

How to Succeed in Introductory Physics

College-level courses are difficult, and to some students an overwhelming experience. In particular, technical courses at this level will require a great deal of comprehension of many concepts and the ability to independently apply these concepts to solve problems. The sciences and engineering, physics in particular, are problem-solving disciplines that require you to understand the principles and solve problems. These courses require the student to be the most active person, spending many hours learning the material and practicing it. Strive to understand the material in these courses, and do not be satisfied in using techniques that you do not understand. Do not memorize equations, but attempt to understand the ideas and apply them to the problems. The professors and other instructors can guide you through the material and help you with problem areas, but you must read, study, practice, and learn. Hopefully, this paper will assist you in getting started in the right direction.

Prior to starting the course, try to overview the material by examining the course outline and reading the introduction and table of contents of the textbook. At this time and throughout the semester try to recognize how the various parts of the course fit together. As the semester progress, integrate the ideas and principles into a solid structure. There are good reasons why the material is covered in one course.

It is imperative for you to realize that technical courses require approximately three hours of studying for each class hour (credit hour). Do not fool yourself into believing that you can succeed with less time, or that you can put off some studying this week and catch up next week. The amount of reading is less than most other courses, but the reading is much denser and you must read it thoroughly, understand it, and practice it. This, along with the homework, requires time. For PHY121, this means ten to twelve hours of studying per week. In general, you will be taking several of technical courses each semester and for most individuals, this means you should make a time schedule. Be realistic in the amount of time you must spend for each of your courses, and block off enough study time to fill the needs for all of your courses. Then assign these hours to each of your courses. An example of such a schedule is given at the end of this document.

Devote a few hours each day to studying physics; do not try to study in one or two large blocks each week. This allows time for you to assimilate the material as well as time for previewing and review materials. A diagram that describes a suggested method of studying for this course is given at the end of this document.

Keep up with the material

A physics course, as with most technical courses, build on itself throughout the semester. Material covered in the second lecture is required to understand the material in the third lecture; and material in the third week is needed to understand material in the fourth week. If you fall behind for some reason, spend extra time and get help catching up immediately. Do not fall behind in handing in homework assignments. One or two missed homework assignments will turn a B into a C, since homework is a significant part of the course grade. If you believe that some math that you do not

remember is required to understand the material get help from the professor or the Learning Resource Center. If there are physics concepts that you have difficulty understanding, get help from the professors. Do not accept not understanding.

Go to every class and be an active participant

It is important that you prepare for each class to get the most from it.

Lectures:

Preview the material in the textbook prior to each lecture. Read all the material that will be covered in the lecture. Pay special attention to the drawings and examples in the material. Jot down any essential questions you have about the material that will be covered. This will improve your ability to follow the lecturer since you will recognize the terminology and have an idea of where the lecture is going. Since you will have thought about some of the material, you will take more logical notes and concentrate on the important ideas.

During the lecture stay alert, think about the material and care about what is occurring. Take notes on one side of the page so the facing page can be used later to fill in comments and answer questions. Listen for the ideas that receive special emphasis by the professor and emphasize them in your notes. When you copy a drawing, try for completeness not neatness or artwork; and makes sure to add any comments made. If you get behind on the notes, leave an empty space and go on. You can fill in the gaps with the help of a friend's notes and by accessing the lecture notes in the library electronic reserve for this class. Put your own comments and questions in your notes as you go along, the facing page can be used to answer these later.

After class review and edit your notes. Look for the important ideas that have been examined in this lecture and how they relate to previous topics. When the professor leaves off completing a problem or derivation during the lecture, complete it at this time. It is very helpful to have your textbook handy at these times to help you fill in the blanks. Integrate any notes, ideas, questions that you have from your textbook. Try to answer those questions in your notes, using all the resources available to you.

Discussion Classes:

Prior to every discussion class, write down a set of specific questions that you want answered. These questions can include general questions on the concepts, and particular questions on examples and homework problems. Go to the discussion classes with a goal. Although many techniques for analyzing and solving problems will be examined during these classes, the discussion classes are the arena for discussing problem areas.

Be active in the discussion classes. Ask questions, try to answer questions posed by the professor, and encourage the discussion in areas that you do not understand. Have your notes ready in the discussion sessions so you can integrate the new ideas into your notes. Do not leave the class without all your questions satisfactorily answered, or without scheduling time to meet the professor.

Do all the homework

Do not put off the homework problems until the last minute. Doing the homework problems is a critical part of understanding and applying the material in this course. It is especially important, since solving problems is the method used to determine your knowledge level (and thus assigning your grade for the course). You will find that solving the problems and reading the text are part of a cycle, which includes your own questions generated in the lecture and while reading. This cycle helps you gain insight that is not possible by only reading the text, since you will be exploring the consequences of the principle covered in the text through the homework problems. Thus, make doing the homework an integral part of your studying. Do not simply search for the right equation or the same problem done in an example while doing the homework, but strive to understand the principles and apply them to the homework problems.

Make sure to hand in as perfect a set of homework solutions as possible. The homework counts as a large portion of your grade, so get as many points as possible. Work diligently on each problem and do not give up after a single attempt. If it appears to be intractable for you, get help. Consult your friends, or go to see the professors or the tutors for assistance. Never hand in a partially done homework assignment. There are enough resources on campus to ensure you can get the homework completed and handed in to the professor on time.

Once you have done the homework to submit, redo the problems without any assistance. This is a critical step to ensure a good grade in this class. By redoing the problems unassisted you cannot simply mimic an example problem or transcribe a tutor's solution. If you cannot do this with some problem, review the solution you have and determine what it is that is so peculiar about the problem and its solution. If you continue to have difficulty with the problem see the professor. Usually this is a symptom of not understanding some particular concept or technique that the professor can help you with in an efficient manner.

Many professors will tell you that you should work on the homework as long as it takes to get it done... no matter how long that might be. I believe that you are the best person to ascertain: "I am truly lost in solving this problem." Please do not give up too quickly on any problem, but don't spend five hours getting nowhere with a particular problem. Get help, and then spend that extra time understanding the ideas.

If time permits, it is always good to do extra, unassigned problems. Be careful not to spend your time doing the "easy" problems, but spend any extra time on problems attacking those that are in the areas that seem a little fuzzy to you. Another excellent method of looking at additional problems is to examine the examples in the additional textbooks on reserve in the library.

When your homework is returned, check for what you did wrong. The key here is did you approach the solution correctly, and execute the approach properly. Simple arithmetic errors are excusable; but do not ignore problems that you did incorrectly. Look at the sample solutions that are posted and if you don't understand, then ask.

The discussion classes will emphasize problem-solving techniques during the first few weeks, including the style for "acceptable" answers on homework, quizzes, and tests.

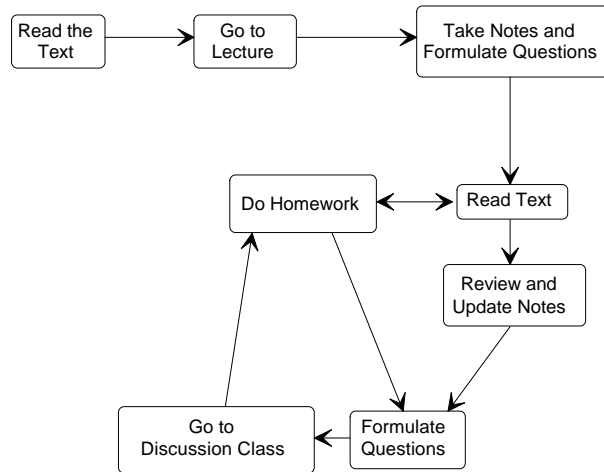
Get in a study group

Find others in the class with similar schedules and form a group of three or four people who get together once a week. An hour scheduled each week prior to handing in the homework should be sufficient to assist everyone in the group. Use the group for discussion of concepts and problem suggestions, but do not use the group as a substitute for your own studying. The more you discuss these ideas with others, the more you will integrate the ideas into concrete useful tools. Ask for help from your classmates and give help to others. One of the best techniques for learning material is to try to teach it to someone else. The grades for the course are not assigned via some distribution, but are determined from each individual's knowledge. Thus helping someone else is not a detriment to your grade. Don't be afraid to visit the professor as a group to get help with some specific idea or problem. It is the most efficient method for everyone.

Prepare for exams early

Your constant studying of the material is the best way to prepare for the exams. Moreover, since the later material builds on the earlier material, you will be practicing for the exam as you keep up with the course. Unless you are a very unusual person, it is not possible to cram for physics exams. So, please keep up with the material. During the days prior to the exam, you can redo the homework and example problems that are relevant. Use the study groups to determine what the critical ideas and problems may be, and to formulate your own version of exam problems. At the last lecture prior to an exam, a sample exam will be distributed that you can use for practice. This will allow you to attend the exam review session with specific questions (not just "please do all the sample exam questions"), and allow you to get a good night sleep before the exam.

Guide to Studying



Sample Schedule

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
9:00	Calculus Lecture	STUDY AH/Calc/WL	Calculus Lecture	STUDY AH	Calculus Lecture		
10:00	STUDY Physics/Calc	Calculus Discussion	STUDY Physics/Calc	STUDY WL	STUDY Physics/Calc		
11:00	Physics Lecture	American History	Physics Lecture	American History	Physics Lecture		
12:00	Swimming	American History	Swimming	American History	Swimming		
1:30	STUDY Physics		STUDY Physics		STUDY Physics		
2:30	Physics Discussion	World Literature	STUDY Physics	World Literature	STUDY AH		
3:30	STUDY WL	World Literature	STUDY AH	World Literature	STUDY AH		
4:30	STUDY WL						
5:30							
6:30	STUDY Physics	STUDY Calc	STUDY WL	STUDY Calc			STUDY Calc
7:30	STUDY Physics	STUDY Calc	STUDY WL	STUDY Calc			STUDY Calc
8:30	STUDY Calc	STUDY Physics	STUDY Calc	STUDY Physics			STUDY Physics
9:30	STUDY Calc	STUDY Physics	STUDY Calc	STUDY Physics			STUDY Physics