

Physics 122 – General Physics II (4)
Course Outline **GE B3 & B4**

Prerequisite for Phys 122: PHYS 121 or PHYS 141. Not open to students having a grade of C- or better in PHYS 132.

Learning Objectives and Criteria:

Upon completion of the course the student is expected to know:

- a: That many dynamic systems describe simple harmonic motion when displaced from equilibrium.
- b: That wave propagation depends on the nature of the medium.
- c: That the wave velocity is distinct from the velocity of the medium through which the wave travels.
- d: The definition of absolute temperature through the constant volume gas thermometer.
- e: To convert between the various temperature scales such as Kelvin, Celsius and Fahrenheit.
- f: The thermodynamic definition of the work done by a system.
- g: How to apply the first law of thermodynamics to thermal processes.
- h: To realize that engines which convert heat into mechanical work are inherently inefficient because of the restrictions of the second law of thermodynamics.
- i: To calculate the optimum efficiency of an engine working between two well-defined temperatures.
- j: The law of refraction of light and how images can be formed by both mirrors and lenses.
- k: The workings of some simple optical instruments such as the magnifier, the microscope, the telescope and corrective eyeglasses.
- l: The wave nature of light which leads to interference and diffraction effects.

Text and References:

Knight, Jones, Field, College Physics, 1st Edition, Pearson Addison Wesley, 2008.

Physics 122 is the second of a 3-course sequence: Phys 121, 122, 123. In this course, the students are exposed to scientific reasoning in lecture and will have to use this approach in their homework assignments. They will learn to set up problem solutions from given information in an organized and systematic method. In Physics 122, as in Physics 121, students are constantly reminded and shown that many problems that arise can be solved through the logic of mathematics and physics. They will become familiar with the language of science and its methods.

Content and Method:

Method: Physics 122 is offered in a traditional lecture/lab format. It meets a total of 6 hours each week - 3 hours of lecture and one 3-hour lab.

Content: Physics 122 will adhere to the following course content:

- Energy, work
- Using energy
- Properties of materials
- Fluids, hydrostatics
- Oscillations, vibrations
- Waves, interference
- Sound
- Physical optics
- Ray optics, instruments

Lab Sections:

The multiple sections of the course will all do the same experiment in a given week. Usually the students will perform 10 experiments in a given quarter. The students typically work in groups of three at each of the 8 stations, limiting the class size to 24. The students will spend most of the 3-hour period collecting and analyzing data. They will then be required to analyze their data and discuss their results in a written or oral report. In a typical quarter, the students will do the following experiments:

- Simple pendulum. Data taking and analysis.
- Simple harmonic motion
- Standing waves
- Resonance of sound waves
- Thermometers
- Calorimetry
- Thermodynamic processes
- Refraction of light
- Thin lenses
- Interference/ diffraction

To ensure uniformity as much as possible, the instructor in charge of the course provides the syllabus for all instructors involved in the course. The syllabus outlines the chapters and topics to be covered for a given week as well as the homework assignments for that particular week. All students in the various sections will do the same laboratory experiment scheduled for that particular week.

Methods of Assessment:

Lecture/Lab Sections: The methods of assessment, in order of importance, are: Exams (2 or 3 one-hour exams and a final exam); Weekly homework assignments; Quizzes; Laboratory reports.