

Physics 141 – General Physics IA (4)

(Also listed as HNRS 134)

Course Outline

GE B3

Prerequisites for Phys 141 are Math 141 with grade C- or better and Math 142 or Math 182 (or concurrent enrollment). Since the course is calculus based, the students are expected to be able to differentiate and know how to solve some basic integrals. Recommended: High school physics. **Primarily for engineering and science students**. Not open to students with credit in PHYS 131.

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 of the natural phenomena.
- g: Know that an understanding of the laws of physics is needed in all scientific disciplines.

Text and References:

Young and Freedman, University Physics, 12th edition, Pearson Addison Wesley, 2008.

Physics 141 is the first of a calculus-based, 3-course sequence: Phys 141, 132, 133. It is a required course for all physics majors, most engineering disciplines as well as students in chemistry, mathematics, and architecture. 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 science and engineering 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 141 is offered in a traditional lecture/lab format. It meets a total of 4 hours a week –4 hours of lecture.

Content: Physics 141 will adhere to the following topics:

- Introduction to units of measurements, definitions of position, displacement, velocity, acceleration.
- One dimensional kinematics, vectors and scalars.
- Two or three dimensional kinematics, projectile motion and circular motion.
- Newton's laws of motion, force and weight, applications of Newton's second law.
- More applications of Newton's second law, static and sliding friction.
- Work and energy, definition of power.
- Conservation of mechanical energy.
- Systems of particles, center of mass, velocity of center of mass, acceleration of

- center of mass and momentum.
- Conservation of momentum in collisions, rotational mechanics.
- Moment of inertia, angular momentum and applications of rotational motion.

Lab Sections:

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.

Methods of Assessment:

Lecture 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.