How to Succeed in College Science

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"What can I do about my grade?" *This* is what you can do about your grade – starting *right now!*

When you attend college, you've accepted a new job: scholar. If you take your job seriously and give it the time and attention that a full-time career demands, you can succeed. Slack off, take the attitude that the professor should do all the work, or figure you'll just skate through the course because you took a similar course in high school, and you may be one of those pleading for a better grade at the end of the term. If you're ready to take charge of your grade, read on.

Active versus Passive Learning

What do you remember most about grade school? When asked this, most people recall field trips, school plays, or special hands-on activities. These are all examples of active learning. That you continue to remember them decades later demonstrates the power of active learning. When you use active learning, you switch from being a receiver of knowledge to being a seeker of knowledge, and even a creator of knowledge, and your learning skyrockets.

Picture a child watching a nature program on TV (passive learning) compared with a child outdoors, poking around in a pond with a stick (active learning). Both forms of learning convey information, but active learning is much better at fixing information into the child's memory. Both passive and active learning have their place. Listening to a lecture or watching a science-related movie exposes you to a lot of information in a short time, but the information may not "stick" or may not be easy to recall. Active learning takes much longer, but is much better at fixing the information firmly into your memory and makes retrieving the information easier. This, in fact, is why science classes have a laboratory component: lab allows you the time to explore concepts in a hands-on, active learning mode.

The more active learning methods you use as you study, the better you will learn the information. Sitting in class and listening to a lecture is passive learning. Copying notes from an overhead presentation is, surprisingly, far more passive than active, since it's easy to copy the words without forming any kind of understanding of them. Putting the lecture and the presentations into your own words is more active. You have to process the information and understand it enough to paraphrase it. Here are more ways to incorporate active learning into your study time:

- Read the assigned chapters before you come to class. You may not fully understand what you read, but you will have enough familiarity with the subject that lecture will help you make sense of the material. You will also be able to ask better questions in class. After class, go back and re-read the chapter. This time through, the chapter should make even more sense.
- Rather than just read your textbook from start to finish, interact with it.
    - Scan the chapter first to get a sense of what it is about. If there is a chapter summary at the end, try reading this first to get an overview of the chapter.
    - Read the section headings. Often they are in the form of a question or a summary statement. If they are in the form of a question, see if you can answer the question when you are done with that section.
    - Jot notes as you go. At the end of each section, try to summarize that section in your own words. Taking notes in your own words is much more effective than highlighting text.
    - Write down any important vocabulary terms. Keep a stack of vocabulary cards with the term on one side and a definition – again in your own words – on the back. You can flip through these in spare moments between classes to review terms.
    - If you're really having a tough time, try outlining the chapter in a word processor. Incorporate the information from your lecture notes and lab into the outline. This forces you to organize the information in your own mind and to link facts together.
    - If there are parts you don't understand, write down questions to ask in lecture, during office hours, or in a study group.
- Learn good note-taking skills. One effective form is the Cornell method. Divide your paper vertically into two columns. One column, taking up about 2/3 of the paper, is where you jot down notes during lecture, trying to **record** the lecture as fully and meaningfully as you can in your own words. The other column is for the other R's of note-taking: **reduce**, or summarize ideas into concise statements, which are cues for **reciting** (trying to restate the information from memory), **reflecting** (thinking about information to find the meaning and

connections in it, writing down questions about parts you don't yet understand, or relating the information to your own life), and **reviewing** (spending time each week paging through your notes to recall important points).

- Be curious enough to seek other sources of information beyond your textbook. For example, when studying genetics, a student can go to the internet and find many interactive sites for practicing genetics problems. You can look up articles online at ScienceNews or Scientific American, or subscribe to the EurekAlerts RSS feed, to find new studies related to the information you are learning.
- Get visual! Instead of summarizing in words, try to draw a picture of an important concept. Make concept maps to link facts together. Try to reproduce important diagrams from the text from memory.
- Get kinesthetic! Build models, such as cell models or molecular models, from simple materials. Push model chromosomes around to practice mitosis. Pretend you are a molecule in an important biological process and act out your role – in the privacy of your own room if you're shy!

Social Learning

Many people think of "studying" as something you do by yourself, staring at the textbook for hours on end. Yet educational research shows that social learning is a vital part of your education. By sharing ideas with others, you may confront prior ideas, encounter new ideas, or help others learn – which in turn helps you remember information.

Classes that include discussion or activities incorporate social learning. As you try to solve problems in lab, you must discuss your ideas with other people as you struggle to understand new information, and you may find that your group's collective knowledge is more powerful than each person's individual knowledge alone.

Study time can include social learning as well if you join a study group. To get the most out of your study group, try these workshop-style ideas:

- Agree that everyone in the group will attend class regularly. No one should be allowed to use the study group as a substitute for going to class.
- Rotate the responsibility of being the leader of the group. The leader should come in with the study agenda based on the most recent lectures, and everyone else should agree to stay on task.
- Keep the learning active. Study group activities could include making a concept map together, playing a "Jeopardy"-style game as a review, doing a jigsaw activity with chapter study questions (where each person is responsible for finding the answer to one or more questions and sharing it with the group), quizzing one another over vocabulary terms, tackling end-of-chapter questions together, acting out important processes, or taking turns teaching each other parts of the chapter.
- Allow a little social time at the beginning and end of each study session. It's healthy to "decompress" after working hard. Keep an eye on the clock, though, so that social time doesn't creep into study time.

Stay Organized and Informed

Every professor has a collection of "you won't believe what this student did" stories: the student who missed a mid-term because she hadn't been to class and didn't bother to keep her syllabus; the student who emailed the evening before a huge term paper was due to say he was having trouble starting the paper and finding resources; the student who hadn't turned in homework all term and on the last day of class said, "Oh, were we supposed to be turning those in?" Avoid being another "war story" by staying organized and informed. Here's how:

- Start with the syllabus. This should have all the important exam dates and assignment due dates for the class.
- Get a master calendar and mark all important dates for all of your classes. Then mark when you will begin writing papers and reviewing for exams. Intensive exam review should begin about a week before exams. Start planning your papers as soon as they are assigned, and give yourself deadlines for finding resources, making outlines, and writing your first draft.
- Keep all of your notes and assignments for each class in its own place. You might have separate notebooks or folders for each class. Establish a system to keep track of outgoing (assignments to turn in) and incoming (graded assignments). Keep all graded assignments in case there are errors in your professor's gradebook.
- If "someone" tells you something – the test is really next week, it's okay to skip lab, etc. – and that "someone" isn't your professor, check with your professor!
- If grades are posted during the term, check them and check often to be sure your records are correct.

Remember, professors don't "give" grades. The grade you are assigned is the grade you earn by your own efforts. Apply these study tips, and you'll improve your chances of earning the grade that you really want.