

# Study Strategies that Work: Advice from Bucknell Student Tutors to Clients in Calculus, Chemistry, Biology and Physics

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Writing Center Tutoring Program, Spring 2005

## **From biology tutors:**

Meet with two or three other classmates a few nights before an exam. Go chronologically through notes to make sure everyone's notes are comprehensive and consistent. Later, study on your own and/or contact your professor or tutor about weak areas. (Note: before forming study groups, it's a good idea to check with the professor to make sure that group study and sharing of notes are permitted.)

Making flash cards for key concepts is usually very helpful.

Study your old tests, or tests from previous years if the professor makes them available.

Try to go over lab concepts because those are usually tested as well, and many people forget that; lab concepts also help with understanding the course material better.

Draw diagrams of mechanisms (chemical and biological). Make note cards of things that need memorizing.

## **From chemistry tutors:**

Go over old tests and quizzes. Redo worksheets multiple times. Make flash cards for reagents, reactants, and products of certain reaction types.

When taking tests, go through and do the ones you're sure of. Skip hard or extra-long problems and then go back.

Use the problems on earlier sections of the test to help you. Specifically for organic chemistry: If you can't remember certain reagents for a synthesis problem, chances are they were listed previously on a reaction section of the test.

Model kits can be useful for some concepts (stereochemistry).

When preparing to study, obtain a piece of computer paper (or something without lines) and try to map out the chapters on the quiz or exam. This will help you see the big concepts. Then refer to the text and notes to fill in the blanks. When it is done, it works as a great study guide.

Instead of note cards, pieces of computer paper can be used. This allows you to write larger reactions (in organic chemistry, especially) on one page. Be careful not to put too much on each page, however.

Do NOT fall behind! Use books, friends, and professors for clarification.

Take good, legible notes.

Do not "cram" or overstudy.

On exams, find a problem you know you can do and work from there. Time is usually an issue with organic chem. exams, and it helps to build your confidence if you know you can do at least one of the problems. It helps to get your mind focused and makes the rest of the exam seem more possible.

Write things that must be memorized (formulas, reaction mechanisms, definitions) on a note card, or multiple note cards if you have a lot, and carry them around with you. This way, if you have, say ten or fifteen minutes between classes or before practice, you can look over what needs to be studied easily. The more you look at something, the more ingrained it becomes in your memory.

## **From calculus tutors:**

Make a formula sheet/definition sheet for every test and use it to review.

Practicing problems is always a great way to prepare for tests.

Always ask questions.

Write formulas down on top of homework page or to begin every problem.

Take small steps. Don't rush through the math.

Continue to do problems from the text until you feel comfortable with them and do not need to look at an example when studying.

For homework: Look at examples in the text and from notes or try a problem with the answer in the back to see if you've got the concept down.

#### **Tutors' advice for calculus or physics:**

DO EXTRA PROBLEMS. If the professor assigns problems that aren't graded, doing these extra problems is the best way to get a better understanding of the material and to figure out what you don't totally understand.

Keep up with work. If you fall behind, you'll have even more trouble understanding the new material.

Go over graded assignments and make sure you understand where and why you made errors.

Try explaining concepts to someone else.

#### **Advice for all subjects:**

Read material that will be covered in class before you go and then read again after class.

Take a few minutes after class to write a synopsis of what was just covered—this keeps your brain thinking and helps you to remember long term, since it is fresh in your mind and sort of a review.

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#### **Additional comments from Bucknell professors:**

"Everything on the list [above] is good, but I'd like to add something about the advantage of studying in groups. Some students tend to think that you are supposed to lock yourself alone in a room and stare at the book until you 'get it,' and this just doesn't work in general, no matter how hard you try or how many hours you put in. [Studies have shown that when] students turn the study of math, for example, into a social activity which is done in groups, this is a much more effective and efficient way to study." --**Prof. Martin Ligare, Physics**

When studying for a test, "don't just read over the problems. *Do* them." --**Prof. Pam Gorkin, Mathematics**

"Don't waste your time erasing—draw a line through [the mistake] and move on." --**Prof. Dee Casteel, Chemistry**

"Don't look at the answer in the back of the book until you have your own answer." Also, "avoid shortcuts. The people who do the worst are the ones who do things quickly." --**Prof. Tom Solomon, Physics**

1) I totally concur with [Prof. Ligare's] comments about working with others. Research shows that we learn most when we verbalize with others and discuss what we are thinking. Most students learn most by "teaching" to others.

2) Develop the habit of analyzing the [test] question by asking yourself: "Why is this question being asked of me?" Or in other words, "what is this question testing me on and why is it important?" I think it's important for students to [see for themselves] how all of these concepts and procedures are related--many questions only look at a little bit of the puzzle, and if you don't step back and ask more global questions, you never see the big picture. Along with this, develop the skill of guessing what you think will be on the test--both the types of questions and the concepts. Say to yourself, "If I were the teacher, it would seem to me that xx would be very important to test." Make a list--run it past your tutor, then the instructor.

--**Prof. M. Lynn Breyfogle, Mathematics**