

# Physics (PHYS)

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## **PHYS 1111K. Introductory Physics I. 4 Hours.**

Pre or co-requisite: MATH 1112 or MATH 1113. Part I of an introductory course in physics. Topics include mechanics, thermodynamics, and waves. Elementary algebra and trigonometry will be used. Three lecture hours, one two-hour laboratory per week, and one one-hour recitation session per week.

## **PHYS 1112K. Introductory Physics II. 4 Hours.**

Prerequisite: PHYS 1111K with a grade of "C" or better. Part II of an introductory course in physics. Topics include electromagnetism, optics, and modern physics. Three lecture hours, one two-hour laboratory, and one one-hour recitation session per week.

## **PHYS 2010. Tools of Physics. 1 Hour.**

An introduction to research techniques for the incoming Physics major. Includes laboratory safety, research methods, exploration of resources (library and Internet), and an outline of the discipline.

## **PHYS 2211K. Principles of Physics I. 4 Hours.**

Co- or prerequisite: MATH 2261. Part I of an introductory course in calculus-based physics. Topics include mechanics, thermodynamics, and waves. Elementary differential and integral calculus will be used. Three lectures, one two-hour laboratory per week, and one one-hour recitation session per week.

## **PHYS 2212K. Principles of Physics II. 4 Hours.**

Prerequisite: PHYS 2211K with a grade of C or better. Co- or prerequisite: MATH 2262. Part II of an introductory course in calculus-based physics. Topics include electromagnetism, optics, and waves. Elementary and integral calculus will be used. Three lecture hours, one two-hour laboratory per week, and one one-hour recitation session per week.

## **PHYS 2700. Modern Physics. 1 Hour.**

Prerequisite: PHYS 2212K. A preparatory course for the upper-division physics curriculum, emphasizing topics not covered in PHYS 2211K and PHYS 2212K but essential for the success in upper level courses. Topics include fluids, elementary thermodynamics, and wave phenomena.

## **PHYS 2950. Directed Study. 0-3 Hours.**

Supervised research on a specific physics or topic as agreed upon by the instructor. A maximum of 6 credit hours may be taken, and they can only be applied toward the general elective requirements for the physics major.

## **PHYS 3040. Electronics. 4 Hours.**

Prerequisite: PHYS 2212K. A lecture-laboratory study of basic electrical circuits and techniques, including extensive use of the oscilloscope. Both continuous wave and pulse phenomena are treated.

## **PHYS 3100. Optics. 4 Hours.**

Prerequisites: PHYS 2212K with a grade of "C" or better, Pre- or Co-requisite; MATH 2263. An intermediate level course with emphasis on physical optics. Lens matrices, interference, polarization, dispersion, absorption, resonance, and quantum effects will be covered. The electromagnetic nature of light is emphasized.

## **PHYS 3800. Differential Equations in Physical Systems. 3 Hours.**

Prerequisite: PHYS 2212K with a grade of "C" or better, Pre- or Co-requisite: MATH 2263. Ordinary differential equations of first and second order, linear equations of higher order, and a brief introduction to partial differential equations. The course will emphasize equations and methods which are important to understanding advanced topics in physics, such as fluid flow, mechanics, wave equations, Schrodinger's time-independent equation, and boundary equations.

## **PHYS 3810. Mathematical Methods of Physics. 3 Hours.**

Prerequisites: PHYS 2212K with a grade of "C" or better, Pre- or Co-requisite: MATH 2263. Special topics in mathematics as related to advanced study in physics. Topics include vector analysis, differential equations, orthogonal functions, eigenvalue problems, matrix methods, and complex variables.

## **PHYS 3820. Computational Physics I. 4 Hours.**

Prerequisites: PHYS 2212K with a grade of "C" or better, Pre- or Co-requisite: MATH 2263. Formulation of equations describing physical systems and the use of computers to solve them, computer simulations of physical systems, the use of computers to acquire and analyze data, and graphical methods of displaying data.

## **PHYS 3821. Computational Physics II. 3 Hours.**

Prerequisite: PHYS 3820 with a grade of "C" or better. Application of advanced numerical and computational techniques to real world problems, and utilizes multiple computer languages to solve them. Topics include matrix algebra, boundary value problems, nonlinear systems, and partial differential equations.

## **PHYS 4040. Experimental Physics. 4 Hours.**

Prerequisite: PHYS 2212K. A lecture-laboratory course devoted to techniques of research in experimental physics. Topics include treatment of data, vacuum techniques, magnetic devices, preparation and manipulation of beams of particles, and radioactivity. A number of modern physics experiments are studied and performed.

**PHYS 4111. Theoretical Mechanics I. 3 Hours.**

Prerequisites: PHYS 2212K with a grade of "C" or better, Pre- or Co-requisite: MATH 2263. Topics include Newtonian mechanics, conservation laws, simple harmonic motion, and Lagrange's equations.

**PHYS 4112. Theoretical Mechanics II. 3 Hours.**

Prerequisite: PHYS 4111 with a grade of "C" or better. Topics include Newtonian mechanics, rotational motion, waves relativity, and Hamiltonian formalism.

**PHYS 4211. Electromagnetism I. 3 Hours.**

Prerequisites: PHYS 2212K with a grade of "C" or better, Pre- or Co-requisite: MATH 2263. Topics include electrostatics, magnetostatics, charge distributions, and Maxwell's equations in differential form.

**PHYS 4212. Electromagnetism II. 3 Hours.**

Prerequisite: PHYS 4211 with a grade of "C" or better. Topics include electrodynamics, time-varying electric and magnetic fields, and propagation of electromagnetic waves.

**PHYS 4300. Plasma Physics. 3 Hours.**

Prerequisites: PHYS 4211 with a grade of "C" or better. An introduction to the physics of ionized gases.

**PHYS 4310. Thermodynamics. 3 Hours.**

Also offered as ENGR 4310. Prerequisites: PHYS 2212K with a grade of "C" or better, Pre- or Co-requisite: MATH 2263. Basic principles of classical thermodynamics which includes open and closed systems for both steady and transient processes.

**PHYS 4411. Quantum Mechanics I. 3 Hours.**

Prerequisites: PHYS 2212K with a grade of "C" or better, Pre- or Co-requisite: MATH 2263 and PHYS 4111. Topics include the wave particle duality of light and matter, Schrodinger's equation, and time-independent solutions to Schrodinger's equation. Dirac notation and matrix formalism are introduced.

**PHYS 4412. Quantum Mechanics II. 3 Hours.**

Prerequisite: PHYS 4411. Topics include angular momentum and spin operators, time-independent perturbation theory, and the WKB approximation.

**PHYS 4501. Capstone Seminar I. 1 Hour.**

Prerequisite: Senior standing. A study of current development in the fields of physics. Oral presentations will be required of all students and will be based on recent research articles in physics and related journals.

**PHYS 4800. Internship in Physics. 3-6 Hours.**

Active participation in research in physics or in a field of science closely allied with physics, such as biophysics. A daily log of activities, a report on the work done, and a research paper relating the work done to the field of physics are required.

**PHYS 4900. Special Topics in Physics. 1-6 Hours.**

Prerequisite: Consent of advisor and instructor, and at least junior standing. Topics to be assigned by instructor; may be taken more than once if topics are different, up to a total of 6 credit hours.

**PHYS 4950. Directed Study in Physics. 1-6 Hours.**

Prerequisite: At least Junior standing; permission of advisor, instructor, and department head. Study in area or subject not normally found in established courses offered by the department; may also allow student to explore in more detail and/or depth an area or subject covered by the department in physics. Up to a maximum of 12 credit hours.