Welcome to Mathematics 119, Fall 2012
Calculus I

Course Orientation and Syllabus

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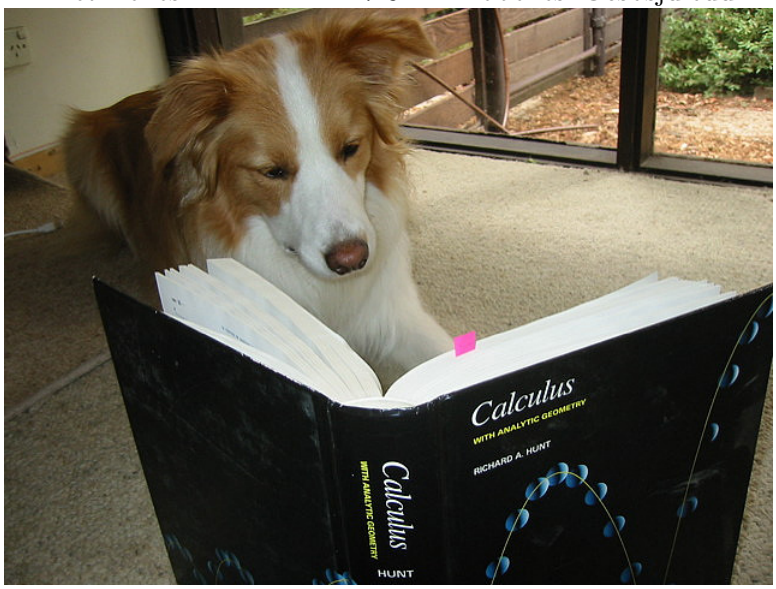

1 Office Hours

None regularly scheduled. However, I encourage you to schedule appointments with me as needed—I am always happy to arrange a time to meet with a student. My schedule changes a lot, and I have found that I need a process to make sure that everything goes smoothly. Here is the process for setting up a meeting:

1. Email me with a list of days and times when you can meet.
2. I will email a time that works for both of us.
3. We meet at that time.

Additionally, you can drop by my office if you are near. In this case, I am not guaranteed to be free to meet, but I often will be.

2 Contacting Bret

Email is by far the best way to reach Bret. I am planning on checking my email in the morning and the afternoon only, but I promise to reply to your emails promptly (this policy is to keep me productive—I want to intentionally limit the amount of time I spend online so that I can do other things during the day).

3 Online resources

- There is a Moodle page for this course. Seek it out; read it often. Like every day after class.
- I have a weblog on teaching and research: `http://symmetricblog.wordpress.com`. Many of the posts will be about this course. Feel free to read and comment if you are interest in learning about the thinking that goes into this course.

- I am on Twitter (bretbenesh). I use this to discuss teaching and mathematics (mostly).
- I am on Facebook and Google Plus. Note that I do not actively friend students, although I happily accept friend requests from students (and I hold no grudges against those who do not friend me). Think, however, about whether you would want me, a professor, to see your status updates and posted pictures before friending me.

4 Textbook and Reading

We will be using *Calculus* by Jon Rogawski. You may find it helpful to bring the textbook with you to class for the first half of the semester.

5 Other Recommended Materials

The (free) computer program Sage (www.sagemath.org) will be a useful tool in learning this material. There is a web-based version, but you can download it if you like. Otherwise, Mathematica may be helpful at times.

6 One Type of Typical Class

A sad fact of life is that there is not enough time to do everything one wants to do in one class. Yet most topics require that one start by learning easier material relating to the topic before progressing to the more difficult material. Because of this, a teacher needs to make a choice:

1. Either introduce a topic in class, do some of the easier work in class, and leave the harder work for the students to do at home, or
2. Figure out a way for the students to do the easier work at home before class and use classtime to do the harder work.

We are opting for the latter. Do so this, we will employ online lectures to be done at home. So here is a rough outline of one type of a typical class (another flavor of class will be described in a different section below):

1. At home, read the designated section(s) of the textbook, making note of any questions that you have about the reading.
2. Answer the reading questions to the course Moodle page. You will normally have to answer, "What did you find difficult or confusing about this section? Please be specific." I will use your questions to create a plan for the next class. These questions should be done by 2 am on the night before the next class.
3. Come to class.
4. We will usually start with "clicker questions" about the reading. I will create the questions to help answer the reading questions you submitted.
5. Meet with your base teams (5 minutes—"base teams" will be explained later).
6. Work on problems relating to that chapter in teams.
7. Go home.
8. Repeat.

<u>Base teams:</u> You will start each day by meeting with your base team. Here, you will greet your teammates, discuss how each team member did with the lecture/reading, and review your team's goals.

7 A note on reading the textbook

> **Don't just read it; fight it!** Ask your own questions, look for your own examples, discover your own proofs. Is the hypothesis necessary? Is the converse true? What happens in the classical special case? What about the degenerate cases? Where does the proof use the hypothesis?
>
> -Paul Halmos

Reading any sort of technical writing is different from reading something like a novel or *Cosmopolitan*. For one, it will take you longer to read one page of mathematics than it will for you to read one page of a novel or magazine article.

Here are some tips to help you read mathematics more easily:

1. As stated before, go slowly.
2. Focus—do not read while watching television/listening to music/checking email. Studies show that *no one* does better while multi-tasking (a lot of people *think* they do better while multitasking, but they are all wrong).
3. Read with paper and a pencil. Write you you need to understand a statement. Sometimes this means seeing how the statement relates to a concrete example, and sometimes this means literally writing down exactly what is in the book to help you focus on it.
4. Be active ("Fight it!"). Ask questions of the textbook, and see if you can answer them yourself. See how statements relate to concrete examples. Summarize in your own words.
5. Do not skim. Much of what we read contains filler that is not essential to read in order to understand the main point. This is not so in mathematics—almost every word is important.
6. Re-read, both when you are first reading (go back over what you did not understand), and also re-read a couple of days later.

8 Course Pacing

We will move quickly through the textbook in the first half of the semester. The reason for this is that I only need you to get an intuitive idea of the material and an idea of the "big picture." The deep understanding will come from working through the material on your own (see below).

This also has the advantage of seeing the material multiple times. Most mathematics is difficult to understand the first time through, but it is easier the second time. You will see most of the material 2-3 times this semester, and it will get easier each time.

9 Cooperative Learning

Several of the policies of this course have been set up to promote *cooperative learning* (as opposed to competitive or individual learning). This may differ from what you are used to, so I will provide a brief explanation as to why these policies are in place.

1. The research from the past 115 years overwhelmingly shows that students learn more in cooperative environments than individual environments, which seem to be the norm at most colleges. Cooperative learning does even better when compared to competitive rather than individual learning.
2. The research shows that the vast majority of students who have had true cooperative learning experiences overwhelmingly prefer those experiences to individual or competitive experiences.

3. Cooperative learning is in keeping with the Benedictine values of this school. “We seek the common good...We integrate a commitment to the common good with respect for the individual...We call the community together for counsel to make decisions.”

Your “base teams” are the main people you will be “cooperating” with.

10 A second flavor typical day

The other type of class we will have is a “Presentation” class. You will be given a list of problems to do (the “course notes”), you will do many of them, and then you will have an opportunity to present them in class. This will be the bulk of your homework, which leads us into the next section.

10.1 The goal

You do not become strong by watching people lift weights, you do not become a good piano player by listening to good music, and you do not learn how to shoot free throws by watching a basketball game. Similarly, you do not learn mathematics by watching someone else do mathematics. You will be doing a lot of the mathematics in this course.

Moreover, I want you to start developing a “producer” (rather than “consumer”) mindset. We need more people who produce new knowledge, art, and ideas. You will be producing mathematics in this course, and I expect that many of you will have moments of pure joy when you finally understand something thoroughly. I hope you get addicted to that feeling and carry it with you when you graduate from CSBSJU. (You will also be consuming mathematics—see the first flavor of typical class).

10.2 The attitude

Doing problems is hard. You should not expect to get problems immediately. But with enough effort, you *will* get some of the solutions. This is why everyone in this class is expected to read the textbook and the course notes, write up good proofs, present proofs, participate in discussions about the presented proofs, be creative, and be supportive.

Finally, here is some advice:

Closing Remarks

(Adopted from pages 202-203 of The Moore Method: A Pathway to Learner-Centered Instruction by C.A Coppin, W.T. Mahavier, E.L. May, and G.E. Parker, quote stolen from Professor Dana Ernst)

> There are two ways to approach this class. The first is to jump right in and start wrestling with the material. The second is to say, ”I’ll wait and see how this works and then see if I like it and put some problems on the board later in the semester after I catch on.” The second approach isn’t such a good idea. If you try every night to do the problems, then either you will get a problem (Shazaam!) and be able to put it on the board with pride or you will struggle with the problem, learn a lot in your struggle, and then watch someone else put it on the board. When this person puts it up you will be able to ask questions that help you and the others understand it, as you say to yourself, ”Ahhh, now I see where I went wrong and now I can do this one and a few more for the next class.” If you do not try problems each night, then you will watch the student put the problem on the board, but perhaps will not quite catch all the details and then when you study for the exams or try the next problems you will have only a loose idea of how to tackle such problems. And then the anxiety will build and build and build. So, take a guess what I recommend that you do.

10.3 Ground rules

You can use your textbook, your Math 119 classmates, and me as a resource. Please do not consult other people, textbooks, or the internet about any of these problems.

To be clear, you are welcome (*encouraged,* even) to work with other Math 119 students on the problems. However, all presentations will be done individually, and all write ups *must* be done individually. I recommend working together to solve the problem, but write up the solution after you split with your partner. You can compare again after you have written up your respective solutions (and repeat the process). But every word that you write should be your own: there should be no copying or cutting-and-pasting. Doing so would be a violation of the school's plagiarism policy, and will be treated as such.

There may be times when the solution to a problem in the course notes can be found in the textbook. I would recommend that you first try to solve it on your own. If you cannot, you can look at the solution in the text. However, in order to present it well, you will need to thoroughly understand it; it will be clear from the presentations if someone truly understands the solution.

11 Skills quizzes

In labs, you will be regularly given a quiz. The each quiz question will be on one of the following Skills:

- Graphs of functions
- Shifting and scaling functions
- Trigonometry
- Limits
- Definition of derivative
- Derivative—symbolic (1-5)
- Derivative—symbolic (6-10)
- Finding tangent lines
- Second derivatives, concavity, inflection points
- Linear approximation
- Finding and classifying extrema
- Computing integrals (1-5)
- Computing integrals (6-10)
- The Fundamental Theorem of Calculus II

You must correctly answer (completely—negative signs and all) four questions from each Skill over the course of the semester. There is no penalty for getting a question on a quiz wrong, but you will eventually need to get four correct questions by the end of the semester. I will guarantee that you will see each type of question eight times, if needed. You may see a Skill more times than that, but I am not guaranteeing it.

To practice these, I suggest that you do the odd problems from the textbook (since the odd questions have the answers in the back of the book). Another excellent way to study for the quizzes is to make up problems on your own (they will be pretty standard) and check your answers using Wolfram Alpha (`www.wolframalpha.com`).

12 Examinations

There will be a take-home exam at the end of the semester. The take-home exam will contain mostly problems that were not solved from the presentations (see below).

13 Presentations and Homework

The basic idea is this:

1. I will assign problems for the Presentation Day.
2. You will do as many as you can.
3. If you feel that you have made significant work on your problem, you will write up your solution neatly (in complete sentences, etc), determine how to present it so that your classmates will understand your work, practice your presentation, and let me know (via Moodle) that you are ready to present the problem the night before Presentation Day.
4. On Presentation Day, I will select one person to present from the people who are done with each problem. I will usually select the person who has presented least.
5. That student will present his/her solution (you will use "notes," which means that you will write up the solution nicely so that the other students will easily understand the solution). Your audience is the set of 348 students, not me.
6. The class (and I) will determine if the solution is correct. If not, the presenting student will have an opportunity to fix the solution. If he/she cannot, another student will be given the chance to present.
7. We move to the next assigned problem.

14 Semester Grading

There will be several components to your semester grade:

- Skill Quizzes
- Presentations
- Final exam

If you complete the Skill Quizzes, you will be guaranteed at least a C for the course. If you do not, then the best grade you can get is a CD.

You will receive a letter grade for the final exam. This grade will be calculated by the points you receive on your exam (i.e. "the usual way").

You will receive a letter grade for presentations based on both the quality and quantity of your presentations. Someone who does 100 easy problems may not necessarily get a better grade than someone who does 10 challenging problems. Here is a rough idea of how this letter grade will be assigned:

D You attended every class, paid attention, and tried (mostly unsuccessfully) to present at least a few times.

C You fulfilled the requirements for a D, and you had a few successful presentations.

B You fulfilled the requirements for a C, and you had many successful presentations.

A You fulfilled the requirements for a B, and you had many successful presentations of difficult problems.

Then here is how your semester grade will be determined:

C You got four correct answers for each Skill on the Skills Quizzes

B You fulfilled the requirements for a C, and you exam and presentation grades average to a B.

A You fulfilled the requirements for a C, and you exam and presentation grades average to a A.

15 Disabilities Requiring Accommodation

If you require accommodations or assistance for a documented disability, please contact Bret as soon as possible. It is best to do this well in advance of the first exam so that we can make whatever arrangements are needed.