

**ECON 201** Principles of Microeconomics (5)  
**ECON 202** Principles of Macroeconomics (5)  
**PHIL 102** Ethics, Politics and Law (5)  
**POLS 101** American National Government (5) and  
**PHIL 101** Self, World and God (5) or  
**PHIL 203** Critical Thinking (5) and  
**POLS 200** Comparative Politics (5) or  
**POLS 221** International Relations (5)

The upper division core provides a common, advanced-level application of the analytic, empirical, and normative tools within each discipline.

**POLS 350** Public Policy (5)  
**PHIL 420** Philosophy of Law (5)  
**ECON 334** U.S. Economic History (5)  
**POLS 340** Politics & Media (5)  
**ECON 407** or  
**PHIL 407** or  
**POLS 407** Capstone (5)

The upper division elective component offers students the opportunity to emphasize particular disciplines. All students will complete 20 additional upper division credit hours, of which a minimum of 5 credit hours must be completed in each discipline. No more than 5 credit hours of practicum 409 credit may be applied to the 20 upper-division elective

credits. A number of these courses will be interdisciplinary, cross-listed, and team taught.

**Course descriptions are located under the individual disciplines - Economics, Philosophy, and Political Science.**

### REQUIREMENTS FOR THE MINOR IN PUBLIC ADMINISTRATION

1. A minimum of 35 graded credits as follows:

**ECON 201** Prin of Microeconomics (5)  
**ECON 435** Public Finance (5)  
**PHIL 490** Ethics & Public Affairs (5)  
**POLS 101** American National Govt (5)  
**POLS 314** State & Local Govt (5)  
**POLS 350** Public Policy (5)  
**POLS 351** Public Administration (5)

2. A minimum grade of "C-" required for each course with an average GPA of 2.00 or more for all courses counting toward the minor.

3. A minimum of 10 hours counting toward the minor must be completed at Eastern Oregon University.

## Eastern Oregon University

# Physics

### PROGRAM OBJECTIVES

The Physics minor is a true liberal arts minor, preparing the student for many options after graduation. The powerful problem-solving approaches developed in the physics curriculum can be applied in numerous career paths. Students are strongly encouraged to engage in research, either with faculty members or through summer internships. Our emphasis is on quality instruction, full student participation, and individual attention to the student.

### LEARNING OUTCOMES

Upon completion of the Physics minor, students will:

- Be proficient in the problem-solving approaches used by physicists, both in theoretical and experimental work;
- Have an understanding of the main areas of physics, including mechanics, electricity and magnetism, wave phenomena, and quantum theory;
- Have a good understanding of laboratory instrumentation, and be able to design instrumentation as needed.

### MEANS OF ASSESSMENT

Several tools are used in assessing student learning. Examinations are designed to let us assess students' ability to apply fundamental concepts and problem-solving strategies to solutions of specific problems. The laboratory notebook is evaluated in courses containing a lab component, to assess and improve experimental skills. Faculty are directly involved in laboratory work, allowing us to interact directly with students and gauge progress in lab activities.

### REQUIREMENTS FOR THE MINOR IN PHYSICS

1. A minimum of 30 graded credits in Physics courses with a minimum GPA of 2.00, as follows:

**PHYS 221, 222, 223** Gen Physics w/Calculus (15)  
**PHYS 321\*** Waves and Quantum Theory (5)  
**PHYS 343, 344** Experimental Tech (10)  
 \* May be taken under the prefixes CHEM 441(4) and CHEM 444(1).

2. A grade of "C-" or better in each course counting toward the

minor with an over all GPA of 2.00.

3. A minimum of 10 hours counting toward the minor must be completed at Eastern Oregon University.

## PHYSICS COURSE DESCRIPTIONS

### PHYS 110- Selected Topics Credits: 1.00 TO 6.00

#### PHYS 201- General Physics\*SMI Credits: 4.00 Gen Ed Core-Natural, Math & Info Sciences

An introductory college physics sequence for those whose majors are not in the physical sciences or engineering, which includes the principles of mechanics, waves, sound, thermodynamics, electricity, magnetism, optics, relativity, and quantum theory. Prerequisite: MATH 111, 112, or equivalent.

#### PHYS 201L - Physics Lab Credits: .00

#### PHYS 202- General Physics\*SMI Credits: 4.00 Gen Ed Core-Natural, Math & Info Sciences

An introductory college physics sequence for those whose majors are not in the physical sciences or engineering, which includes the principles of mechanics, waves, sound, thermodynamics, electricity, magnetism, optics, relativity, and quantum theory. Prerequisite: MATH 111, 112, or equivalent.

#### PHYS 202L - Physics Lab Credits: .00

#### PHYS 203- General Physics\*SMI Credits: 4.00 Gen Ed Core-Natural, Math & Info Sciences

An introductory college physics sequence for those whose majors are not in the physical sciences or engineering, which includes the principles of mechanics, waves, sound, thermodynamics, electricity, magnetism, optics, relativity, and quantum theory. Prerequisite: MATH 111, 112, or equivalent.

#### PHYS 203L - Physics Lab Credits: .00

#### PHYS 210- Selected Topics Credits: 1.00 TO 6.00

#### PHYS 221- Gen Physics/Calc\*SMI Credits: 5.00 Gen Ed Core-Natural, Math & Info Sciences

First part of a six-term sequence in physics, which includes CHEM 440 and PHYS 321, 322, for students in the physical sciences and engineering. Emphasis in classical mechanics, special relativity, electricity and magnetism, and waves. Prerequisite: Calculus previously or concurrently.

#### PHYS 221L - Gen Physics Lab Credits: .00

#### PHYS 222- Gen Physics/Calc\*SMI Credits: 5.00 Gen Ed Core-Natural, Math & Info Sciences

First part of a six-term sequence in physics, which includes CHEM 440 and PHYS 321, 322, for students in the physical sciences and engineering. Emphasis in classical mechanics, special relativity, electricity and magnetism, and waves. Prerequisite: Calculus previously or concurrently.

#### PHYS 222L - Gen Physics Lab Credits: .00

#### PHYS 223- Gen Physics/Calc\*SMI Credits: 5.00 Gen Ed Core-Natural, Math & Info Sciences

First part of a six-term sequence in physics, which includes CHEM 440 and PHYS 321, 322, for students in the physical sciences and engineering. Emphasis in classical mechanics, special relativity, electricity and magnetism, and waves. Prerequisite: Calculus previously or concurrently.

#### PHYS 223L - Gen Physics Lab Credits: .00

#### PHYS 231- Physics of Music\*SMI Credits: 3.00 Gen Ed Core-Natural, Math & Info Sciences

An exploration of the physical principles of musical instruments, acoustics, and the biophysics of hearing. In-class laboratory activities provide a significant hands-on aspect to the course. This course is designed with music and fine arts majors in mind, but is accessible to anyone. Prerequisite: A good facility with algebra; two years of high school algebra required.

#### PHYS 310- Selected Topics Credits: 1.00 TO 6.00

Student must have at least sophomore standing to register for this course.

#### PHYS 321- Waves & Quan Theory Credits: 5.00

An introduction to quantum physics, from basic concepts through rigorous treatment of the hydrogen atom. Prerequisite: PHYS 223 and MATH 254. Student must have at least sophomore standing to register for this course.

#### PHYS 321L - Waves & Quan Thry Lab Credits: .00

Student must have at least sophomore standing to register for this course.

#### PHYS 322- Waves & Quan Theory Credits: 5.00

Classical waves. The second term of a sequence, emphasizing spectroscopy, quantum statistics, the solid state, and a brief introduction to nuclear physics. Prerequisite: PHYS 223 and MATH 254. Student must have at least sophomore standing to register for this course.

#### PHYS 322L - Waves & Quan Thry Lab Credits: .00

Student must have at least sophomore standing to register for this course.

#### PHYS 343- Experimental Tech Credits: 5.00

For students in science and engineering. Topics include an introduction to electronic circuits and techniques, vacuum technology, optical techniques, and machine shop practices of special relevance to present-day experimental instrumentation. The final term deals almost exclusively with microcomputer interfacing and application. Prerequisite: PHYS 223. Student must have at least sophomore standing to register for this course.

#### PHYS 343L - Experimental Tech Lab Credits: .00

Student must have at least sophomore standing to register for this course.

#### PHYS 344- Experimental Tech Credits: 5.00

For students in science and engineering. Topics include an introduction to electronic circuits and techniques, vacuum technology, optical techniques, and machine shop practices of special relevance to present-day experimental instrumentation. The final term deals almost exclusively with

microcomputer interfacing and application. Prerequisite: PHYS 223. Student must have at least sophomore standing to register for this course.

**PHYS 344L - Experimental Tech Lab Credits: .00**

Student must have at least sophomore standing to register for this course.

**PHYS 345- Experimental Tech Credits: 5.00**

For students in science and engineering. Topics include an introduction to electronic circuits and techniques, vacuum technology, optical techniques, and machine shop practices of special relevance to present-day experimental instrumentation. The final term deals almost exclusively with microcomputer interfacing and application. Prerequisite: PHYS 223. Student must have at least sophomore standing to register for this course.

**PHYS 345L - Experimental Tech Lab Credits: .00**

Student must have at least sophomore standing to register for this course.

**PHYS 401- Research Credits: 1.00 TO 15.00**

Individual research project selected with and supervised by a member of the Physics faculty. Student must have at least junior standing to register for this course.

**PHYS 405- Reading & Conference Credits: 1.00 TO 15.00**

Individual or small group study of a physics topic not included in the regular curriculum, under the supervision of a member of the Physics faculty. Student must have at least junior standing to register for this course.

**PHYS 407- Seminar Credits: 1.00 TO 15.00**

A formal course on a physics topic not included in the regular curriculum offered by a member of the Physics faculty. Student must have at least junior standing to register for this course.

**PHYS 410- Selected Topics Credits: 1.00 TO 6.00**

Student must have at least junior standing to register for this course.

**PHYS 441- Theoretical Physics Credits: 5.00**

An advanced integrated course in mechanics and

electromagnetic fields: relativistic and nonrelativistic kinematics, dynamics and electrodynamics of particles and rigid bodies; Lagrange's equations; Maxwell's equations and electromagnetic waves. Prerequisite: CS 161 and MATH 321. Student must have at least junior standing to register for this course.

**PHYS 442- Theoretical Physics Credits: 5.00**

An advanced integrated course in mechanics and electromagnetic fields: relativistic and nonrelativistic kinematics, dynamics and electrodynamics of particles and rigid bodies; Lagrange's equations; Maxwell's equations and electromagnetic waves. Prerequisite: PHYS 441 or consent of instructor. Student must have at least junior standing to register for this course.

**PHYS 443- Theoretical Physics Credits: 5.00**

An advanced integrated course in mechanics and electromagnetic fields: relativistic and nonrelativistic kinematics, dynamics and electrodynamics of particles and rigid bodies; Lagrange's equations; Maxwell's equations and electromagnetic waves. Prerequisite: PHYS 442 or consent of instructor. Student must have at least junior standing to register for this course.

**PHYS 490- Hist & Phil Phys Credits: 2.00**

(Capstone) A seminar on the history and philosophy of physics, emphasizing the essential unity of the discipline and exploring questions of how physics relates to the other natural sciences. Intended to serve as a capstone experience for physics majors. Prerequisite: PHYS 223; PHYS 321 recommended but not required. Student must have at least junior standing to register for this course.

**PHYS 491- Physics Capstone Seminar Credits: 1.00**

A seminar on the history and philosophy of physics. The second term of this capstone experience involves individual research and a presentation. Student must have at least junior standing to register for this course.