GENERAL INFORMATION

- Doing well in college science classes requires a minimum of 2-3 hours work outside of class for each hour you are in lecture. For a 3-unit class, that's 6-9 hours of reading, studying, and homework each week! Many high school students were able to do well in their science classes without putting in very much time studying, so the transition to college classes and expectations can be a huge problem for students.

- To fit in all the things that are important to you as a busy college student, it is crucial to have a strong time management plan. If you don't already have one, make a time management plan using the *"Time management worksheet."* The worksheet is available at www.csus.edu/indiv/p/paradisj/studyskills.htm

- Make daily, weekly and semester "to do" lists. "To do" lists can ensure (1) you prioritize your tasks, (2) you accomplish everything you need to, (3) you make it to all your appointments and classes, and (4) you plan ahead and break down large projects into small assignments with periodic deadlines.

- When you are scheduling your time for the Steps described in this *"Science Study Skills Cycle,"* block out time in 30 – 60 minute chunks. This is much more effective than trying to "study for 4 hours." It gives your brain a chance to rest and process what you have been working on.

- Keep all your course materials organized in a 3-ring binder. Many students keep their notes in one section, their worksheets in another section, and their exams in another section…however, it might make more sense to keep your binder organized by topic so that all of your notes, practice, homework, and exams for a given topic are in the same section. For example, hole-punch your exams and put them in your binder right after the lecture notes that were covered on that exam. This makes it easier later to find all of your related materials when you are studying.

- Scientific research indicates that our brains are not designed to multi-task. If you are studying, make that your sole focus during that time. Find a quiet spot without distractions and turn off the television, close *facebook*, and wait until you're done studying to read those *tweets*.

- Get enough sleep so that you can stay alert during lecture. Falling asleep in the front row wastes your time and might offend your professor.

- Never miss lecture. If you have an absolute emergency and must miss lecture, email your instructor so he or she knows that you take being absent seriously and will work hard to catch up. Keep up with missed readings and homework as best you can and be sure to get the missed notes from at least 2 students when you return to class. After you are all caught up, follow up with your instructor during office hours to clarify any remaining questions about the missed material.

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STEP 1: BEFORE LECTURE

- Review material from previous lecture. Get any questions answered. You can't build a strong house on a weak foundation. If you don't understand preceding content how can you learn new concepts that build on that earlier content?

- Read the assigned textbook sections and take notes. Follow the directions outlined in "*Taking notes during pre-lecture reading of a science textbook*" handout. The handout is available at www.csus.edu/indiv/p/paradisj/studyskills.htm

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STEP 2: DURING LECTURE

- If possible, get to lecture 5 – 10 minutes early. Skim over the important points from the previous class. Also skim the notes you took while reading the textbook in preparation for that day's lecture. This will provide you with a context for where the class is as well as remind you what you found confusing in the textbook reading.

- Take careful notes using the right-hand page. Don't cram your notes together, leave 1-2 spaces between lines so that you can go back and add information (see below). Also leave the left-hand page blank for now (see below).

- Be active during lecture: work on questions that the professor asks you to (this is your chance to see if you understand the material) and ask questions when you have them (this gets your questions answered and also gives your instructor feedback about whether the class as a whole understands the material).

STEP 3: ASAP AFTER LECTURE (IDEALLY WITHIN 1-2 HOURS)

- If your notes are particularly messy, consider rewriting them at this point. You could also type them up, though that can be hard in science classes which might have a lot of drawings and calculations.

- Fill in any gaps in your notes based on additional things you remember from lecture. Here is your chance to write down things that your instructor said, but that you didn't write down in class. This is the first step in turning what are, for the typical student, poor notes into excellent resources to help you learn the material. Two heads are better than one on this, so work on your notes with a classmate right after class if possible. Identify important (!) or confusing (?) information and things you feel you understand (√).

- Hide the work/answers and repeat any problems done in lecture. Typically it "all made sense" when your instructor was going through the material…the question is, can you do it on your own now? Write clarifying notes next to these problems explaining any difficult steps or confusing ideas.

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STEP 4: BEFORE THE NEXT LECTURE

- Use the blank left-hand page in your notebook to annotate your notes:
    - Fill in gaps or confusing parts of your notes as you carefully re-read the assigned text. Unlike the reading you did before lecture, now you are reading for real understanding. Pay careful attention to areas that your instructor stressed during lecture. Be sure you can understand any graphs or charts that the author has provided.
    - Do problems worked out by the author in the body of the chapter. Some textbooks also have worked out problems at the end of each chapter (just before the homework section).
    - Get remaining questions answered ASAP. Study groups and office hours can be good for this.
- Complete the assigned homework:
    - Begin by treating your homework as the learning and self-testing opportunity that it is meant to be. Students who rush through their homework to get it done or who treat it as though it were busy-work are missing out on the true purpose of homework.
    - Close your book/notes, work alone, find a quiet space without distractions, and time yourself (How much could you do in a 50-minute test period?) If you have done a good job annotating your notes, you should already understand the material enough to do the homework as a self-testing. If you start the homework and feel lost or overwhelmed, go back to your lecture notes and textbook reading and work on them some more before trying the homework again.
    - If any problems give you trouble: (1) see if there are similar ones worked out in lecture or done by the textbook author that can be used as an example; (2) find and do extra of the type of problem with which you had the trouble. Some textbooks provide you with an additional homework problem that matches each of the assigned homework problems.
    - Get questions answered ASAP. Study groups and office hours can be good for this.
- Continue cycling through Steps 1-4. Move on to Step 5 about 1 week before each test.

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STEP 5: REVIEW BEFORE THE TEST
(STARTING ABOUT 1 WEEK BEFORE EACH TEST)

- By this point you should have already learned most of the material, struggled through the difficult concepts, and gotten most of your questions answered. The purpose of reviewing before the test is to make sure that all of the concepts are fresh in your mind and that any last minute questions are addressed.

- Read over your notes (from textbook and class). Note topics that were stressed and make sure you are comfortable with them.

- Redo problems from lecture and homework (closed book/notes, work alone, quiet space without distractions, and time yourself). Identify the type of problem you are still getting wrong and get more practice/help with them. Study groups and office hours can be good for clarifying any problems you still have.

- Take any provided practice exam (closed book/notes, work alone, quiet space without distractions, and time yourself). For even more practice, consider making a practice exam from a selection of lecture, homework, and quiz problems. Study groups can be good for making/sharing practice exams. Take the practice exam (closed book/notes, work alone, quiet space, and time yourself). Get help with any problems you couldn't do. Study groups and office hours can be good for this.

- Never try to cram the night before an exam. Show up to the test well-rested.

- It is important to note that students who work with this *Science Study Skills Cycle* find that their emphasis shifts from "passing the tests" to "learning the material." In fact, if you come to class prepared, annotate your notes, approach your homework as a learning opportunity, and get your questions answered as soon as they arise, you will find that you don't need to dedicate very much time to what you used to call "studying."

STEP 6: AFTER THE TEST

- Complete the "*Exam correction worksheet: Learning from your mistakes*" for all the questions you got wrong. Also, highlight these problem areas in your notes and write clarifying notations and explanations. When you are done, check the posted answer key to make sure your answers are now correct. The exam correction worksheet is available at www.csus.edu/indiv/p/paradisj/studyskills.htm

- Get unresolved problems answered ASAP. Study groups and office hours can be good for this.

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FINAL COMMENTS

- The *Science Study Skills Cycle* is not meant to be a rigid system, so feel free to make it your own. Every part of the *Cycle* may not apply to every one of your classes, so use the parts that work for you and your classes and modify those that don't fit your learning style or your particular course work.

- As you begin working with the *Cycle*, it is best to start out small. Choose 1-2 suggestions to try each semester and really focus on incorporating those suggestions until they become a natural part of your study habits. Once you are comfortable with your new skills, you can add a few more ideas from the *Cycle*.

- As with any complex skill (like playing the piano, learning a new language, or playing basketball), developing strong study skills takes practice. You are trying to change years of previous habits and you might not see any huge payoff right away, so don't give up! This study skills *Cycle* has been based on observing thousands of science students and represents a synthesis of their best study skills practices. Remember doing what good students do will make you a good student too!

- The hard work that it takes to do well in your college science courses will be a lot more manageable if you have a clear, motivating goal for yourself. In other words, it will be a lot easier to focus on your homework on a Thursday night when your friends are going out IF you know why your studies are so important to you. So, figure out why you are in college studying science. If you realize that in fact, studying science isn't for you, college is the perfect time to explore other options and to figure out where your passions lie.

- Use the "*Identify your learning style"* handout. (The handout is available at www.csus.edu/indiv/p/paradisj/studyskills.htm). Understanding your learning style can make you a more effective student and can help in other areas of your life too!

- Don't be afraid to ask for help. You aren't alone in this… there are a lot of people and organizations on campus that are rooting for you and want to help you succeed. To get started, go to www.csus.edu/experience/student-success/academic-support/ and explore the site to see all the support services that are available to you free, as a SacState student.

Good Luck!!!