

Physics 121 – College Physics I (4)
Course Outline **GE B3 & B4**

Prerequisites for Phys 121 are Math 118 and high school trigonometry or Math 119. Not open to students having a grade of C- or better in PHYS 131 or 141.

Learning Objectives and Criteria:

Upon completion of the course the student is expected to:

- a: Know that the physical world can be described in terms of mathematics.
- b: Apply the laws of conservation of energy and conservation of momentum.
- c: Know that most scientific theories can be tested in the laboratory.
- d: Solve problems in an organized and systematic way using free body diagrams.
- e: Know that real world problems are often complex and have no exact solutions.
- f: Know that physics is able to explain many natural phenomena.
- g: Know that an understanding of the laws of physics is needed in all scientific disciplines.

Text and References:

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

Physics 121 is the first of a 3-course sequence: Phys 121, 122, 123. It introduces the students to the basic ideas in physics, such as conservation of energy and conservation of momentum as well as Newton's laws. A substantial part of the course is devoted to teaching students how to solve problems in a structured way and helping students realize that most problems in scientific and technical areas can be explained in terms of the logic of mathematics and physics. The course provides a stepping-stone to further studies in more advanced courses both in physics and related disciplines.

Content and Method:

Method: **Physics 121 is offered in a traditional lecture/lab format.** It meets a total of 6 hours a week – 3 hours of lecture and one 3-hour lab

Content: **Physics 121 will adhere to the following topics:**

- Motion, units
- 1D motion, kinematics
- 2D motion, vectors
- Forces, Newton's laws of motion
- Applying Newton's laws
- Circular motion, gravity
- Rotational motion
- Equilibrium, elasticity
- Momentum
- Energy, work

Lab Sections:

The multiple sections of the course 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 and/or oral report. In a typical quarter, the students will do the following experiments:

- Data taking and analysis
- Linear acceleration
- Equilibrium produced by forces
- Coefficient of sliding friction
- Centripetal force
- Conservation of energy
- Elastic potential energy
- Momentum conservation
- Ballistic pendulum
- Moment of inertia

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.