PHY-132-01 General Physics II
Fall 2001
Dr. Paul Bunson

Lectures: MWF 11:00 – 11:50am, Rm. SCI-1023
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The Scope of the Class:
Welcome to the second semester of general physics! In this course, we will be exploring more about how the world around us works. In General Physics I, you learned some principles that physicists consider to be fundamental. These include Newton's Laws, conservation of energy and momentum, and the Laws of Thermodynamics. They are fundamental in the sense that they are believed to be valid no matter what details are involved in ANY given situation.

This semester we will focus on the laws governing electricity and magnetism. Physicists now consider them to be a single force, although we will consider them separately to begin. Electromagnetism accounts for much of the phenomena that we see around us. We will start by discussing electric charges and fields. Next, we will cover the analogous quantities for magnetism. We will show how these concepts can be combined to describe electromagnetic waves such as radio, microwaves, visible light, and x-rays. We will look at the properties of light involved in classical optics and also the more modern theories of relativity and quantum physics.

The Structure of the Class:
Educational research has shown that students learn physics better when they are *actively* involved rather than passively taking notes. Some of you may have taken Workshop Physics for the first part of this course simply because you learn better in a "hands-on" environment. This semester, active participation will be accomplished by a method called "peer instruction" developed by Eric Mazur at Harvard. The way this works is that three or four times per class, I will ask you a multiple-choice question pertaining to the subject at hand. You will be given a minute or two to decide on an answer. If the class as a whole does not get the right answer, you will discuss the problem with you neighbor and try to reach some agreement. Although some of these problems may be challenging; hopefully, you will find this to be an interesting and rewarding way to learn physics!

This method of learning does place certain responsibilities on you. If you are going to have time to work with the concepts in class, to some extent you will be need to know what they are in advance. This means that I may not provide as thorough an introduction as you like; rather, you will be expected to read the text to familiarize yourself with the basic concepts. To help in this, you will be given some simple questions to answer based on the reading assignments.

Text:
Your textbook for this class is *Fundamentals of Physics, Vol. II* (6th ed.) by Halliday, Resnick & Walker, which is an excellent text containing clear explanations and thought provoking exercises. One common complaint of most intro physics texts is that there is too much material, which is generally not appreciated unless you also want a good reference. If you are feeling overwhelmed, pay particular attention to the reading assignments, checkpoint questions, chapter summaries and daily outlines on the website to help you focus on what is most important.

Getting help: Office hours are your best opportunity to ask me questions outside of lecture. Of course, the best time to discuss ANY difficulties you are having is when they arise. Although I try to have a review session before each exam, these are probably too late for helping with major difficulties. If you cannot make it to office hours, email me and make an appointment. I may be able to answer some questions via email, but it is generally better if problems are discussed in person. Help is also available from other people in the class, physics majors, and tutors. Tutors are available through the Science Learning Center. Contact Minna Mahlab (mahlab@grinnell.edu) regarding tutors and help sessions.

Homework: Daily reading assignments will be due at the beginning of each class. These will count for 5% of your grade. There will also be weekly homework assignments worth 10% of your grade. These are due on Wednesdays and will typically cover the previous week's material. It is a good idea to start these early and work on them as we cover the material. You are encouraged to discuss the assignments with others and with your professor. However, your written assignment should be in your own words and reflect your own understanding of the material. Furthermore, your homework MUST SHOW ALL WORK and not just the final answers. Late assignments will receive a reduced grade. Solutions will be distributed.

Lab: You must register for a lab section. The laboratory component of this course is very important, because it provides the opportunity to approach the same material in a hands-on environment. It is department policy that absence from MORE THAN THREE lab sessions without a satisfactory excuse will result in the grade of F for the entire course.

Exams: There will be three midterms along with a final that is cumulative. Exams will be closed book; however, a formula sheet will be provided in advance. Non-programmable calculators will be permitted. Exams will not be graded on a curve.

Course Grade: Your grade will be based on the following percentages:
Homework 15% (reading: 5%, problem sets: 10%)
Midterms 45% (3 exams @ 15% each)
Final Exam 25%
Lab 15%

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SCHEDULE

Date	Lecture	Lab
8/31	Chapter 22 – Electric Charge	No Lab
9/3 9/5 9/7	Chapter 23 – Electric Fields Chapter 23 – Electric Fields Chapter 24 – Gauss' Law	Electric Fields I
9/10 9/12 9/14	Chapter 24 – Gauss' Law Chapter 25 – Electric Potential Chapter 25 – Electric Potential	Electric Fields II
9/17 9/19 9/21	Chapter 26 – Capacitance Chapter 26 – Capacitance Chapter 27 – Current and Resistance	Capacitors
9/24 9/26 9/28	Chapter 28 – Circuits Chapter 28 – Circuits Chapter 28 – Circuits	Ohm's Law
10/1 10/3 10/5	EXAM I Chapter 29 – Magnetic Fields Chapter 29 – Magnetic Fields	DC Black Box
10/8 10/10 10/12	Chapter 30 – Magnetic Fields Due to Currents Chapter 30 – Magnetic Fields Due to Currents Chapter 30 – Magnetic Fields Due to Currents	Magnetism
10/15 10/17 10/19	Chapter 31 – Induction and Inductance Chapter 31 – Induction and Inductance Chapter 31 – Induction and Inductance	Magnetic Forces on Electrons
10/22 – 10/26	------ Fall Break ------	NO LABS
10/29 10/31 11/2	Chapter 33 - E&M Osc. and AC Current Chapter 33 - E&M Osc. and AC Current Chapter 33 - E&M Osc. and AC Current	The Oscilloscope
11/5 11/7 11/9	EXAM II Chapter 34 – E&M Waves Chapter 34 – E&M Waves	Electromagnetic Oscillations, etc
11/12 11/14 11/16	Chapter 35 – Images Chapter 35 – Images Chapter 35 – Images	Geometric Optics I
11/19 11/21 11/23	Chapter 36 – Interference Chapter 36 – Interference Thanksgiving	NO LABS
11/26 11/28 11/30	Chapter 39 – Relativity Chapter 39 – Relativity EXAM III	Interference & Diffraction
12/3 12/5 12/7	Chapter 39 – Photons and Matter Waves Chapter 39 – Photons and Matter Waves Chapter 40 – Matter Waves	Geometric Optics II
12/10 12/12 12/14	Chapter 40 – Matter Waves Chapter 41 – Atoms Chapter 41 – Atoms	Atomic Line Spectra
12/17-21	---------- Final Exams ----------	NO LABS