General Physics I - Mechanics
Physics 155-A Fall 2009

Information

Room 276. M 8-8:50, WF 9-9:50.

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Office Hours: M-Th 10-11, by appointment, or if my office door is open.

Goals

This course introduces you to most of the fundamental concepts of classical physics. A typical week includes three 50-minute classroom meetings and two 80-minute laboratory meetings. The classroom activities will include discussion, lecture, and group work. The laboratory meetings are structured so that the first focuses on concepts and equipment, while the second focuses on solving a problem.

There are two main goals to the course. First, is for you to gain a conceptual understanding of physics. The topics we will cover include motion, force, Newton's Laws, work, momentum and energy and their conservation, rotational motion, oscillations, fluids, and waves. In the second semester we will cover gravitation, electricity and magnetism, electronic circuits, light and optics. We will use readings from the text, lecture, discussion and experimental exercises to help you construct a knowledge base of basic physical principles. A solid grasp of the fundamental concepts will enable you to succeed in the homework and exam portions of the course.

The second goal is for you improve your problem solving abilities. Problem solving shows up in both the discussion sections and the laboratory meetings. You will be presented with a problem-solving template to help formalize your training to become a more successful problem solver.

Mathematics

There are some mathematical topics that will be useful tools throughout the semester. In particular we will make extensive use of vector notation (which requires trigonometry), and more sporadic use of the concepts from single variable calculus (differentiation and integration). These topics will be covered to the extent required for practical use in the course rather than with the deeper theoretical basis you will find in the Math Department.

Group Work

In both class and laboratory you will be working in groups. These groups will be established at the beginning of the semester and I reserve the power to change their make-up during the semester. Part of your homework will be turned in as a group submission. A well functioning group permits all group members to learn. Group work is not intended to make learning easier, just more efficient - it is still hard work!! I expect you all to actively participate to make your groups function effectively.

Textbook & Lecture

There will be substantial overlap between the text and lecture. Please try to read the text before coming to class. A few topics won't be covered in lecture, but will still appear on problem sets and exams and I will let you know what those topics are as we go along. The reason for doing this is to build into the course activities that require you to learn things by

reading the book. This can be challenging with some science textbooks, and I want you to develop this skill.

Assignments and Grading

Problem Sets: Weighted 10%.

Each week a problem set is due on Wednesday at 5 pm, consisting of individual and group problems.

Individual problems: 5-10 problems to be worked by yourself. These are posted on Webassign (http://webassign.net/) and are turned in online. You should have an account at Webassign with your Whitman email userid as both username and password (good idea to change your password after logging on). Institution = whitman. Each problem on Webassign may be submitted up to 5 times, therefore it is to your advantage to start these early in the problem set cycle, so you have time to think about the problem should your initial solution be incorrect. There will be a $20 charge billed to your student account for the use of Webassign.

Group problems: 2 problems solved as a group and written up using the problem solving strategy. One solution per group to be turned in by 5 pm on Wednesdays in the wooden boxes ouside the physics department offices. Group problem sets will be posted on CLEo (https://cleo.whitman.edu/).

Problem Solving Strategy

Posted on CLEo is a strategy for problem solving. Group problem submissions should include every element of this strategy, where appropriate. For the individual problems, use the strategy as a guide. There is an example problem solved using the strategy on CLEo.

NOTE: There is absolutely no way to make-up problem sets. If you are going on a field trip or to a sporting event, you should to turn in your problem set before you leave. However, in order to accommodate for illness etc., I will drop your two lowest problem set scores in calculating your final grade.

Exams: Weighted 75%.

Midterms (in class; 15% each):	Sept 25 (Friday) Oct 23 (Friday) Nov 20 (Friday)
Final Exam (30%):	December 16 (Wednesday); 9 am -12 noon.

NOTE: If you have irreconcilable conflicts during the times that the midterms will be given it is your responsibility to let me know **at least 1 week in advance** of the midterm. The date of the final is set in stone and cannot be altered.

Laboratory: Weighted 15%-with the additional requirements that in order to pass the course you must achieve a minimal laboratory grade of 70%.
Details about the laboratory can be obtained from your lab instructor.

Course Schedule (Text is Physics for Scientists and Engineers with Modern Physics, by Knight. Available at the bookstore.)

Week	Topic	Text Chapter
1. Aug. 31	Concepts of Motion describing motion – position, displacement, velocity, acceleration	1,2
2. Sept. 7	Kinematics motion in 1D with constant acceleration	2
3. Sept. 14	Force and its Relation to Motion vector notation, net force, free-body diagrams, Newton's 1^{st} & 2^{nd} Laws	3,4
4. Sept. 21*	Dynamics (1D) weight ≠ mass, friction, drag, 1D problems w/ Newton's 2^{nd} Law	5
5. Sept. 28	Dynamics (2D) independence of x and y motion, projectile motion, relative motion	6,7
6. Oct. 5	Dynamics (2D); Newton's Third Law non-constant forces, circular motion, action/reaction pairs	7,8,10.4
7. Oct. 12^{+}	Conservation of Momentum arguably the most important law of physics	9
8. Oct. 19*	Conservation of Energy what a Physicist means by energy, types of energy	10
9. Oct. 26	Work force, work and potential energy	11
10. Nov 2	Rotational Motion the analogue between linear and angular quantities: $x{:}\theta$, $v{:}\omega$, $a{:}\alpha$, $F{:}\tau$ rotational energy	13
11. Nov 9	Angular Momentum conservation of angular momentum	13
12. Nov. 16*	Oscillations describing oscillatory behavior	14
Nov. 23	Thanksgiving	
13. Nov. 30	Fluids pressure, buoyancy, flow, Bernoulli	15
14. Dec. 11	Waves describing waves; connection to oscillations	20-21
15. Dec. 18	Final Exam, Wed. Dec 16 9am-12noon.	

* Midterm exam on the Friday of this week.

+ Fall break. No class on Monday.