taught at a level appropriate for future scientists and engineers. Particular topics include charge, current, potential, fields, AC and DC circuits, Maxwell's Equations, and electromagnetic waves. PREREQ: PHYS 2211, PRE-OR-COREQ: MATH 2275. Partially satisfies Objective 5 of the General Education Requirements. F, S

### ***PHYS 2213 Engineering Physics I Laboratory: 1 semester hour.***

Principles and methods of physical measurement. PRE-or-COREQ: PHYS 2211. Partially satisfies Objective 5 of the General Education Requirements. F, S

### ***PHYS 2214 Engineering Physics II Laboratory: 1 semester hour.***

Principles and methods of physical measurement. PRE-or-COREQ: PHYS 2212. PREREQ: PHYS 2213. Partially satisfies Objective 5 of the General Education Requirements. F, S

### ***PHYS 2215 Thermal Physics: 1 semester hour.***

Introduction to thermodynamics and kinetic theory. Designed for students who have taken AP Physics C in high school and have not had instruction in thermal physics normally covered in Engineering Physics I and II. PRE-OR-COREQ: MATH 1175. D

### ***PHYS 2299 Experimental Course: 1-6 semester hours.***

The content of this course is not described in the catalog. Title and number of credits are announced in the Class Schedule. Experimental courses may be offered no more than three times with the same title and content. May be repeated.

### ***PHYS 3301 Modern Physics: 3 semester hours.***

A one-semester course surveying 20th century physics including elements of special relativity and quantum mechanics as applied to atoms. A continuation of the Engineering Physics sequence. PREREQ: PHYS 2212. COREQ: MATH 3360. F

### ***PHYS 3312 Introduction to Biophysics: 4 semester hours.***

Survey course designed for pre-medical, pharmacy, biology, and physical science students covering topics such as the physics of sensory systems, electromagnetic radiations, and physical measurement techniques applied to biological problems. PREREQ: CHEM 1112, CHEM 1112L, MATH 1160 or MATH 1170. D

### ***PHYS 3313 Intermediate Laboratory I: 2 semester hours.***

Modern and historical experiments in atomic physics, nuclear physics, and optics. PREREQ: PHYS 2214. COREQ: PHYS 3301 and MATH 3360. F

### ***PHYS 3399 Experimental Course: 1-6 semester hours.***

The content of this course is not described in the catalog. Title and number of credits are announced in the Class Schedule. Experimental courses may be offered no more than three times with the same title and content. May be repeated.

### ***PHYS 4400 Practicum in Physical Science: 2 semester hours.***

Emphasizes design, set-up, equipment, operation, and administration of physics teaching laboratories, demonstrations and activities. Introduces pre-designed experiments plus the design and maintenance of lab equipment. Ideal for Education majors. PREREQ: Permission of instructor. S

### ***PHYS 4403 Advanced Modern Physics I: 3 semester hours.***

Study of the elementary principles of quantum mechanics and an introduction to atomic, solid state and nuclear physics. Quantum mechanics will be used as much as possible. PREREQ: MATH 3360 or equivalent, and PHYS 3301. S

**PHYS 4404 Advanced Modern Physics II: 3 semester hours.**

Study of the elementary principles of quantum mechanics and an introduction to atomic, solid state and nuclear physics. Quantum mechanics will be used as much as possible. PREREQ: PHYS 4403. F

**PHYS 4405 Advanced Physics Laboratory I: 2 semester hours.**

Experiments in radiation detection and measurement, nuclear spectroscopy including x-ray and gamma spectroscopies, neutron activation and ion beam methods. Available to Geology, Engineering, Health Physics, and Physics majors. PREREQ: Permission of the instructor. D

**PHYS 4406 Advanced Physics Laboratory II: 2 semester hours.**

Senior projects providing a capstone to the physics major curriculum. Written and oral presentation of the project procedures and results are required. F, S

**PHYS 4408 Error Analysis for the Physical Sciences: 3 semester hours.**

Lecture course with computation requirements. Topics include: Error propagation, Probability Distributions, Least Squares fit, multiple regression, goodness of fit, covariance and correlations. PREREQ: MATH 3360. AS

**PHYS 4414 Electronic Instrumentation and Measurement: 3 semester hours.**

Lecture course with laboratory requirements. Topics include: DC and AC electrical circuits, Analog pulses, Bipolar Transistors, Field Effect Transistors, Operational amplifiers. PREREQ: PHYS 2212, PHYS 2214, and MATH 3360. AS

**PHYS 4415 Statistical Physics: 3 semester hours.**

Topics covered may include kinetic theory, elementary statistical mechanics, random motion and the theory of noise. Choice of topics will depend upon the interest of the students and instructor. PREREQ: PHYS 2212 and MATH 3360. S

**PHYS 4416 Radiation Detection and Measurement: 3 semester hours.**

Lecture/laboratory course emphasizing practical measurement techniques in nuclear physics. PREREQ: CHEM 1112, CHEM 1112L, and PHYS 1111 and PHYS 1113 or PHYS 2211 and PHYS 2213. S

**PHYS 4416L Radiation Detection and Measurement Lab: 0 semester hours.****PHYS 4421 Electricity and Magnetism I: 3 semester hours.**

Intermediate course in fundamental principles of electrical and magnetic theory. Free use will be made of vector analysis and differential equations. PREREQ: PHYS 2212 and MATH 3360. F

**PHYS 4422 Electricity and Magnetism II: 3 semester hours.**

Intermediate course in fundamental principles of electrical and magnetic theory. Free use will be made of vector analysis and differential equations. PREREQ: PHYS 4421. S

**PHYS 4425 Nuclear and Particle Physics I: 3 semester hours.**

A course in Nuclear and Particle Physics with emphasis upon structural models, radioactivity, nuclear reactions, particle interactions, fission and fusion, the standard model of particle physics, symmetries and conservation laws. PREREQ: PHYS 3301 F

**PHYS 4426 Nuclear and Particle Physics II: 3 semester hours.**

A course in Nuclear and Particle Physics with emphasis upon structural models, radioactivity, nuclear reactions, particle interactions, fission and fusion, the standard model of particle physics, symmetries and conservation laws. PREREQ: PHYS 4425. S

**PHYS 4430 Accelerator Physics: 3 semester hours.**

The physics of direct voltage accelerators, betatrons, synchrotrons, linear induction acceleration; high current accelerators; electromagnetic particle optics, free electron lasers, and synchrotron light sources. PREREQ: PHYS 4422 or permission of instructor. D

**PHYS 4442 Solid State Physics: 3 semester hours.**

Introduction to the field of solid state physics emphasizing the fundamental concepts. Topics usually covered are crystal structure, x-ray diffraction, crystal binding energies, free electron theory of solids, energy bands. PREREQ: PHYS 3301 and MATH 3360 or permission of instructor. AF

**PHYS 4452 Intermediate Optics: 3 semester hours.**

Wave theory, e/m waves, production of light, measurement of light, reflection, refraction, interference, diffraction, polarization, optical systems, matrix methods, Jones vectors, Fourier optics, propagation of e/m waves in materials, atmospheric optics. PREREQ: PHYS 2212. COREQ: MATH 3360. AS

**PHYS 4453 Topics in Astrophysics: 2 semester hours.**

Applications of upper division physics to astronomy or cosmology. May include lab exercises. PREREQ: Permission of instructor. AS

**PHYS 4461 Introduction to Mathematical Physics I: 3 semester hours.**

Introduction to the mathematics most commonly used in physics with applications to and practice in solving physical problems; includes vector analysis, ordinary and partial differential equations. PREREQ: PHYS 2212 and MATH 3360. F

**PHYS 4462 Introduction to Mathematical Physics II: 3 semester hours.**

Introduction to the mathematics most commonly used in physics with applications to and practice in solving physical problems; includes vector analysis, ordinary and partial differential equations. PREREQ: PHYS 4461. S

**PHYS 4470 Simulations of Particle Interactions with Matter: 3 semester hours.**

Lecture course with monte-carlo computation requirements. Topics include: Stopping power, interactions of electrons and photons with matter, hadronic interactions, and radiation detection devices. PREREQ: MATH 3360 and PHYS 3301. AF

**PHYS 4481 Independent Problems: 1-3 semester hours.**

Students are assigned to, or request assignment to, independent problems on the basis of interest. May be repeated to a maximum of 6 credits. F, S

**PHYS 4483 Theoretical Mechanics: 4 semester hours.**

Detailed study of the motion of particles, satellites, rigid bodies and oscillating systems. Develop and apply Lagrangian and Hamiltonian methods. PREREQ: PHYS 2212 and MATH 3360. F

**PHYS 4492 Colloquium in Physics: 1 semester hour.**

Faculty and student lectures in current research topics in physics. Open to upper division and graduate students in physics. May be repeated for up to 4 credits. F, S

**PHYS 4499 Experimental Course: 1-6 semester hours.**

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