

General Information for Math 18(2) Several Variable Calculus Section 2

Fall 1999

Important note: This course is one of two sections of math 18. The sections are *not* identical. This section is for students who have *not* yet taken a linear algebra course.

Instructor: My name is Thomas Hunter. My office in the mathematics department is in Dupont 185. You can reach me by phone at 328-8244 or by email at `thunter1@swarthmore.edu`.

Office Hours: Wednesdays from 3:30pm to 4:30pm and Fridays from 12:30pm to 1:30pm and by generous appointment. The stated slots are times you can be sure to find me in my office and willing to talk. Other times are fine, but to be sure that I am available, you should make an appointment with me. Of course you should feel free to stop by anytime and see whether I am available.

Text: We will use the text *Vector Calculus* (fourth edition) by Marsden & Tromba. It is available at the bookstore.

General Game Plan: We will cover the entire text—if possible—with the following two categorical omissions: We will skip the most theoretical sections. We will limit our discussion—most of the time—to two and three dimensions. A more detailed plan but quite tentative is included with this document and should be updated periodically.

Meetings: Regular lectures will be 11:30am-12:20am Monday, Wednesday, and Friday in Trotter 303.

Homework: I will assign homework nearly every day in lecture and each week's worth of homework will be due in class the following Friday. (Wednesday if there is an exam.) I expect to have a grader for the course, but I will try to keep close track of how the grading is going.

Exams: There will be two mid-terms and a final exam. The midterms will be in class on Wednesday, October 6 and on Wednesday, November 17. The final will be scheduled by the registrar.

Grades: The mid-terms will be worth 100 points. The final will be worth 200 points. Your grade will be based on these scores. I will drop the lowest midterm or half of the final—whichever benefits your score the most.

Computer and Electronic resources: There is a web page associated to this course. You may find it via my home page at <http://www.swarthmore.edu/NatSci/thunter1/>. Other resources you may find useful are the Macintosh graphing calculator, Mathematica, and Maple. Use of these or any other computational tool will not be a required part of the course. (In fact I will ban calculators on most tests.) However, demonstrations in class will often use one or another of these tools and you may find them very useful for learning the concepts. Copies of all programs for all classroom demos will be stored in our class folder on the Classes server.

Clinic: Math Clinic will be run every evening which precedes a weekday, starting sometime in the first or second week of the semester. The Clinic is a great resource for all students—not just for those with difficulties. It is a place where you can work together with other students and know that help and encouragement are available whenever you need it.

Late work: Generally speaking late work will never be accepted and exams may never be taken late. In the case of irreconcilable conflicts you may schedule an exam earlier than the official time, but make up exams will not be given after the regularly scheduled exam except for the most extraordinary circumstances. (For example, global invasion by extraterrestrials.)

Advice: Here is some advice I give to students in my mathematics classes at all levels.

- The most efficient way to master mathematics is to go over the lecture notes after every lecture and work problems related to that lecture. This means in particular that you should set aside time at least 3 days a week to work on this class. Studying this way works. Trying to cram it all on one night does not. (You may as well sleep without studying—it is just about as effective and gets you more sleep.)
- Don't be afraid to be confused—just get even! Learning mathematics is a process which often involves first developing and refining a confusion and then resolving it. This process is a struggle. But if you aren't struggling you probably aren't learning, so endeavor to struggle well. By developing and refining a confusion and then resolving it, I mean:

Develop: Read the text, go to class, work the problems, and get confused. A course which offers you something to learn should offer you good confusions.

Refine: Don't be lazy in your confusion. When you have developed a good one try to understand exactly what you are confused about. Relevant things to ask are: "What is the most concise and precise way I can describe my confusion?" (The answer, "I can't do problem 17," is not useful. Can you read problem 17? Do you understand all of the terms? If not which ones? If so, then you understand quite a bit about problem 17; what *exactly* is your confusion?) "Is there anything like this—perhaps something more general or something more specific—which I have already come to understand?", "How does this relate to what I have seen before?", "Can I change the confusion at hand in some way to make it tractable?", "What is given?", "What is desired?", "Can I make a good guess? Why is it good? And how can I check it?"

Resolve: Don't expect to solve every problem right away. If you are stuck on a problem, leave it for a while and then go back to it. If you are still stuck, do something about it: Go to the text for the answer. Try the problem again. Work related problems which you do know how to do with an eye toward discovering what you are missing. Try the problem again. Ask in class. Try the problem again. Then read the text again. Ask your classmates. (Study together at a regular time. Share your confusions!) Read the text again. Ask your professor outside of class. (But be prepared!)

- Seek lots of different kinds of help. Talk to your classmates. Go to the clinic. Talk to me. Speak up in class. Work together with your classmates, but do not copy from them.
- Be organized. Get a daily planner. Schedule your worktime a week in advance if you can. Evaluate your effectiveness regularly. Schedule more worktime (or different hours) if you are not getting enough done. There is no one correct prescription for how much time you should spend outside of class. However, if you don't come to class with a refined confusion and if you don't resolve your new confusions when you leave class, then you will probably learn very little. So time outside of class is of great importance. For many students, spending twice as much concentrated time outside of class as is spent in class is too little.
- College mathematics exams differ in several ways from most high school exams. For one thing, we usually want to see how deeply you understand the material, not how well you do routine problems. Explaining a line of reasoning is often more important than the answer itself. Often problems will require that you have synthesized the material, not just digested discrete chunks of it. You must understand the ideas behind what you are computing.

Tentative Schedule:

Date	Topic	Problems
Fri. Sep. 3	1.1 & 1.2	1.1: 1–9, 1.2:1–11.
Mon. Sep. 6	1.3	1.3: 1–8,10,11,13,14.
Wed. Sep. 8	1.4	1.4: 1,2,3,8,12,15.
Fri. Sep. 10	1.5	1.5: 1,3–6, 7,8,17,18.
Mon. Sep. 13	2.1 & 2.2	2.1: 1–6, 11–13, 21–23.
Wed. Sep. 15	2.3	2.3: 1, 2, 3, 5, 6, 7, 13.
Fri. Sep. 17	2.4	2.4: 1–14.
Mon. Sep. 20	2.5	2.5: 1,2,4–9.
Wed. Sep. 22	2.6	2.6: 1–10,13,16.
Fri. Sep. 24	3.1	3.1: 1–6.
Mon. Sep. 27	3.2	3.2: 1–6.
Wed. Sep. 29	3.3	3.3: 1–10, 17.
Fri. Oct. 1	3.4	3.4: 1, 4, 7, 10, 13, 15, 21.
Mon. Oct. 4	4.1 & 4.2	4.1: 1–4, 19. 4.2 1–6
Wed. Oct. 6	Midterm	
Fri. Oct. 8	4.3	4.3: 3, 4, 7, 8, 10, 11, 13–16
Mon. Oct. 11	Break	
Wed. Oct. 13		
Fri. Oct. 15		
Mon. Oct. 18	4.4	4.4: 1–5, 9–20
Wed. Oct. 20	5.1	5.1: 1, 2. 5.3: 1, 2.
Fri. Oct. 22	5.3	5.3: 6–9, 11.
Mon. Oct. 25	5.4	5.4: 1, 2, 5, 8, 11.
Wed. Oct. 27	5.6	5.6: 1–4, 6, 7.
Fri. Oct. 29	6.1	6.1: 1–4, 7.
Mon. Nov. 1	6.2	6.2: 1–4, 15, 16.
Wed. Nov. 3	6.3	6.3: 1, 2, 9, 10, 12.
Fri. Nov. 5	7.1	7.1: 1–3, 7.
Mon. Nov. 8	7.2	7.2: 1–3, 6, 9, 16.
Wed. Nov. 10	7.3	7.3: 1–7.
Fri. Nov. 12	7.4	7.4: 1–8.
Mon. Nov. 15	7.5	7.5: 1–5, 7, 9.
Wed. Nov. 17	Midterm	
Fri. Nov. 19	7.6	7.6: 1–7, 9, 10.
Mon. Nov. 22	7.6	7.6: 8, 15, 16.
Wed. Nov. 24	Meditation on the fundamental theorem of Calculus	7 REVIEW: 1,2,3, 17,18.
Fri. Nov. 26	Thanksgiving break	
Mon. Nov. 29	8.1	8.1: 1, 2, 3, 5, 7.
Wed. Dec. 1	8.2	8.2: 1–5.
Fri. Dec. 3	8.2	8.2: 7–9.
Mon. Dec. 8	8.3	8.3: 2–7, 10.
Wed. Dec. 10	8.4	8.4: 2–4, 9, 10.