

# PH - PHYSICS / ASTRONOMY

## PH104 Descriptive Astronomy

Credits 4 Summer

**Registration Requirement:** RD090 and WR090, or IECC201R and IECC201W; and MTH020; each with a grade of "C" or better, or placement above stated course levels.

Descriptive treatment of the history of astronomy which includes planetary and lunar motion, moon phases, constellations, stars and galaxies. Topics include the origin of the solar system, asteroids, meteors, comets, stellar evolution, galaxies, black holes, quasars and cosmology. An accompanying laboratory is used for demonstrations, experiments and projects as well as outdoor observations.

**Additional Course Fee:** \$25.00

**This course fulfills:** Lab Science

## PH109C Observational Astronomy

Credits 3 Summer

A course designed to introduce students to the fundamentals of observing the night sky. Students learn to use telescopes, star charts and photographic equipment to investigate the moon, planets, star clusters, galaxies and nebulae. Evening field trips away from the Portland light dome are required.

**Additional Course Fee:** \$25.00

**This course fulfills:** Non-Lab Science

## PH121 General Astronomy

Credits 3 Fall

**Registration Requirement:** RD090 and WR090, or IECC201R and IECC201W; and MTH020; each with a grade of "C" or better, or placement above stated course levels.

Descriptive treatment of the history of astronomy including the contributions of Kepler, Galileo and Newton; telescopes, light and the spectrum; Earth as a planet and the moon. This course is intended primarily for the general college student who is not majoring in a physical science. The planetarium is used extensively and is supplemented by occasional viewing of celestial objects with a telescope.

**Additional Course Fee:** \$25.00

**This course fulfills:** Non-Lab Science

## PH122 General Astronomy

Credits 3 Winter

**Registration Requirement:** RD090 and WR090, or IECC201R and IECC201W; and MTH020; each with a grade of "C" or better, or placement above stated course levels.

Descriptive treatment of the solar system including the terrestrial planets, the Jovian planets, comets, meteors, asteroids and meteorites. The planetarium star projector is used in conjunction with star charts to help students locate planets and other celestial objects in the night sky. Course may be taken out of sequence.

**Additional Course Fee:** \$25.00

**This course fulfills:** Non-Lab Science

## PH123 General Astronomy

Credits 3 Spring

**Registration Requirement:** RD090 and WR090, or IECC201R and IECC201W; and MTH020; each with a grade of "C" or better, or placement above stated course levels.

Descriptive treatment of stars and their evolution, the sun nebulae, star clusters, the Milky Way, galaxies, black holes, neutron stars, quasars and the expanding universe. Course may be taken out of sequence.

**Additional Course Fee:** \$25.00

**This course fulfills:** Non-Lab Science

## PH201 General Physics I

Credits 5 Fall

**Registration Requirement:** RD090 and WR090, or IECC201R and IECC201W; and MTH112/MTH112Z; each with a grade of "C" or better, or placement above stated course levels.

Physical laws and theories are developed and discussed. This course is intended primarily for the general college student who is not majoring in a physical science. The following topics are developed: vectors, one- and two-dimensional kinematics, dynamics, uniform circular motion, work, energy, impulse and momentum, rotational kinematics and dynamics, static equilibrium, gravitation and fluid statics. A scientific calculator is required. A graphing calculator may be required.

**Additional Course Fee:** \$25.00

**This course fulfills:** Lab Science

## PH202 General Physics II

Credits 5 Winter

**Registration Requirement:** PH201.

The following topics are developed: simple harmonic motion, temperature, thermal expansion, thermal energy and phase changes, gas laws and thermodynamics, waves, sound, interference, reflection, refraction and geometric optics. A scientific calculator is required. A graphing calculator may be required.

**Additional Course Fee:** \$25.00

**This course fulfills:** Lab Science

## PH203 General Physics III

Credits 5 Spring

**Registration Requirement:** PH202.

The following topics are developed: electric forces and fields, potential and potential energy, electric circuits, magnetic forces and fields, electromagnetic induction and alternating current circuits. A scientific calculator is required. A graphing calculator may be required.

**Additional Course Fee:** \$25.00

**This course fulfills:** Lab Science

**PH211 General Physics with Calculus I**

Credits 5

Fall

**Registration Requirement:** RD090 and WR090, or IECC201R and IECC201W; and MTH251; each with a grade of "C" or better, or placement above stated course levels.

General Physics with Calculus includes the following topics: motion in one and two dimensions, particle dynamics, work, energy, momentum, conservation of energy and momentum, collision theory, rotational kinematics and dynamics, rigid body equilibrium, universal gravitation and fluid statics are treated using practical problems and examples. Emphasis is placed on logical reasoning, thorough understanding of the principles and the ability to successfully solve numerical problems. Vector notation is employed extensively. The theory and results of classical mechanics are used to predict the behavior of actual physical systems and explain phenomena commonly encountered in the real world.

**Additional Course Fee:** \$25.00

**This course fulfills:** Lab Science

**PH212 General Physics with Calculus II**

Credits 5

Winter

**Registration Requirement:** PH211.

Provides prospective science and engineering majors with a thorough basic knowledge of thermodynamics, geometrical and physical optics, simple harmonic motion and wave motion.

**Additional Course Fee:** \$25.00

**This course fulfills:** Lab Science

**PH213 General Physics with Calculus III**

Credits 5

Spring

**Registration Requirement:** PH212.

Provides engineering and science majors with those topics within the scope of electricity and magnetism.

**Additional Course Fee:** \$25.00

**This course fulfills:** Lab Science

*Course fees are subject to change. Additional section fees (web, hybrid, etc.) may apply.*