

# Physics 150: Introductory Physics I

Fall 2007

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	Room	Time
Recitation	Eaton 111	10:10-11:05 MWF
Laboratory	Eaton B13	1:30-5:00 T
Laboratory	Eaton B13	1:30-5:00 W

## Texts & Materials

- Hugh Young and Roger Freedman, *University Physics*, 11th Edition
- Physics 150 Laboratory Manual
- 5 × 5 Quad Ruled Composition book as a Laboratory Notebook
- Instructors' Solution Manual is on reserve in the library

## Course Objectives

Physics is the fundamental study of the behavior of matter and energy. It is a quantitative and mathematical science. By the end of the course, students should have a working knowledge of the elementary principles of mechanics and waves and their expression in mathematical form. Students should be able to apply these principles to simple problems stated in plain english.

## About T.J. Allen

I am a theoretical physicist working on particle physics and gravitation. I received my Ph.D. from Caltech in 1988 for work I did in string theory. I have been teaching since 1980, at the University of Wisconsin, the California Institute of Technology, SUNY Utica/Rome, and HWS. Besides physics, some other interests of mine are calligraphy, computers, piano, yoga and the martial art Aikido. Teaching is very important to me. My students and former students have a curious way of becoming part of my "extended family."

## About Physics 150

Like most introductory science courses, introductory physics tries to compress hundreds of years of scientific discovery into a single year. The result has been described as "trying to drink from a fire-hose" and seems to drive out every last glimmer of interest from some of our bright and curious students. I must admit to being biased against the traditionally taught introductory physics course. I will try to make the course as interesting, fun, and enjoyable as I can for all of you. Unlike many other science courses, physics is primarily a problem-solving course. There are only a few principles a week that we will learn, however there are many ways to use those principles. Learning to use the principles is best accomplished through solving lots of problems. I ask that you work as many problems as you can on the material, doing even more problems than are assigned. I suggest that you work together in groups because that is a good way to learn this material. Explain to yourself and your study partners the ideas you are learning, how they apply to various situations, and how they translate into problems. Numerical answers usually are not very useful for understanding; it is much better to figure out how you get to the answer from what you know.

## Course Requirements

Laboratory  
 Daily reading assignments in text  
 Class attendance and involvement  
 Homework problems, and other assignments  
 Quizzes  
 2 Hour Exams  
 Final Exam

## Grading

The class will be graded on a straight percentage with the following breakdown:

A: 88% – 100%      B: 75% – 87%      C: 60% – 74%  
 D: 50% – 59%      F: < 50%

I will not grade on a “curve,” unless I feel that my exams were inappropriately difficult. In that case, I will add points to each exam to bring the grades up to where I feel they should have been. In other words, an exam score of 80% is guaranteed to be at least a “B–.” The final grade will be composed of five elements, three of which are the quizzes and exams. The other two elements are the laboratory and homework/participation. The numerical grade will be computed using two schemes and your final grade will determined by the higher of the two.

$\alpha$	$\beta$	Element
10%	10%	homework/participation
20%	20%	laboratory
30%	15%	hour exams
10%	5%	quizzes
30%	50%	final exam

## Late Policy

Late homeworks will not be accepted. If you miss a quiz and you have a valid excuse, you may take a quiz the next day for 80% credit. If you miss an hour exam and have a valid excuse (a note from your physician or an acceptable alternative), you will be allowed to count the other hour exam for twice the weight. You must check with me **before** you miss the exam unless you fall ill suddenly before the exam, in which case you should contact me as soon as you are well. **There will be no makeup for the final exam.**

## Homework

**It is very important that you do the homework.** Doing the homework thoroughly and correctly is the most important and valuable part of the course, at least insofar as learning the material is concerned. It is also quite helpful if you do additional problems of your own choosing from the course text or any other source. Your grade is more a reflection of how much useful work you did outside of class than of how “mentally quick” you are. Homework may be irregularly collected, inspected, and marked. No advance warning of homework collection will be given. The contribution of the homework to your grade will be based more on the number of problems you did and less on how well you did them.

## Quizzes

There will be short quizzes in recitation every so often, announced in advance. They will be on the current material, usually a single problem, sometimes two or three very short problems.

### Exams

There will be two hour exams and a final exam. The hour exams will be in recitation on October 3 and November 7. The final exam will be during the period set by the Registrar's office, which should be Wednesday December 12 at 1:30 PM. The hour exams will each be at least four problems. You will be allowed to bring one *handwritten* 8.5" × 11" page (one side) of notes to each hour exam and two *handwritten* 8.5" × 11" pages (two sides total) to the final exam.

### Recitations

Recitation is a place to get your questions answered, to see if you did the homework correctly, to learn how to approach problem solving, and to discuss the reading. I expect students to attend recitation and to be interactive. Just sitting quietly and writing down what I write on the board is not very helpful to your understanding!

### Laboratories

***All of the laboratories must be completed in order to pass the course. A laboratory is not complete until you have handed in a laboratory report, or have otherwise had your lab work evaluated.*** You must have a laboratory manual and you must bring the lab manual, your lab notebook, and a calculator to each laboratory. Be sure that the lab notebook that you purchase is a Composition Book that is *bound* and *has quadrille (graph paper) lines*. Laboratory sections do not meet every week, so you should pay attention to the meeting times in the syllabus. You must have read the lab manual *before* entering the laboratory. I expect all students in laboratory to contribute to their lab group's efforts and to solve any problems that may arise by thinking about what they should do to get the experiment to work and trying it before they find me and ask for help. I am more concerned that you learn something interesting from laboratory than that you finish the lab. Keeping a neat lab notebook is important (especially since concise, neat notebooks are generally much more helpful when you are writing your lab report.) If you cannot state what you are doing or what you learned simply and concisely, then you probably need to think more about it!

### Office Hours

Initially office hours will be Monday 3:00 PM - 4:00 PM and Friday 2:00 PM - 3:00 PM, and by appointment. You may stop by any time to see if I am free to discuss physics, life, the universe, or anything else. If my office door is closed, I am very likely to be busy.

### Physics Teaching Fellows Program

Assistance with course concepts is available through the Teaching Fellows Program. The Teaching Fellows Program provides a collaborative approach to teaching and learning. The Fellows were nominated by the physics department and selected jointly by the Center for Teaching and Learning (CTL) and the department. The fellows have been trained by the CTL.

The Teaching Fellows act as learning facilitators, helping their peers adapt to a subject's discourse and promoting academic interaction between students and faculty as well as among students. Time spent working with a fellow is time well spent. Note that the Fellows are not meant to replace the one-on-one tutoring offered through CTL, which remains available, nor to replace faculty-student interaction.

The Physics Teaching Fellows may be found Monday through Thursday from 7 - 11 PM in Eaton 105. The physics department encourages you to take full advantage of this program.

## Syllabus

The reading assignments are to be done and the homework assignments are to be *attempted before recitation* on the day in which they are assigned. Homework assignments are to be *completed* by the following recitation so you have time to ask questions on the material before they are due. Be careful in finding the questions (Q:) and problems (P:). In the text the questions are labeled "Discussion Questions" and the problems are labeled "Exercises," "Problems," or "Challenge Problems."

The readings will be discussed during the first part of the lecture/recitation and the problems will be discussed during the second part of the lecture/recitation.

Some problems are more difficult or more mathematical than the others. If you have trouble, go on to another problem and come back to the troublesome one. I expect that everyone will attempt all of the problems and complete most of them.

The laboratories will be done in your laboratory section, either on Tuesday or Wednesday.

If we get ahead of or fall behind this syllabus, as is quite possible, a revised version will be distributed.

Date	Reading	Homework Assignment	Laboratory
Mon 27 Aug	Introduction & Outline		No Lab
Wed 29 Aug	Ch 1	<b>Q:</b> 1, 8, 10, 11, 13; <b>P:</b> 10, 12, 22, 43, 52, 89	
Fri 31 Aug	Ch 2: §1-3	<b>Q:</b> 2, 3; <b>P:</b> 5, 7, 9, 18	
Mon 3 Sep	Ch 2: §4,5	<b>Q:</b> 15, 18; <b>P:</b> 23, 31, 41, 59, 61, 77	Random Error & Experimental Precision
Wed 5 Sep	Ch 3: §1-3	<b>Q:</b> 6, 10; <b>P:</b> 4, 8, 21, 55	
Fri 7 Sep	Ch 3: §4,5	<b>Q:</b> 13; <b>P:</b> 28, 38, 79	
Mon 10 Sep	Ch 4: §1-4	<b>Q:</b> 4, 41; <b>P:</b> 4, 14, 33	No Lab
Wed 12 Sep	Ch 4: §5,6	<b>Q:</b> 28, 31, 40; <b>P:</b> 23, 28, 39, 40, 49	
Fri 14 Sep	Ch 5: §1,2	<b>Q:</b> 1, 3; <b>P:</b> 3, 7, 15, 85	
Mon 17 Sep	Ch 5: §3	<b>Q:</b> 12, 13; <b>P:</b> 30, 81, 89	Instantaneous Velocity
Wed 19 Sep	Ch 5: §4,5	<b>Q:</b> 23; <b>P:</b> 48, 53, 114, 115	
Fri 21 Sep	Ch 6: §1,2	<b>Q:</b> 4, 12; <b>P:</b> 3, 8, 12, 14, 16	
Mon 24 Sep	Ch 6: §3,4	<b>Q:</b> 20, 22; <b>P:</b> 29, 31, 46, 99	Force Table
Wed 26 Sep	Ch 7: §1,2	<b>Q:</b> 1, 5; <b>P:</b> 5, 9, 12, 15, 55	
Fri 28 Sep	Ch 7: §3,4	<b>Q:</b> 12; <b>P:</b> 27, 46, 33	
Mon 1 Oct	Ch 7: §5	<b>Q:</b> 16; <b>P:</b> 37, 63	No Lab
Wed 3 Oct	<b>Exam 1</b>		
Fri 5 Oct	Ch 8: §1-3	<b>Q:</b> 2, 9; <b>P:</b> 3, 7, 19, 27, 34	

<b>Date</b>	<b>Reading</b>	<b>Homework Assignment</b>	<b>Laboratory</b>
Mon 8 Oct	Ch 8: §4,5	<b>Q:</b> 21, 22; <b>P:</b> 39, 93, 94, 103	<i>Newton's</i>
Wed 10 Oct	Ch 9: §1,2	<b>Q:</b> 7; <b>P:</b> 5, 9, 16	<i>Second</i>
Fri 12 Oct	Ch 9: §3,4	<b>Q:</b> 9, 10; <b>P:</b> 33, 47, 79	<i>Law</i>
Mon 15 Oct	<b>Fall Recess</b>		<i>No Lab</i>
Wed 17 Oct	Ch 9: §5,6	<b>Q:</b> 20; <b>P:</b> 52, 85, 89	
Fri 19 Oct	Ch 10: §1,2	<b>Q:</b> 1, 3, 10; <b>P:</b> 1, 5, 13, 66	
Mon 22 Oct	Ch 10: §3,4	<b>Q:</b> 18, 27; <b>P:</b> 19, 30, 62	<i>No Lab</i>
Wed 24 Oct	Ch 10: §5-7	<b>P:</b> 39, 70, 90	
Fri 26 Oct	Ch 11: §1-3	<b>Q:</b> 4, 5, 7; <b>P:</b> 5, 11, 14, 72	
Mon 29 Oct	Ch 11: §4,5	<b>Q:</b> 14; <b>P:</b> 23, 32, 39, 96	<i>No Lab</i>
Wed 31 Oct	Ch 12: §1-4	<b>Q:</b> 1, 7, 9, 10; <b>P:</b> 4, 13, 23, 27	
Fri 2 Nov	Ch 12: §5,6,8	<b>Q:</b> 14, 17, 21; <b>P:</b> 34, 43, 69, 83	
Mon 5 Nov	Ch 13: §1-4	<b>Q:</b> 1, 3; <b>P:</b> 4, 15, 17, 27	<i>No Lab</i>
Wed 7 Nov	<b>Exam 2</b>		
Fri 9 Nov	Ch 13: §5-8	<b>Q:</b> 12; <b>P:</b> 34, 50, 63, 88	
Mon 12 Nov	Ch 14: §1,2	<b>Q:</b> 4; <b>P:</b> 6, 9, 43, 51	<i>Simple</i>
Wed 14 Nov	Ch 14: §3,4	<b>Q:</b> 13, 18, 20; <b>P:</b> 25, 31, 75	<i>Harmonic</i>
Fri 16 Nov	Ch 14: §5,6	<b>Q:</b> 23, 29; <b>P:</b> 33, 86	<i>Motion</i>
Mon 19 Nov	Ch 15: §1-3	<b>Q:</b> 6; <b>P:</b> 5, 6, 12, 48	<i>No Lab</i>
Wed 21 Nov	<b>Happy</b>		
Fri 23 Nov	<b>Thanksgiving!</b>		
Mon 26 Nov	Ch 15: §4,5	<b>Q:</b> 4, 13; <b>P:</b> 15, 20	<i>Standing</i>
Wed 28 Nov	Ch 15: §6,7	<b>Q:</b> 15; <b>P:</b> 31, 32	<i>Waves</i>
Fri 30 Nov	Ch 15: §8	<b>P:</b> 39, 45	
Mon 3 Dec	Ch 16: §1-4	<b>Q:</b> 1, 5, 8; <b>P:</b> 3, 8, 23, 26	<i>No Lab</i>
Wed 5 Dec	Ch 16: §5-8	<b>Q:</b> 16; <b>P:</b> 33, 37, 62	
Fri 7 Dec	<b>Summary &amp; Review</b>		