

Photocopy this and hand it out on the first class day.

# HOW TO SUCCEED IN PHYSICS—AND IN COLLEGE

## DAILY STUDYING

*Before class:* Read over everything that is likely to be discussed. Some topics will be confusing at first, but don't worry about it. Just note the areas that you have trouble with. This first reading can be fairly light.

*In class:* Stay alert, focused. It's not like watching TV. You must be actively involved, thinking, reacting. Always follow the meaning. Make a few brief notes, but don't let note-taking distract your focus. You've already read the book, so just highlight your book to indicate lecture topics that are in the book. For topics not in the book, take a few notes. Get into the lecture: answer the questions the teacher asks, visualize the ideas, think with the teacher. All of this works better if you have read the book in advance.

*After class:* Before the next class (before you start to forget the material), reread the book more carefully, perhaps taking notes on the main points and expanding (in writing) on those points. Focus your reading on the points covered in lecture, being sure you understand them. As you reread each section, answer the review questions (at the end of each chapter) for that section.

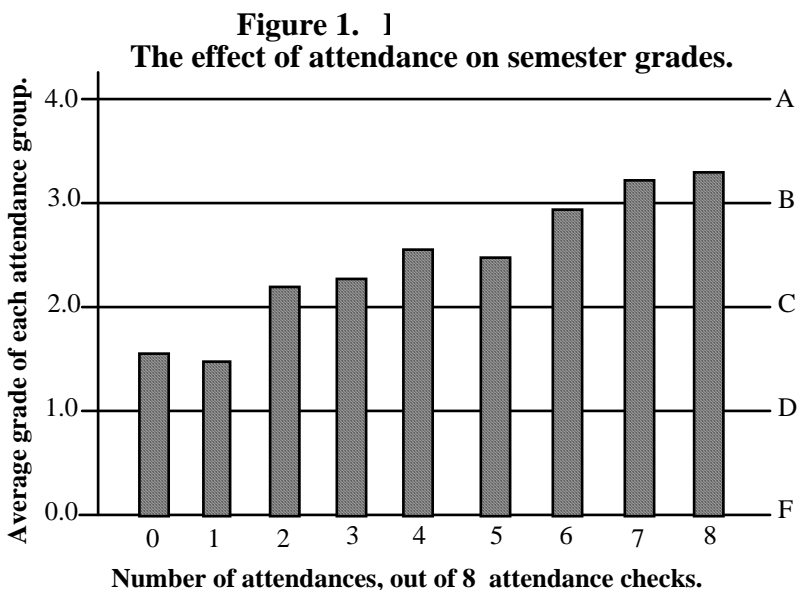
*Attend class:* This is the most important key to success. For example, during one typical semester at the author's university the average course grade-point of the high attenders was 3.13 (a B), while the average grade-point of the low attenders was 1.40 (D) (see Figure 1). For the high attenders, the grade distribution was very high (for instance, 42% got A's), while for low attenders the distribution was very low (see Figure 2). Good students will miss at most once or twice during the semester. If you miss more than three times, you should ask yourself if you are really serious about college.

*Write to learn:* As daily homework, keep a "journal" of the course. Here's how. Immediately following each class meeting, make a list of the most important points discussed. Some of these points may be found listed in the "checklist" at the end of each chapter, but some will not be found there, and some will not be found anywhere in the textbook. Next, write out a brief paragraph explaining each point clearly, and in your own words. For help, refer to the textbook, your class notes, and your classmates. Be sure to do this in your words: not the teacher's, and not the book's. There are many ways to express any particular idea. If you understand the idea, you will be able to explain it clearly in your own words. As each exam comes

along, you can use your journal for the bulk of your studying. But the main value of the journal is that simply writing the ideas down will clarify them.

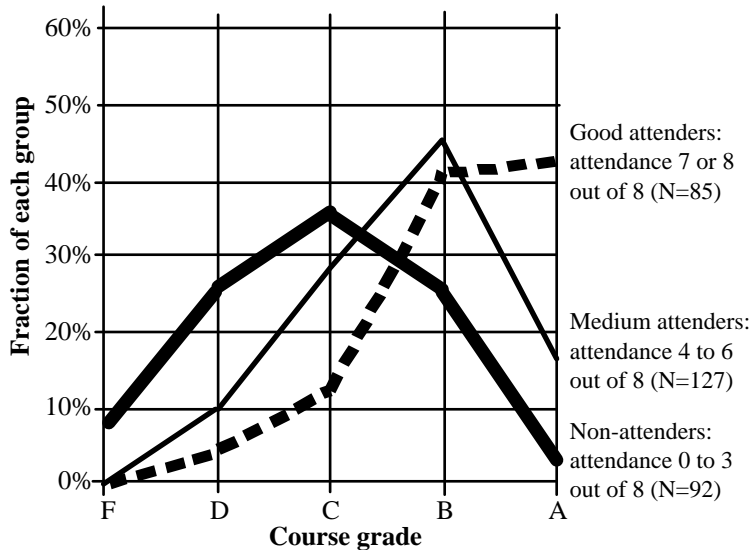
*It takes time.* A reasonable time allotment for a class such as this is two hours outside of class for every hour spent in class.

*How to develop real confidence.* The beginning of understanding is the willingness to question your own knowledge. Sometimes our ego will say to us "that's simple—I understand that," when actually we



don't understand. Physics often sounds simpler than it really is. You might believe that you understand the teacher's explanation of an idea, when actually all you have done is heard the words. Again, it's not like TV. Your mind must be actively engaged. Keep questioning your understanding, keep asking yourself questions, especially during your daily journal writing. Do you really, clearly, understand the ideas? As a test of your understanding of an idea, see if you can express it two or three different ways.

**Figure 2. ]**  
**The effect of attendance on grade distributions.**



## STUDYING FOR EXAMS

*Keep up daily.* Follow the suggested daily study method. If you have to do a lot of studying the last few days before an exam, you are already in trouble.

*Cramming,* especially on the night before the exam, is counterproductive. Even if you didn't keep up on daily work, don't cram. It causes confusion, panic, fatigue, and reduced confidence.

*Review* for a few hours, a day or two before the exam. Review from your journal, and by rereading parts of the book. A serious review session with classmates, based on your list of important topics in your journal, might help.

*Review session.* We will have one optional-attendance review session during a class period a few days before each hour exam. If there is sufficient demand, we will also have one other review session outside of class, probably in the evening. Review sessions are devoted entirely to your questions. During class or while studying, write down specific questions to ask. Be sure to speak up! Freshmen and transfer students are especially urged to come to review sessions, and to speak up.

*Studying from old exams* is not a wise use of your time. The textbook author has taken statistics and found that students who spend time studying old exams actually do worse than those who do not study old exams. Apparently, time spent on old exams would be more profitably spent on other forms of study.

*Just before the exam.* Don't study physics. Instead take a walk, talk to friends.

## TAKING EXAMS

*Stay loose.* Don't study physics just before the exam. Keep relaxed and do your best. That's all anybody can do. Beyond that, let the chips fall where they may. The feeling that you "must" make some particular grade will only hurt your grade. Aim for your best work, rather than for a particular grade. Good daily study habits will increase your confidence.

*Never skim* an exam. Do not look ahead at the questions that are coming. Skimming only reduces your confidence and concentration. Any answer given on the basis of quick reading will probably be wrong.

*Relaxed concentration* is the key to effective exam-taking. Clear your mind of everything except one exam question at a time. Forget the previous question, the coming question, your course grade, your personal life, etc., etc. For multiple-choice questions, read the question first (not the five possible answers), and ponder just that much. Then think over every one of the five possible answers. Take them all seriously, until you have finished all five. Don't jump to conclusions. Don't focus on any single answer until you have really considered all answers. Have you ever given a "stupid" answer, (i.e., one

you would have known was wrong if you had only stopped to think)? Stupid answers come from rushing. So slow down and think about all five choices. Make your best choice. Relax before moving on to the next question.

*Read the questions naturally but carefully*, just as you would read the textbook, or hear the lectures. Teachers put a lot of care into wording the questions in the most natural, direct, easily understood, and clear way. But scientific writing is not like street-corner conversation. The specifics, the details, are important. Most questions are about ideas, rather than about simple facts.

*Don't return to old questions*. Once you've decided on an answer, your decision should be final. Any rethinking is likely to be superficial and wrong. If you must return to an answered question, spend twice as long on it as you did the first time. Return only to those that you couldn't answer the first time. If you still can't decide, then guess between the plausible answers.

*Don't expect perfection*. Even the very best students will miss a few questions.

## ANXIETY

*Science anxiety* is common. Relax. For some of you, anxiety was caused by a teacher or parent who disliked or feared science, or by a parent or older sibling who “knew it all” and was critical of you. Relax. Anxiety is also caused by our public schools, especially grades K through 6, which teach so little science that students never become comfortable with it. Relax. The preceding advice about studying and exams will help increase your confidence and decrease your anxiety. Relax. When listening to the teacher, or writing in your journal, try to focus, calmly, on the specific ideas, especially the more quantitative ideas. Relax. You will find that scientific ideas are really just common sense, if you think about them carefully. As an exercise, be conscious of keeping your body (i.e., your muscles) relaxed while reading or writing or hearing or thinking physics. Notice any muscular tensions. Relax.

*Exam anxiety* will decrease if you follow the advice about exam-taking. Try concentration (or “meditation”) exercises before exams by concentrating fully on something insignificant: your own breathing, a dot in the middle of a blank page, a relaxing nonsense word such as “ohm.” On exams, focus on one question at a time. Relaxed awareness can overcome anxiety.

*You are responsible only to yourself* for your performance in this course. You aren't responsible to your parents, your friends, etc. Just do your best, and let that be enough.

## **OUTSIDE HELP**

Help is available on your campus to improve your academic performance. The information service on your campus should be able to guide you to helpful resources that can provide good advice about such issues as:

- Note taking
- Test-taking
- Listening
- Memory and concentration
- Time management
- Math anxiety, test anxiety
- Note taking

Help is also available on your campus to assist you with personal and psychological problems. Ask your campus information service about the following types of assistance:

- Emergency care
- Crisis intervention
- Short-term individual counseling
- Couples/family counseling
- Self-exploration groups
- Focus short-term groups
- Psychiatric evaluation and medication
- Consultation, referrals