

# PHYSICS

---

## Courses

### PHYS 100 - Current Topics in Physics (4 Credit Hours)

Designed principally for students not contemplating a major in the sciences, but who nevertheless wish to develop their ability to figure things out about the physical world for themselves. Recently, the course has focused on the physics of societal concerns such as energy and the environment. The laboratory, an integral part of the course, will serve to introduce the student to the observation, measurement, and analysis of phenomena directly related to topics studied in the course. Open to seniors by consent only. Mathematical preparation is assumed to include high school algebra and geometry.

### PHYS 121 - General Physics I (4 Credit Hours)

This calculus-based course is designed to provide a thorough quantitative coverage of the foundations and concepts of physics and its approach toward an understanding of natural phenomena. Newtonian mechanics and dynamics, fluids, and thermal physics are covered. Three lectures and one three-hour laboratory each week.

**Prerequisite(s):** MATH 130 or MATH 135 or MATH 145 or concurrent.

### PHYS 122 - General Physics II (4 Credit Hours)

This calculus-based course is designed to provide a thorough quantitative coverage of the foundations and concepts of physics and its approach toward an understanding of natural phenomena. The course includes electricity and magnetism, optics and waves. Three lectures and one three-hour laboratory each week.

**Prerequisite(s):** PHYS 121.

### PHYS 125 - Principles of Physics I: Quarks to Cosmos (4 Credit Hours)

Physics/Astronomy 125 will introduce students to topics that are at the current frontiers of physics and astronomy, and help students develop quantitative reasoning and analytical skills necessary for further study in these fields. Topics possibly covered include special relativity, waves and interference, quantization of light and energy, the hydrogen atom, nuclear structure, radioactivity, and cosmology. The course satisfies the quantitative reasoning requirement. Three lectures and one three-hour laboratory per week.

**Prerequisite(s):** MATH 130 or MATH 135 or MATH 145 or concurrent.

**Crosslisting:** ASTR 125.

### PHYS 126 - Principles of Physics II (4 Credit Hours)

This course is designed to provide a thorough quantitative understanding of the principles of physics and its approach toward investigating natural phenomena and the universe around us. This calculus-based sequence is primarily designed for those interested in physics, astronomy and pre-engineering. This course satisfies the quantitative reasoning requirement and is also appropriate for those majoring in other physical sciences (see also Physics 121-122). Topics include Newtonian mechanics, vibrations, fluids, and thermal physics. Three lectures and one three-hour laboratory each week.

**Prerequisite(s):** PHYS 125, MATH 135 or MATH 145 or concurrent.

### PHYS 127 - Principles of Physics III (4 Credit Hours)

This course is designed to provide a thorough quantitative understanding of the principles of physics and its approach toward investigating natural phenomena and the universe around us. This calculus-based sequence is primarily designed for those interested in physics, astronomy, and pre-engineering. This course is also appropriate for those majoring in other physical sciences. (also see Physics 121-122). Topics include electricity and magnetism, waves and optics. Three lectures and one three-hour laboratory each week.

**Prerequisite(s):** PHYS 126 and MATH 145 or concurrent.

### PHYS 199 - Introductory Topics in Physics (1-4 Credit Hours)

A general category used only in the evaluation of transfer credit.

### PHYS 200 - Modern Physics (4 Credit Hours)

A quantitative study of topics in modern physics including relativistic kinematics and dynamics, interactions between light and matter, an introduction to the principles of quantum mechanics, and atomic physics. Additional topics may include solid-state physics, nuclear physics, or other contemporary topics. Analytical techniques are emphasized throughout.

**Prerequisite(s):** PHYS 122 or PHYS 127, PHYS 201 or concurrent, or consent.

### PHYS 201 - Applied Mathematics for Physical Systems (4 Credit Hours)

A one-semester overview of mathematics applied to physical systems, with extensive use of examples from introductory and intermediate physics. Topics covered will include operators, functions, vectors, complex numbers, integration, differentiation, geometry, differential equations, and linear algebra. The unity of linear systems will be emphasized, though non-linearity will also be discussed. Both hand- and computer-aided computation will be required.

**Prerequisite(s):** PHYS 121 or PHYS 126, and MATH 145, or consent.

### PHYS 220 - Geometrical and Physical Optics (4 Credit Hours)

A study of the laws of reflection and refraction and their applications to lenses and mirrors; and a study of diffraction, interference, polarization, and related phenomena. The course includes a laboratory.

**Prerequisite(s):** PHYS 122 or PHYS 127.

### PHYS 245 - Special Intermediate Topics in Physics (4 Credit Hours)

This course provides a venue in which to explore chosen topics in physics at the intermediate level. Topics vary according to the interests of students and faculty. In some cases, the course may be repeated for credit.

**Prerequisite(s):** PHYS 121 or PHYS 126 or consent.

### PHYS 299 - Intermediate Topics in Physics (1-4 Credit Hours)

A general category used only in the evaluation of transfer credit.

### PHYS 305 - Classical Mechanics (4 Credit Hours)

A course in classical mathematical physics designed to provide the student with a basic understanding of the methods and procedures of physical analysis.

**Prerequisite(s):** PHYS 127, PHYS 201 or MATH 213, or consent.

### PHYS 306 - Electricity and Magnetism (4 Credit Hours)

A course in the theory of electromagnetic interactions, including the sources and descriptions of electric and magnetic fields, Maxwell's equations, and electromagnetic radiation.

**Prerequisite(s):** PHYS 305 or consent.

**PHYS 311 - Electronics (4 Credit Hours)**

A course in digital and analog electronics with an emphasis on circuit design and lab work. Topics typically include binary encoding, combinational and sequential logic, microcontrollers and FPGAs, AC circuits, transistors, op-amps, and interfacing with scientific instruments.

**Prerequisite(s):** PHYS 122 or PHYS 127 or consent.

**PHYS 312 - Experimental Physics (4 Credit Hours)**

A course in the theory and practice of physical research with emphasis on the understanding and use of present-day research instrumentation. May be repeated once for credit as either PHYS 312 or ASTR 312.

**Prerequisite(s):** PHYS 122 or PHYS 127, PHYS 200 recommended.

**PHYS 320 - Thermodynamics (4 Credit Hours)**

Selected topics from thermodynamics, kinetic theory, and statistical methods. This course normally will be offered in alternate years. The course may include a laboratory.

**Prerequisite(s):** PHYS 200 or consent.

**PHYS 330 - Introductory Quantum Mechanics (4 Credit Hours)**

A first course including solutions of the Schroedinger equation for some elementary systems, followed by an introduction to the more abstract methods of quantum mechanics.

**Prerequisite(s):** PHYS 305, PHYS 201 or MATH 213, or consent.

**PHYS 340 - Advanced Topics (1-2 Credit Hours)**

Independent work on selected topics at the advanced level under the guidance of individual staff members. May be taken for a maximum of four semester hours of credit.

**Prerequisite(s):** Junior standing and consent of chairperson.

**PHYS 345 - Special Topics in Physics (4 Credit Hours)**

Topics will be chosen according to the interests of the staff member offering the course from such areas as energy, the solid state, laser physics, nuclear physics, biophysics, astrophysics, geophysics and medical physics. The course normally will be offered on demand. May be repeated with consent of chairperson.

**Prerequisite(s):** PHYS 122 or PHYS 127, or consent.

**PHYS 361 - Directed Study (1-4 Credit Hours)**

Prerequisite: Consent of chairperson.

**PHYS 362 - Directed Study (1-4 Credit Hours)**

Prerequisite: Consent of chairperson.

**PHYS 363 - Independent Study (1-4 Credit Hours)****PHYS 364 - Independent Study (1-4 Credit Hours)****PHYS 399 - Advanced Topics in Physics (1-4 Credit Hours)**

A general category used only in the evaluation of transfer credit.

**PHYS 400 - Physics Seminar (1 Credit Hour)**

Current topics in physics. May be repeated.

**PHYS 405 - Advanced Dynamics (3 Credit Hours)**

A course extending the work of PHYS 305 to include the more general formulations of classical dynamics and to relate these to modern theoretical physics.

**Prerequisite(s):** PHYS 305 or consent.

**PHYS 406 - Electromagnetic Theory (3 Credit Hours)**

A course extending the work of PHYS 306 to include more general boundary value problems, additional implications of Maxwell's equations, and the wave aspects of electromagnetic radiation, including topics in modern physical optics.

**Prerequisite(s):** PHYS 306 or consent.

**PHYS 451 - Senior Research (4 Credit Hours)**

Prerequisite: PHYS 312 or consent of chairperson.

**PHYS 452 - Senior Research (4 Credit Hours)**

Prerequisite: PHYS 312 or Consent of Chairperson.

**PHYS 470 - Teaching Methods in Physics (1 Credit Hour)**

This course is designed to provide an understanding of the basic methods used to teach physics. This course is primarily for those majoring in physics, astronomy, and pre-engineering. One-hour laboratory each week.

**Prerequisite(s):** PHYS 121 and PHYS 122, or PHYS 126.