

Statement regarding how the course meets expectations for General Education

(1) A brief statement regarding how the course meets the mission of general education.

The General Education Program at Eastern Oregon University challenges students to become critical, creative thinkers and engaged, knowledgeable citizens, open to new ways of looking at the world.

Physics by its very nature challenges students to become critical, creative thinkers. Students come into the course with little background and very often have preconceived, “Aristotlean” notions of how the physical world behaves. This course challenges those preconceptions, especially through laboratory exercises, and encourages students to modify their conceptions of the physical world to better reflect physical realities. In addition, this course seeks to show students how physical “truths” are formulated through the process of doing science. Homework and laboratory exercises are challenging and encourage students to develop their problem-solving skills in and out of class. We introduce modeling methods and illustrate their use not only in physics but in other disciplines. Overall, we seek to illustrate the applications of physics to a broad range of subjects outside the classroom.

(2) Identify which components of the general education requirements will be met by completion of this course.

This course will fulfil the new general education Category 3: Study of the Natural World.

(3) Identify the specific general education outcomes that the course will address and describe how the course will assess these outcomes in relation to student achievement.

From the New General Education requirements:

“A liberally educated person should be familiar with the methodology, practice, and controversies regarding the academic study of the natural world. Students will choose from specifically designed course work in variety of disciplines. Upon completion of course work in this category, students should be able to employ scientific methods in the laboratory or in fieldwork as defined by the specific discipline(s) or sub-discipline(s) the student has studied, analyze and evaluate data based on discipline-defined criteria, observe accurately, integrate knowledge and data with the fundamental concepts of the specific discipline(s) or sub-discipline(s) the student has studied, and report results effectively both orally and in writing.”

Specific outcomes relating to these requirements are: students completing PHYS 202 will be able to

- Describe the nature of electricity in the context of the atomic theory;
- Use the concepts of electric field, potential, and energy to calculate the motion of particles under the influence of electric forces;
- Analyse simple DC circuits;
- Describe the layout of common house wiring and the function of circuit breakers and ground lines;

- Explain, in terms of interference, why a “rainbow” appears on the surface of a compact disc;
- Explain, in terms of interference, why different colors are reflected by oil on water;
- State the wavelength range of visible light;
- State the two postulates of Special Relativity;
- Calculate time dilation and length contraction for objects moving at very high speeds;
- Calculate kinetic energy and work done on objects accelerated to very high speeds;
- Describe the Bohr model of the atom, its significance, and its shortcomings;
- Calculate energies and wavelengths of photons produced by quantum processes;
- Calculate the wavelengths of x-rays produced by common x-ray tubes;
- Describe the concept of wave-particle duality and calculate wavelengths of particle waves;
- Assign quantum numbers to electrons in a given element of the Periodic Table;
- Describe the basic structure of the atomic nucleus;
- Balance equations for processes involving nuclear transformations;
- Describe briefly the contributions of the following persons to scientific thought: Maxwell, Faraday, M. Curie, Bohr, de Broglie, Heisenberg, Schrödinger, and Gamow;
- Clearly describe, in a notebook, measurements they have done in the laboratory and the subsequent analysis of those measurements, relating them to theory.

These outcomes will be assessed as follows. Two midterm exams and a final exam are given. Homework is assigned twice a week, graded, and returned. A unit exam is given at the end of every chapter, and students must pass each of these with a 75% or better. Unit exams not passed may be repeated until the student scores 75% or better. Students keep a laboratory notebook, which is turned in and graded weekly.

**General Education Syllabus
Eastern Oregon University
College of Arts and Sciences
Course Syllabus**

PHYS 203**General Physics**

Catalog Description for the PHYS 201-203 sequence: 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.

Prerequisites: PHYS 202 or equivalent, and a good facility with college-level algebra. Math 112 recommended.

Format (1) On campus: 3 1-hour lecture per week, and 1 3-hour lab per week. (2) Through the Division of Distance Education: individualized study format.

Credit hours: 4.

General Education Course Information

A. **Response to the mission statement:** General Physics addresses the mission in several ways. Physics by its very nature challenges students to become critical, creative thinkers. Students come into the course with little background and very often have preconceived, “Artistotlean” notions of how the physical world behaves. This course challenges those preconceptions, especially through laboratory exercises, and encourages students to modify their conceptions of the physical world to better reflect physical realities. In addition, this course seeks to show students how physical “truths” are formulated through the process of doing science. Homework and laboratory exercises are challenging and encourage students to develop their problem-solving skills in and out of class. We introduce modeling methods and illustrate their use not only in physics but in other disciplines. Overall, we seek to illustrate the applications of physics to a broad range of subjects outside the classroom.

B. **General Education Requirements met:** Category Three - Study of the Natural World.

“A liberally educated person should be familiar with the methodology, practice, and controversies regarding the academic study of the natural world. Students will choose from specifically designed course work in variety of disciplines. Upon completion of course work in this category, students should be able to employ scientific methods in the laboratory or in fieldwork as defined by the specific discipline(s) or sub-discipline(s) the student has studied, analyze and evaluate data based on discipline-defined criteria, observe accurately, integrate knowledge and

data with the fundamental concepts of the specific discipline(s) or sub-discipline(s) the student has studied, and report results effectively both orally and in writing.”

Outcomes: Upon completing PHYS 203, students will be able to

- Describe the nature of electricity in the context of the atomic theory;
- Use the concepts of electric field, potential, and energy to calculate the motion of particles under the influence of electric forces;
- Analyse simple DC circuits;
- Describe the layout of common house wiring and the function of circuit breakers and ground lines;
- Explain, in terms of interference, why a “rainbow” appears on the surface of a compact disc;
- Explain, in terms of interference, why different colors are reflected by oil on water;
- State the wavelength range of visible light;
- State the two postulates of Special Relativity;
- Calculate time dilation and length contraction for objects moving at very high speeds;
- Calculate kinetic energy and work done on objects accelerated to very high speeds;
- Describe the Bohr model of the atom, its significance, and its shortcomings;
- Calculate energies and wavelengths of photons produced by quantum processes;
- Calculate the wavelengths of x-rays produced by common x-ray tubes;
- Describe the concept of wave-particle duality and calculate wavelengths of particle waves;
- Assign quantum numbers to electrons in a given element of the Periodic Table;
- Describe the basic structure of the atomic nucleus;
- Balance equations for processes involving nuclear transformations;
- Describe briefly the contributions of the following persons to scientific thought: Maxwell, Faraday, M. Curie, Bohr, de Broglie, Heisenberg, Schrödinger, and Gamow;
- Clearly describe, in a notebook, measurements they have done in the laboratory and the subsequent analysis of those measurements, relating them to theory.

Means of Assessment: Two midterm exams and a final exam are given. Homework is assigned twice a week, graded, and returned. A unit exam is given at the end of every chapter, and students must pass each of these with a 75% or better. Unit exams not passed may be repeated until the student scores 75% or better. Students keep a laboratory notebook, which is turned in and graded weekly.

Brief Outline of Course: topics to be studied are, in summary,

- Basic concepts of electricity,
- Voltage and Current,
- DC circuits and circuit analysis,
- Magnetism,
- Wave behavior of light: interference and diffraction,
- Special relativity,
- Early quantum theory, and
- Basic atomic physics and spectroscopy.

Grading Policies: Each assessment category is weighted as follows:

Assessment category	weight
Laboratories	18%
Unit exams	10%
Homework	20%
Midterm exam (each)	15%
Final exam	22%

Based on a 100-point scale. Grade ranges are: A = 85-100, B = 72-84, C = 62-71, D = 55-62, F = less than 55.

Materials

- *College Physics* by Giambattista, Richardson, and Richardson.
- *Thirty Years that Shook Physics* by George Gamow.
- A quadrille-ruled notebook for the laboratories.
- A calculator with scientific functions, a ruler, a protractor, and a stapler.

Course Requirements: There are no attendance requirements for the lecture portion, class, but attendance at labs is mandatory. If a student cannot attend his/her regular laboratory session, he/she may attend another one provided there is room. Homework will be regular assigned. There are 5 to 7 quizzes (“unit exams”) given on basic concepts. Students must pass every quiz with a 75% or better. Quizzes not passed may be repeated.

Statement on Americans with Disabilities: If you have a documented disability or suspect that you have a learning problem and need accommodations, please contact the Disability Services Program in Loso Hall 234. Telephone: 962-3081

Statement on Academic Misconduct: Eastern Oregon University places a high value upon the integrity of its student scholars. Any student found guilty of an act of academic misconduct (including, but not limited to cheating; plagiarism; or theft of an examination or supplies) may be subject to having his or her grade reduced in the course in question, being placed on probation or suspended from the university, or being expelled from the university -or a combination of these.

See Section II of the Student Handbook and Planning Calendar for clarification.

Syllabus prepared by Tom Herrmann
January 2006.