ACADEMIC RESOURCE CENTER
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General Study Suggestions

The most important requirement for effective study is the proper mental attitude and a driving desire to learn. Picture to yourself as vividly as possible the consequences of your failure to learn—flunking out, opinions of family and friends, lowered income throughout life because of incompetence. Then think of what may happen if you do particularly well—respect from family and friends, possible scholarships, offers of jobs leading to important and responsible positions.

Get interested in the subject by learning something about it, tying it in with other courses, talking it over with fellow students. Be assured that if the course is required as part of a curriculum of professional training, the course is necessary. Try to discover why.

Go to class; be alert. Make a serious effort to stay right with the lecture Adopt a cooperative and receptive mental attitude rather than a belligerent one. Perhaps you will develop more enthusiasm for the course if you sit in one of the front rows, where you will be forced to pay attention.

Find yourself a quiet place to study, with plenty of light and desk space that is free from distractions, including radios and pictures of girl friends or boy friends. (The desk is for work; put the pictures on the bureau.) Study conscientiously, keep at it; sit with your back to the door and reject interruptions. The time you save will enable you to enjoy occasional bull sessions without worrying because you aren't studying.

Budget your time. Make out a study schedule and stick to it for at least two weeks. Get adequate sleep, regular moderate exercise, and some recreation, but leave two full honest hours weekly per unit for study.

There are 168 hours a week. Of these 168 hours you will be asleep for about 60, dressing and eating for about 20. If you take Saturday afternoon off for a hike, consider Sunday morning and afternoon as time off from studying, and have two four-hour dates a week, you have about 68 hours a week for work. If you are in class and laboratory for 20 hours, you still have 48 hours for study. It seems like a tremendous amount of time, doesn't it?—especially considering that you've taken off half of Saturday and most of Sunday. Just where does all the time go? A great deal of it is lost in ten-and twenty-minute idle discussions, time wasted during the twenty minutes while you wait before a class after you've needlessly spent another twenty minutes walking to the post office and back for a stamp you could have picked up just as easily on your way back from lunch, and so on. It is up to you whether you want to make good use of these numerous ten; twenty, or thirty-minute intervals. I'm not urging that you never take a minute off to enjoy life, but there is certainly little danger that you will use your time too efficiently.

You learn more physics by studying it for an hour a day than by studying it for ten hours on a week end, and it takes less time. Furthermore, you will get more from the middle-of-the-week classes Don't get behind. Keep up with your work. It's much easier to learn your lessons from day to day than it is to half-learn them all at once on the day before the exam. If the prospect of an assignment is forbidding, begin on it; you may get more done than you expected.

Plan to study physics as soon after class as possible, while you still remember things that probably will be forgotten twenty-four hours later. You may find it a good idea to study physics when your mind is fresh, before you work on subjects requiring less concentration. During a study session of several consecutive hours, an occasional relaxation period of five minutes often is a help. Sometimes it is better to study one subject for an hour and then shift to another subject for an hour, rather than to study one course continuously. Sometimes it is not better. Experiment to find out which method suits you.

When you study, really study. Much of your time may be lost in slipshod thinking, daydreaming, following blind alleys of thought, and just plain loafing. Probably you have experienced times when your process of learning was very easy and rapid. Try to figure out how this happened and then try to duplicate the occurrence. (Sometimes the prospect of an examination provides a good incentive; can you provide yourself with an artificial incentive?) While you are studying, keep personal worries off your mind. If you have a personal problem, get some good advice, think it over, then make your decision and stick to it.

You understand a lecture better if you have some notion ahead of time as to its subject matter. For this reason, spending the five or ten minutes between classes reading the main paragraph headings gives you a better return for the time spent in the lecture than if you spend the time before class reading the daily paper. (By all means, read the newspaper later.) Experiment to find out what part of your study time for a given assignment should be spent before lecture and what part after lecture, in order to give you the best return. Probably you will spend from ten to forty percent of your time studying before lecture.

Perspective is one of the chief aims of education. To see the parts in relation to the whole is much more important than to know all the details. [3] Perspective provides a scaffolding into which the details may be fitted readily. When you study an assignment, first go over it rapidly, taking in only the high spots, to find out what it is about. Then go over it more carefully. Study to understand the material, not just to read an assignment. Go slowly Physics can't be read like a novel or even like a history lesson. (A physics assignment is often only a half-dozen pages rather than a half-dozen chapters.) Try to think of applications of the material as you read it and of problems to which the formulas apply. Try to correlate the material with your previous knowledge and with other courses. Material in the text is not necessarily 100 percent correct. Textbook authors are human and sometimes are misinformed, just as other people are. All books have some

typographical errors, although usually not very many. Be critical. Do not believe what you read unless it makes sense to you. [4]

When you finish a paragraph, think out its main idea. Say it out loud or write it down. When you finish the page, ask yourself what was on the page. It may have seemed simple when the author wrote it, but can you put it in your own words? You may have to do so in an exam.

When you finish the assignment, plan what question you would ask if you were making up an examination. Close the book and deliver yourself a three-minute formal lecture on the lesson or, if you feel silly talking to yourself, write out a fifteen-minute essay on the subject. Probably you will discover that you didn't know the material as well as you thought you did—better to find it out while studying than during an exam. The importance of frequent self-recitation cannot be overemphasized. Review the day's work in the evening, the week's work on Friday, and the whole course once a month.

Psychologists say that if you overlearn material (i.e., study it somewhat longer than is necessary just to understand it), you will remember it later with comparative ease. Furthermore, overlearning and review show you where you are weak and give you a chance to clear up the weak points.

Physics can be learned by seeing, hearing, reading, writing, and talking. Do not overlook the chance of talking things over with your friends. An excellent study procedure is for two students to study a week's material together and then give each other an oral exam on it. (Let A ask B a question. If B answers, it is a point for B; if B cannot answer but A can, then it is a point for A. The one with the most points can call the tune but perhaps the loser will want to study a little more.) Trying to explain something to a critical friend will show if you really know it. Don't delude yourself by saying, "I know it but I can't explain it," for if you do understand it, you can explain it. As a matter of fact, a good test of your understanding is furnished by the ease with which you can explain something. When you understand it well enough, you can explain it easily.

As you are outlining the course, revising your lecture-notes, reading the text, or doing problems, occasionally you will come upon things you simply cannot understand. Don't say: "I can't get it at all." Rather, try to analyze your difficulty so that you can state specifically what you don't understand. Make a list of these difficult topics and ask the instructor about them at the next class. Don't hesitate to ask, either. Probably there are others who will be glad to know the answers too. Contrary to popular student impression, the instructor probably will be pleased that you ask about the course.

If you are having real difficulty with a course, spend an hour writing an essay on what you think the course is about, what its significance is, how it should be studied, why you are taking the course (or if it is a required course, why you think it is required), why you think you are having difficulty, etc. Then show your instructor the essay but ask him to count ten before he says anything. Very likely your essay will be of value to him in

diagnosing your difficulty and prescribing a remedy. Writing the essay certainly will help you to profit from your instructor's diagnosis and remarks.

If the course seems to be too deep for you, try going to the main library or to the physics library, where there are some books simpler and easier to understand than your text. The instructor will be able to suggest several books of this type, But don't neglect your own book. It has an index and probably several appendices. They may help. *Use* your own book; don't just read it. Underline important points, put your own comments in the margin, etc. (If it costs $500 to $1000 for you to take a physics course, it is hardly worth while to worry about the resale value of a $5 text.)

Sometimes a student can learn more in an hour from a good tutor than he could in a whole evening by himself. Your instructor will know of some good tutors. Or the material may not be so difficult as you think. Don't expect too much. A thing may have a terrifying name (such as a prolate spheroid) but may actually represent something simple (a football). The sentence following an obscure one may clear up the trouble.

If your physics suffers because it takes you too long to read your history lesson, speak to your adviser, who will be able to suggest corrective procedures. Most people can greatly increase their reading speed and degree of understanding if they go about it in the proper way. [5]

Pay special attention to definitions. Often a common word has a special technical meaning; be sure you understand it. Although in common parlance such terms as force, energy, work, and power often are used synonymously, all of them have distinct, different meanings in physics. Learn these meanings. For nontechnical words about which you are in doubt, use a dictionary. All students should own and use a good dictionary. Definitions are important not because they may be asked for in an examination but because a clear and concise formulation of the meaning of a defined quantity is essential to an understanding of it. Incidentally, do not merely mimic the words in the text but study for a grasp of the subject so that you can give the definition in your own words too.

Take an active part in recitation work. Ask questions. Try to anticipate what will come next. Such an alert mental attitude will help to make the material sink in.

In technical courses, undoubtedly you will have numerical problems to work from time to time. In addition to quantitative problems, however, discussion questions are very useful learning aids. If your text has questions of this type, be sure to go over them. If, after thinking hard, you cannot get the answers, ask your instructor for some hints. If your book does not have this type of question, you should either get a book that does or else ask enough questions in your recitation section so that you get the benefit of this kind of mental exercise.