

SOME ADVICE TO THE STUDENT

Welcome you all to the wonderful world of physics! Whatever your reason for taking this physics course (perhaps you are taking it only because it is required), I hope that most of you will enjoy physics, *because life itself is physics!* Here is some advice which I believe will be of benefit to you:

1. Keep in your mind that physics is the most fundamental science, which is after the basic principles of the universe. Understanding physics means that you understand how the whole universe works. All other science courses you will see later in your university life will certainly use the very same physical principles you will learn in your physics courses. Therefore, it is crucial to a serious engineering student that they have a firm grasp of understanding of the concepts and theories taught in this course. To this end, the first advice to give you is that *you should be always positive towards to physics.*
2. You should get to know your textbook to make full use it. Pay special attention to marginal notes, highlighted texts, equations in the boxes, etc. Textbook contains also many useful tables in appendices, and a very large index allowing you to quickly find a specific subject.
3. Set up a regular, daily basis, study plan, and try to adhere to it. It's all right sometimes to delay your study, but at most one or two days, but *never let it become a habit.* It's meaningless to delay study until the very day of exam; you can be sure that you will end up with a disastrous result.
4. In case of trouble with the course, seek advice of the instructor or experienced students.
5. For every hour in the class, you'd better devote at least two hours of self-study, perhaps at home.

6. A preliminary reading of the text before attending the lecture will facilitate your learning process. Try to develop this good habit.
7. Try to be on time for your class, for learning something new is a matter of discipline.
8. In the class, take careful notes, without distracting your attention from your instructor. Whenever you feel necessary, do not hesitate to ask the instructor for further clarification.
9. Memorizing does not mean that you have understood or learnt something. So *do not memorize anything*, instead learn them *by heart*; that is, try to learn physics so well that you can easily remember any physical principle even so long after you have taken the course. This can be best accomplished by learning physics through *practicing*. Here is your motto, by the Nobel laureate **R. P. Feynman**: “*You don’t know anything until you have practiced.*”
10. Enhance your problem-solving skills by following the worked examples, carefully reading solving strategies, hints, pitfalls, etc.
11. You should be able to solve a wide range of problems; this can only be done by trying to solve as many problems as possible. It is even better if you can find another way to solve the same problem.
12. Seeing a problem’s solution in the class does not mean that you understand it. This is merely a self-deception. You must solve that problem and similar ones by yourself.
13. Do not attempt to solve any problem unless you understand at least the rudiments of a chapter.
14. Plan the way you solve any problem. If the at-hand is a multi-concept problem, a systematic approach will be especially important. Before attempting a problem, make sure that you have understood what are you asked, this usually requires more than one reading. The wording a problem almost always carries the information required for a proper solution. Then, in reading a problem check for any special word or phrase which allow you to interpret the problem. After you have fully understood the problem, just jot down the given quantities as a *list*, and identify which quantity you are asked find. Determine the method for the solution and carry out it.
15. Accuracy is very important in solving a problem and in your later engineering career. In all mid-results, keep at least *five* significant figures and use them in the following procedures. Only at the very end may you give the main result you are asked with *three* significant figures.

16. After finishing chapter, you ought to have no difficulty in defining any quantity you have newly learnt. You should be aware of the limitations and assumptions pertaining to the use of a specific formula.
17. If you feel you do not understand a point, re-read the text and consult your notes, *do not let it go*.
18. Try to become competent as early as possible to use your calculator, it will soon one of indispensable tools in your engineering career.
19. Physics is a large-volume book, written in a special language: *calculus*. When you are taking your introductory physics courses, place a special emphasis to the accompanying calculus course. Without a good knowledge of calculus, you can be only average academically; you cannot, and should not, evade calculus. Calculus expresses lengthy ideas in short and succinct forms, following the great master **Galileo Galilei**: “*Facts which at first seem improbable will, even on scant explanation, drop the cloak which has hidden them and stand forth in naked and simple beauty.*”
20. Although calculus is very important, physics is not to be confused with it. Calculus is a tool (but absolutely essential!), not your final goal. You should regard equations in physics as special statements about mechanism of our world; they are not at all abstract, and meaningless, mathematical statements.

In welcoming lines above, I have already made *life* and *physics* equivalent to each other. Therefore it seems appropriate to me close my words with another motto: “*Life (physics) is almost always easier than you think.*” But don’t forget that this doesn’t necessarily mean that life (physics) is easy! It’s my sincere hope that you will find physics fascinating, funny, and more interesting than ever.

H.O., February 2013

“Le savant n’étudie pas la nature parce que cela est utile; il l’étudie parce qu’il y prend plaisir et il y prend plaisir parce qu’elle est belle. Si la nature n’était pas belle, elle ne vaudrait pas la peine d’être connue, la vie ne vaudrait pas la peine d’être vécue.”

“The scientist does not study nature because it is useful; he studies it because he delights in it, and he delights in it because it is beautiful. If nature were not beautiful, it would not be worth knowing, and if nature were not worth knowing, life would not be worth living.”

Henri Poincaré