

Prepared by Department of Natural Sciences & Applied Technology

Date of Departmental Approval: February 3, 2014

Date Approved by Curriculum and Programs: March 12, 2014

Effective: Fall 2014

1. Course Number: PHY152 and PHY152L
Course Title: Physics II and Physics II Laboratory

2. Description: Second semester of a two-semester introduction to college physics without calculus. This course covers vibrations and waves; electricity and magnetism; light and optics, and some modern physics. The course is appropriate for non-science majors who are interested in science. (3 class hours / 2 laboratory hours)

3. Student Learning Outcomes:

Upon successful completion of this course, students are able to do the following:

- Describe the scope of the field of Physics and its basic historical development.
- Effectively utilize appropriate quantities and units to describe physical phenomena.
- Use a variety of devices and instruments in taking laboratory measurements.
- Use appropriate techniques in the laboratory, collect and analyze meaningful data, and present clearly and cogently written laboratory results (utilizing Standard American English).
- Use word processing and spreadsheet software to prepare and present laboratory reports.
- Use a scientific calculator as a tool in solving a wide variety of problems.
- Work cooperatively in a small group setting to complete various laboratory exercises, following the written instructions provided.
- Describe and discuss electric charges, forces and fields, including Coulomb's Law.
- Apply the ideas of energy to electricity.
- Describe the magnetic field.
- Describe and analyze the interactions between magnetic fields and electric particles.
- Interpret Maxwell's Equations.
- Solve (using algebra and trigonometry as tools) almost all one concept problems presented that involve any of the topics included in this course.
- Solve (using algebra and trigonometry as tools) most "two concept" problems from the same list of topics.
- Explain some of the ways in which Physics can be applied to the problems of society in general.

4. Credits: 4 credits

5. Satisfies General Education Requirement: Natural or Physical Science

6. Prerequisite: Grade of C or better in PHY101 or PHY151

7. Semester Offered: Spring

8. Suggested General Guidelines for Evaluation: Grades will be based on class work; homework; one-hour tests; laboratory work and reports; and a final examination.

9. General Topical Outline: See attached.

PHY152. Physics II Content Outline

I. Simple harmonic motion (SHM) and waves

- A. Vibrations and oscillations
 - 1. Hooke's law
 - 2. Acceleration, velocity, and position
- B. Waves
 - 1. Description and types
 - 2. Velocity
 - 3. Superposition, interference, reflection
- C. Sound
 - 1. Energy and intensity - the db scale
 - 2. The Doppler effect
- D. Music and sound quality

II. Electricity

- A. Electric charges, forces, and fields
 - 1. Coulomb's Law
 - 2. Electric field
- B. Electrical energy
 - 1. Electrical potential energy
 - 2. Potential difference
- C. Capacitance
- D. Current and Resistance (mainly in laboratory)
 - 1. Ohm's Law
 - 2. Electrical energy and power
- E. D.C. Circuits (exclusively in laboratory)
 - 1. Series and Parallel circuits
 - 2. Kirchoff's Laws

III. Magnetism and Electromagnetism

- A. Magnetism
 - 1. Magnets and magnetic fields
 - 2. Force between a moving charged particle and a magnetic field.
- B. Induction - Faraday's Law
- C. Electromagnetic Waves
 - 1. Maxwell's Equations (simplified)
 - 2. Properties and spectrum of EM waves
- D. Superconductivity

IV. Light and Optics (Geometric) (in laboratory only)

- A. Properties of Light
- B. Geometric Optics
 - 1. Reflection and refraction
 - 2. Mirrors and Lenses
- C. Wave Optics

V. Introduction to Modern Physics (mainly historic and qualitative)

- A. Quantum Physics
- B. Atomic Physics
- C. Nuclear Physics
- D. Cosmology