

How to Study for the Sciences

(presented each semester as a part of the University of Oklahoma, Student Learning Center's *Student Success Series*, <http://studentlearning.ou.edu>)

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As a full-time student, you spend about 15 hours a week in class, and you should spend at least 30 hours a week on homework and studying. How should you use those 45 hours a week?

ALWAYS:

- **Keep a calendar** and look ahead – lots of things happen at the same time in the semester, and you will need to pace yourself and plan.
- **Go to class.** It's much harder to learn from other people's notes than from your own.

BEFORE CLASS:

- **Skim** what's coming up in **the textbook**, so it's not all totally unfamiliar and you have some idea of what's coming.
- **Skim the previous day's notes**, so you can relate each lecture to what came before.

TAKING NOTES:

- **Take notes on everything**, except (perhaps) things your professor SPECIFICALLY says you don't have to know for an exam. If you only take notes on what "seems important," you run the risk that you will miss important material that didn't seem important in lecture.
- Write down the instructor's MESSAGE, which (a) may not be every word on the board/slide and (b) may be MORE than what is on the board/slide. Include sketches of the figures; they often contain important concepts.
- Use abbreviations to speed note-taking.
- Keep true to the instructor's outline structure (or create your own) so you can tell how each topic relates to the others. Otherwise everything seems like an isolated fact, making it very hard to learn.
- Make notes to yourself in the margins of your notes, indicating potential test questions or especially big ideas. Clues to potential test questions are material that your professor repeats several times, problems that your professor works in class, and statements like "I put this stuff on every test I ever write."

READING THE TEXTBOOK:

- Do not "just read" without thinking about what you are reading – that's "pretend studying"
- Study your textbook along with your notes – do they agree with each other? Do you understand the flow of the story? At the very least, annotate your notes with helpful ideas from the textbook; better yet, rewrite them in your own words (see below).

REWRITING YOUR NOTES:

- **Rewrite your notes** in your own words, incorporating useful information from the textbook. If you do not understand it well enough to rewrite it in your own words, make a note to ask your instructor as soon as you can.
- Why rewrite?
 - You are constructing knowledge as you are deciding how to rewrite your notes in your own words and integrate them with the text.

- Later material builds on earlier material. Taking time to study early pays off when you are trying to learn the material that comes later.
- Concepts that seem very clear in lecture become mysterious as time goes by. Keeping up with the material keeps it all fresh and makes it much easier to study for exams.
- Try to do this after every lecture if you can, or at least once a week. This is a great way to fill those 1-2 hour time slots between classes.

STUDYING FOR EXAMS:

- **Keep up** – study as you go along, because concepts build on each other. Each lecture will make a lot more sense if you understand everything that came before it. Also, your notes won't make sense if you wait for weeks to look at them.
- **Flash cards** can be helpful if they cover all the important things and if you use them correctly. They can also constitute “pretend studying” if you never use them to test your understanding or if you only use them to memorize vocabulary words.
- Don't be satisfied just by recognizing material or memorizing words; make sure you **UNDERSTAND the concepts**. Can you apply your new knowledge? Do you understand how each topic relates to the others? (Creating your own “concept map” is a good way to test this)
- Be smart about the way you use exams from previous semesters. It is not a good idea to look up the answers and then just study the answered questions. Instead, use old exams as “practice tests” that can tell you how well you know the material. After you have done your best, grade your exam and ask your instructor about concepts you don't understand. Study those areas you missed, and try again.
- Don't ignore the things you don't know and keep re-studying what you already know.
- Remember: *hope is not a strategy*. **Confront material you don't understand**. Think about it until you “get it,” ask your instructor, use available tutoring services. Do whatever it takes. Hoping that it won't be on the test doesn't work!

AFTER THE EXAM:

- Which questions did you miss, and why? Did you not study enough? Did you study the wrong things? Did you avoid studying the things you did not understand? Did you make poor assumptions about what your instructor would ask?
- How could you study differently next time to improve your score?

BEWARE OF “PRETEND STUDYING”

- “Pretend studying” is anything you do that looks like studying but does not require your brain's active involvement.
- Examples include highlighting the text, “flipping through” your notes or book, making the world's most beautiful flashcards, “reading” while watching TV or listening to your favorite music ... you can probably add your own.

ESCAPE DISTRACTIONS

- Find a quiet place where you can study without distractions.
- **Turn off your phone** so that calls and text messages don't interrupt your thoughts.
- During time you have set aside to study, don't even open Facebook and other online attractions, not even for “just a minute.” Those minutes can easily turn into hours of lost time.
- If you study with friends, be sure you are staying on task. **Make concept maps** together, quiz each other on your flashcards, ask each other questions, and figure out what you don't understand. But some “study partners” are more of a distraction than a help.