AMS/ECON11B: Mathematical Methods for Economics II

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Office hours
Monday 11:30-12:30 in BE 160
Tuesday 2:00-3:00 in BE 160 & 6:00-7:00 pm in BE 160
Wednesday 12:00-1:00 in BE 160
Thursday 2:45-3:45 in BE 145
Friday 12:30-1:30 in BE 145

Overview of the Course
This course is a continuation of AMS/ECON 11A, covering differential calculus in several variables and integral calculus in one variable.

We begin with differential calculus for functions of several variables. We study partial derivatives, their interpretations and applications including elasticity and Taylor approximation. Finally, we look at optimization in several variables, both with and without constraints, the `envelope theorem' and study applications to economics.

The study of integral calculus begins with anti-differentiation and the indefinite integral, with elementary initial value problems as motivation. You will see that although differentiation is a science, integration is more of an art.

Finally, we'll learn about the definite integral, the fundamental theorem of calculus and see how to apply definite integrals to compute area, consumers' and producers' surplus, present value and other things.

Teaching Philosophy

• As much as the material itself, the processes that you learn in this course will stand by you in the future.

• I am organized and have carefully selected material for you to learn; I value your time as much as my own.

• You conduct focused hard work, since there is no success without work.

• Hard work and serious scholarship can be fun.
Course Slogans

‘We can, we will’ -- Motto of the US Army 9th Cavalry Regiment (the Buffalo Soldiers; check out the movie Sergeant Rutledge on one of the long weekends)

‘Try not. Do, or do not. There is no try’ – Jedi Master Yoda

‘Simple, but not easy’ – Dave Draper

What I expect you to know coming into AMS11B

I will assume that you not only passed/did well in AMS 11A, but that you remember it. To help you do so, I have put the practice final that I used in fall 2009 on the course web site.
Textbook


**Cheating**
- Is cause for dismissal from the University.
- Devalues everybody’s grade – you should not tolerate it (nor will I).
- Students who help others cheat are also cheaters.
- Students caught cheating will automatically receive a failing grade and will be reported to their major department and College.

**Approximate Topical Outline**

*Starting the Week of Topic*

| Jan 3 | Functions of several variables, partial derivatives and applications (sections 17.1 and 17.2) |
| Jan 10 | Higher order partial derivatives, chain rule and Taylor polynomials (sections 17.4, 17.5 and supplementary material 2) |
| Jan 17 | Optimization: critical points and the second derivative test (section 17.6 and supplementary material 3) |
| Jan 24 | Applications; Constrained optimization (sections 17.6, 17.7) |
| Jan 31 | Envelope theorem and applications (Section 17.7 and supplementary material 4) |
| Feb 7 | Differentials and the indefinite integral (Sections 14.1-14.4) |
| Feb 14 | Techniques of integration and applications (Sections 14.4, 14.5, 15.3) |
| Feb 21 | The definite integral and fundamental theorem of calculus (Sections 14.6, 14.7) |
| Feb 28 | Applications of definite integrals (Sections 14.9-14.10, 15.3) |
| Mar 7 | Differential equations and logistic growth (Sections 15.5, 15.6) |

**Modeling Fridays**

In the second half of class on Friday, I will model problem solving. You need to give the problems to me before class starts, written out on a full sheet of notebook paper. If there are not enough problems, I will simply continue lecturing.

**Holidays:** Monday Jan 17 and Monday Feb 21.

*Fiat Lux*
Exams

Exam 1       Wednesday January 26
Exam 2       Wednesday February 16
Final Examination       Tuesday March 15, 4-7 pm. Class on Monday March 14 will be a review/problem session

Exams are cumulative and 30-40% of the questions will be drawn from the review problems in your textbook.

Our heroes  (Yours truly with Hume and Smith, summer 2010)
Tips for Success

Ask yourself: 1) What are my long-term goals? 2) What is my behavior? 3) Is my behavior contributing to my long-term goals?

11B covers a lot of ground in a short amount of time. To do well in the class, I recommend the following:

1. Attend all lectures. Go to section every week for additional review and practice (see below).

Here’s a reason why. I do not take attendance, but one day after the second exam in AMS 11A in Fall 2009, I did take attendance. Here is the grade distribution on that exam of students who were in attendance:

And here is the grade distribution of students who were not in attendance:

This pattern is repeated for all three exams in AMS/ECON 11A and for the final exam and final grades.

2. Read the textbook. The textbook is not just a repository for homework problems. You should at least page through the appropriate sections in the text before we talk about them in lecture and then read them carefully again after lecture. Read actively - by this I mean that you should follow the text with paper and pencil, work out the details of the examples, supplement your class notes with material from the book, annotate the book with comments from your class notes, etc. Discuss the material with your study group.
3. Don't do all your studying in one or two blocks - study 1-2 hours a day, 5-6 days a week: review and revise your class notes, do some of the homework, study the review questions, etc. All in all you should expect to spend 7-10 hours (or more) studying outside of class each week.

4. In addition to studying by yourself, spend several hours a week studying with 1-2 friends - take turns explaining the material to each other, quizzing each other and showing each other how to solve problems.

And if you don’t want to believe me:

**Hints for Success in a course taught by Mangel (by Kerry Murphy, Fall 1993)**

1. Create a small study group. Set up a time to meet. Treat it as a class and attend every meeting.

2. Discuss homework with your study group. You'll be surprised by the many different ways to approach a problem. These discussions will promote a better understanding of the material and improve problem solving approaches.

3. Attend office hours habitually and always attend discussion section. Having done the homework, you will usually have questions. Attend no matter how few questions you have. Other students will inquire about topics that you may not have considered. These new ideas and approaches can be expanded in your homework before you turn it in.

4. Don't overlook the importance of homework. It is a major portion of your grade and you will be rewarded for time spent.

5. Do one or two practice problems with your study group each week. They may give insight into your homework, but most of all you will be slowly preparing for the exams. Procrastination will catch up with you in the long run!

**Advice from three students in AMS/ECON11A in Fall 2009**

*Cody Heekin*

While I have never taken calculus before, unfortunately my method of studying will not be applicable to most incoming students. My older brother was a math major at UCSB and tutored during his tenure there. I visit him the weekend before every exam and review the current material. I have actually elected not to go to sections or MSI as he has been a more than sufficient tutor for me. *I guess the one way to spin this for your future students is: get help early and often, wherever you may find your most helpful source.*

*Elijah Phillips*

1) Go to lecture. It doesn't matter at what time the lecture is, just go. The grade's worth the lost sleep. While you're there, ask questions if you don't understand.

2) Memorize the formulas/derivatives: There is no way anybody can get through the
course without having each of the derivatives memorized.

3) Do all the homework. Attempt every problem, even if you're not turning it in.
   3a) Try different methods to solving each problem of the homework. You only get homework once a week, so you have time to experiment a little as well.
   3b) Professor Mangel's advice about thinking systematically is helpful if you actually do it. Before working out a problem, remember the steps to solve problems.
   3c) If you are having trouble, try writing all your steps both all the way out and in English. This makes it easier to memorize the steps and look for errors.
   3d) Set aside regular hours to review. Don't study for hours at a time; take breaks and come back to it afterwards.
   3e) I don't know if the instructors agree with this, but it has worked for me: You don't study by reading the chapter over and over. You study by working out different problems over and over.

4) When test time comes, be confident! Its harder to do well if you're already in the mindset that you'll fail. Once in the test, be calm and start the test by doing easy problems first. Then go back and do the progressively harder questions.

Emily Burville

Like many, Math does not come easy to me. Here are some things that helped me:

1. Attend the MSI, discussion sections, and office hours. I would not have passed the class if it wasn't for these. You will have questions about the homework and can get them answered here. It'll also make you feel a lot less stressed about the tests.

2. To learn the material, you must practice, practice, practice. Do a few problems each night to keep it fresh in your mind.

3. Although it sounds obvious, I can't help but stress; don't cram the night before a test. Plan to spread your studying time across a week, this will help you succeed, and ease your stress about the test.

4. You can pass this class if you dedicate enough time and effort into it. Use the resources that are provided and don't give up when you don't understand something straight away.

5. If there seems to be a hurdle that you need to overcome that just doesn't make sense, find someone in class who you are confident knows the subject matter and join with them in a study group.

The Importance of Study Skills

The pace of UC courses is much faster than either high school or community college and may require that you further develop your study skills (check out what your College offers in this area).

• Keep up with the material.

• Start your homework as soon as possible, but no later than Tuesday.
• Start preparing for the exams at least a week in advance.

• Keep in touch with your TA and me if you are having problems. **We want you to succeed, but this is a partnership.**

**Sections**

Sections are not mandatory – but they are intended to help you succeed. In sections you will be reviewing the material by doing exercises and problems and may even get help with homework.

**Grades will be determined as follows**

• The average of your 6 highest homework scores: 25%
• Your highest midterm exam: 25%
• Your second highest midterm exam: 20%
• Your final exam: 30%

Letter grades will be determined as follows: Fail: <50%, D: 50-61%, C: 62-73%, B: 74-86%; A: >86%.

If you are taking the course P/NP, then you must earn a C or better for a P grade. Intangibles, such as improvement throughout the quarter, can help in borderline cases, especially at the C/D border.

There is no extra credit work in this course and no exceptions are made in the grading. So, for example, if you have been told that you need a B- or better to declare as an economics major, and you have concerns about earning the grade you want/need, then please come see me early in the quarter so that we can devise a study plan for you that will help you attain your goals.

Remember: **I do not give grades, you earn them.**

Evaluations will report your examination and homework scores, along with the class average and standard deviation. Comments from TAs about your performance will be added as appropriate.

**Missing Class**

There are many legitimate reasons for missing class. If I miss class, which I do not plan to do, I will arrange a substitute teacher. If you are going to miss class because of travel or sickness, arrange a substitute student to take notes – one of your classmates is a good choice – and please send an email message to me.

It is still not clear how intense the flu season will be, but we must take it seriously. If you develop the symptoms of flu (fever and chills AND a cough or sore throat) isolate yourself until at least 24 hours after you are free of the fever. (This would likely be a period of 3-5 days.) **Do not come to class, but do send an email message to me indicating that you are sick.**
**Homework**
Is due at before lecture starts on the Wednesday indicated below. It should be stapled with your name PRINTED (so we can read the name) on it. **Do not put homework in my mailbox or under my door after lecture. Do not turn in your homework in Section.** If you know you are going to be gone, you may turn in your homework early in class or during an office hour. **Remember: the perfect is the enemy of the good – if you don’t have all of the homework done, turn in what you have done.**

The late homework policy is simple. **ABSOLUTELY NO LATE HOMEWORK WILL BE ACCEPTED UNDER ANY CIRCUMSTANCES.** I drop the lowest three homework scores to account for unexpected absences, flat tires, etc.

I will choose 6 problems from each assignment for the readers to grade. Each problem will be scored 0 [nothing right], 1 [something right], or 2 [perfectly correct] and the entire set of 6 will be given up to 3 points for quality of presentation and effort.

<table>
<thead>
<tr>
<th>HW #</th>
<th>Due On Wednesday</th>
<th>Assignment from section of the book or Supplementary Notes</th>
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<tbody>
<tr>
<td>1</td>
<td>January 12</td>
<td>17.1: 2, 4, 10, 12, 16, 20, 22, 28, 30. 17.2: 2, 4, 6, 8, 12, 14, 18, 20, 22</td>
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<td>2</td>
<td>January 19</td>
<td>17.4: 2, 4, 6, 12, 16, 18 17.5: 2, 4, 10, 12, 14, 20</td>
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<td>3</td>
<td>January 26</td>
<td>17.6: 2, 4, 6, 8, 10, 12, 14, 18 SN 2: 1, 3, 5</td>
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<td>4</td>
<td>February 2</td>
<td>17.6: 22, 24, 26, 30, 36 17.7: 2, 4, 6, 8</td>
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<td>5</td>
<td>February 9</td>
<td>17.7: 14, 16, 18, 20, 24 SN 4: 1, 2, 4</td>
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<td>6</td>
<td>February 16</td>
<td>14.2: 2, 4, 6, 8, 10, 12, 22, 26, 32, 34, 38 14.3: 2, 6, 8, 18, 20</td>
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<td>7</td>
<td>February 23</td>
<td>14.4: 2, 4, 6, 8, 19, 14, 18, 26, 32, 42, 60, 84, 86 14.5: 2, 4, 8, 14, 22, 30</td>
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<td>8</td>
<td>March 2</td>
<td>14.6: 2, 4, 6, 10 14.7: 2, 4, 6, 10, 14, 22, 40, 52, 62 14.10: 2, 4, 8</td>
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<td>9</td>
<td>March 9</td>
<td>15.3: 2, 4, 6, 8, 10, 14, 26, 30, 42, 48, 52, 60 15.5: 2, 4, 6, 10, 14, 22, 24 15.6: 2, 4, 6, 8</td>
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*Fiat Lux*
Some Fun: The Golden Age of Piracy

In non-fiction books, there is none better than Peter Leeson's *The Invisible Hook*. *The hidden economics of pirates* (Princeton University Press, 2009). I also like David Cordingly’s *Under the Black Flag* (Random House, 2006) and Don C. Seitz’s *Under the Black Flag. Exploits of the Most Notorious Pirates* (Dover 2002). If you want to talk like a pirate, check out George Choundas *The Pirate Primer* (Writer’s Digest, 2007).

For your light reading (or movie viewing) the best are Rafael Sabatini *Captain Blood* and *The Sea Hawk*, Robert Louis Stevenson *Kidnapped* and Daphne du Maurier *Frenchman’s Creek*. I consider all of these to be classics.