I’ve seen many students put in a lot of time into math courses and still feel that they haven’t mastered the material. Often, they aren’t directing their energies as efficiently as they could. Here’s my advice for how to work smarter and succeed in this course. Some of these suggestions will require a little more time at first, since they require approaching the material a bit differently. But in the long run applying this method will consume less time and lead to better comprehension.

I) Class time
   a. **Turn off your phone.** Do not read text messages. Do not write text messages. Replying immediately to the boy or girl you like makes you look desperate and is more likely to lead to your failure with them as well as with this class. Reading the message “I H8 U” is just going to disturb and frustrate you until the end of class. Better not to see it until after class when you can do something about it. Concentrate on the class now so you don’t have to spend time trying to learn what was covered in class later.
   b. **Keep a complete set of notes.** As you write down notes, try to make sense of everything you’re writing down. If you can’t, or are beginning to get behind, either ask me a question or put a “?” in pencil on the margin next to anything that doesn’t make sense and move on. In each class there will be moments when I don’t talk about class material. This is intended to be time used as either a mental breather or to catch up. If you have “?”s, see if you can resolve these issues during these breaks. Even if you can’t resolve the “?”s, you might be able to form a good question about it. Feel free to ask your question, even if it’s about material that we covered a number of minutes before.

II) Homework
   a. **Start the homework on the day that the lecture was presented.** Find a place you can concentrate.
   b. **Read your notes before working on the homework.** In particular try to understand any parts of the notes that have “?”s. Erase the “?”s if you understand the idea. If not, move on to the homework.
   c. **Do not look at the book examples while doing the homework except as a last resort.** If you start by looking at examples, you undercut all the conceptual aspects of the problem and don’t develop the ability to think independently. The homework problems will then seem like a bunch of disconnected algorithms, and you’ll spend massive amounts of time before tests being overwhelmed by all the supposedly different problems you “need to memorize”. Worse, since the tests are designed to test your understanding of the concepts, not just your ability to spew homework algorithms, you will have real difficulty answering questions involving new applications of concepts or involving combining different concepts. So you’ve spent a lot of time and performed poorly, which is painful for you and, honestly, painful for me too. Instead:
i. Try to work towards the answer step by step as independently as possible. Try to minimize things like looking at book examples, starting with the answer in the back and working backwards from it, or working with others early in the process or as soon as you run into any roadblock.

ii. If you’re uncertain about an algebra or trig property, try to use an example to clarify, instead of guessing. For example, if you’re unsure if $e^{x+y} = e^x e^y$, don’t just guess it is and move on. Try plugging in, say, $x=2$ and $y=3$ and then, since both sides clearly equal $e^{ee}$, you’re pretty confident this is true! Now look back and reinforce this formula so that next time, you’re more likely to have internalized it. No one remembers all of their high school algebra and trig. This will help you relearn it.

iii. If you have two ideas for how to approach a problem and, after a couple of minutes of thought, are really unsure which way is right, work through one way and then look at the answer in the back of the book if possible. If you’re wrong, try the other way. See if you can get to the correct answer by yourself. If you can’t and you’ve worked on the problem for 15+ minutes, then you might look through the examples for a hint (but use them as little as possible.) You might also want to ask a classmate, a tutor or me about the problem. Since you started the homework on the day the material was presented, you will have enough time to ask questions before the homework is due. Even if the homework has already been turned in, you should ask about anything that doesn’t make sense.

iv. Once you have the right answer, do not immediately move on to the next problem. Try to understand why it was right and why any other ideas you had entertained were wrong. This reinforces the right idea so that you don’t go down the wrong path the next time. This takes very little time and you will learn as much from doing this as you did from all the time working on the problem up to this point.

v. At the end of the homework, ask yourself how different the problems were from each other. In general, you should feel there were maybe one or two concepts with some small variations. If you feel there were four or more types of problems that seem only vaguely related, you’re likely not seeing the material from the conceptual angle that you need to excel in this and later classes. See me during office hours.

vi. If you had any “?” still in your notes, reread them and see if you can make sense of them now that you’ve done the homework. If you can’t, you should ask me about them (or at very least ask a tutor or classmate).
III) Exams

a. **Outline the course.** I usually do this for you before exams. The outline should contain no more than one line per day of class. The one line contains the one or two concepts that the homework stressed. When you have an exam problem, you want to determine which days of material are relevant, so having this overview becomes crucial.

b. **Read the notes again.** This allows you to link concepts between days. The class is intended to flow so that one day’s ideas connect to the next day’s like a story. This is where you connect ideas in your brain and realize that the course actually requires memorizing very little.

c. Go through some homework problems again. You might pair up with a classmate and take turns yanking random problems for each other. The goal of this is to get used to not knowing from which section the questions originate. **You should definitely be able to answer any of the questions from any section.** The test will not only ask these, but also questions that go further than the homework in linking concepts in new ways. If you don’t have the homework down solid, you will have a hard time passing the course.

d. If you’re in Math 11-14: Only **after** doing a-d, you might try some practice problems at [http://math.scu.edu/~dostrov/CalcPractice.html](http://math.scu.edu/~dostrov/CalcPractice.html). These problems were written by Ed Schaefer; they are **not** indicative of the problems I will ask, but they’re good to chew on since you haven’t seen them yet. You might also try to do new problems from the sections on which you’ll be tested or some of the miscellaneous problems, if they exist, at the end of the chapter.

e. **Reread the notes one final time.** It won’t take long and, again, you’ll connect more concepts since you’ve just looked over so many problems.

f. If you have to choose between cramming and sleeping on the night before the exam, choose sleep. You’re better off having a sharp mind with some correct ideas than a tired mind awkwardly crammed with too much. And, yes, Red Bull gives you wings, but remember that those getting wings have typically just died, which is exactly what you don’t want in this class.

IV) For additional ideas: Because the Drahmann Center loves you, they have compiled an entire website devoted to helping you study better: [http://www.scu.edu/advising/learning стратегий.cfm](http://www.scu.edu/advising/learning стратегий.cfm)

Note, in particular, there is a section on “Math Study Skills”.