

Math 223 – Vector Calculus

Section 009 – Spring 2013

Time and place: MTWR 2:00–2:50, PAS 318

Course text: *Multivariable Calculus*, 5th edition, by Hughes-Hallett, *et al.*

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Office Hours: These will tentatively be held M 3–4, Th 3–4, and by appointment.

Don't hesitate to request an appointment if you can't make an office hour; the worst that can happen is that I'll be busy and have to ask you to wait until a more convenient time. I'll also be in the tutoring room once a week; location and hours TBA.

Welcome to Math 223!

In this final chapter of the calculus sequence, we will study *multivariable calculus*, in which we extend the ideas of the derivative and the integral to functions of several variables. We will begin by developing the machinery of vectors, which allow us to study motion, force, and flow in two and three dimensions. We'll then extend our knowledge of rates of change and critical points to functions of two or more variables, and then learn to integrate over a two- or three-dimensional region. Finally, we'll learn how the Fundamental Theorem of Calculus miraculously extends to vector-valued functions.

Vector calculus is a wondrous body of knowledge that gives us access to important insights about physics. I hope to help you gain an appreciation of the interconnectedness and physical significance of the ideas of vector calculus, in addition to gaining a working knowledge of the subject.

Of the three courses in the calculus sequence, this one is the hardest and will require the greatest degree of intellectual independence on your part. For many of you who had Calculus I and/or II in high school before taking them in college, this course will also require the greatest growth. My goal is to support you in any way I can, but your own motivation and persistence will be essential to your success.

Grading and expectations

Your grade in this course will be determined by the following:

- Preliminary exam – 20 points
- Four midterm exams – 100 points each
- Final exam – 200 points
- Homework and Quizzes – 120 points

Total – 740 points

Grades in this course will be assigned on the standard scale, with an A representing a grade of 90% or better, a B representing a grade of at least 80% but less than 90%, a C representing a grade of at least 70% but less than 80%, and a D representing a grade of 60% but less than 70%. An E will be given for a grade less than 60%. For more information on what grades mean in this course, please consult the Course Policy Addenda on my course homepage.

Preliminary Exam

On **Thursday, January 17**, there will be a Preliminary Exam (“Prelim”) that will test how well you have retained skills from Calculus I and II that are essential for your success in this course. This will be a closed-book, no-calculator exam with very little partial credit offered.

Midterm Exams

We will have midterm exams in class on the following dates:

1. Thursday, January 31
2. Thursday, February 28
3. Thursday, March 28
4. Thursday, April 25

Calculators will be allowed on exams, though some problems will call for you to do things without a calculator. If you must miss any of these exams, please notify me as soon as possible so that we can discuss arranging a make-up exam; I do not drop exam grades. A make-up exam may only be granted if you miss for a compelling reason such as an illness, an emergency that requires you to miss class, or a University excused absence, and only if you provide documentation of the reason for your absence.

Final Exam

We will have a final exam on **Monday, May 6** from **1:00 to 3:00 PM**. This final exam will be a common exam taken by all sections of Math 223. Please note that since this is a common exam, the date and time are non-negotiable.

Homework and Quizzes

You will have two types of homework in this class: online homework via WebAssign, and written homework which I will grade by hand. If you took Math 124/125/129 at UA, you are already familiar with the WebAssign system. There are some types of calculus problems that do not transfer well to an online format; for these, I plan to give written homework. Each student is expected to do his or her own work and to turn in their own individual assignments. Working together on assignments is tolerated, though it is strongly encouraged that you first attempt to work through the assignments on your own.

I might occasionally give in-class quizzes, some of which may not be announced in advance. Some quizzes will be closed-book quizzes that you must complete on your own, while others will be group quizzes on which you are allowed to work together. You might think of the latter as “in-class” work.

Homework policy

I will not grade and return your work unless it is turned in on time. At the end of the semester, I plan on dropping a few (one or two) of the lowest homework scores from each student. This allows you to miss at least two assignments without consequence. Be aware, however, that it is in your best interest to reserve the dropped homework for emergency situations. In the case of written homework, I will not grade and return your work unless it is properly stapled and unless you have removed the frills from the edges of the paper. I reserve the right to give zero credit for sloppy work.

Attendance and administrative drops

Attendance in this class is vital for your understanding of the material. It is therefore regarded as very important that you attend class every day. I promise that no matter what your math skills are right now, you will do better if you attend class than you will if you don’t. I have the authority to drop chronically absent students from this class. Because there are many students who want to enroll in this class, I will drop you if you miss more than two of the first five days of class, or if you miss the first two days. If you think you will require an exception to this policy, please let me know immediately.

Fostering an active learning environment

In my years of taking and teaching math courses, I have seen quite a trend in the correlation between the number of students who participate in the lectures and the final course averages. In classrooms where the students feel content to let one or two students pull most of the weight in the participation arena, the common result is a poorer understanding on the parts of most students. Clear communication of mathematical ideas is tricky, as there are many important aspects of human thought and understanding that must be taken into consideration. In our culture there seems to be a stigma perpetuated that results in many pretending to understand material that is being presented in order to “save face.” This is due to either intimidation or fear of looking “stupid.” In my experience, the most effective way to understand material is through talking, asking questions when you don’t understand (I promise that if you have a question, the same question is also on the mind of many others), and by keeping your ego out of it. Don’t be afraid of being wrong. Being wrong is the beginning of real discovery. In light of this, bullying and aggressive comments towards others will not be tolerated.

I want this to be a lively class – not only so that the class is fun to attend, but also so that what I’m doing in class is geared to your level of understanding, not what I imagine your level of understanding is. So show up, do the reading in advance, ask questions, and don’t be afraid to take risks in class.

Academic dishonesty

For purposes of this course, “academic dishonesty” means presenting somebody else’s work as your own, with or without that person’s consent, *or* using unauthorized help on classwork. This includes, but is not limited to, cheating on exams or quizzes, copying solutions to homework, or having others do your work for you.

Students withdrawing from the course

If you withdraw from the course via UAccess by February 5, the course will be deleted from your enrollment record. If you withdraw from the course by March 5, you will receive a grade of W. The University allows withdraws after March 5, but only with the Dean’s signature. Late withdraws will be dealt with on a case-by-case basis, and requests for a late withdraw with a W without a valid reason may not be honored.

Incompletes

The grade of I can only be awarded if all of the following conditions are met: (1) the student has completed all but a small portion of the required work, (2) the student has scored at least 50% on the work completed, (3) the student has a valid reason for not completing the course on time, (4) the student agrees to make up the material in a short period of time, and (5) the student asks for the incomplete before grades are due, 48 hours after the final exam.

Students with disabilities

If you anticipate issues related to the format or requirements of this course, please meet with me so that we can discuss ways to ensure your full participation in the course. If you determine that disability-related accommodations are necessary, please register with Disability Resources (621-3268; drc.arizona.edu) and notify me of your eligibility for reasonable accommodations by Tuesday, January 22. We can then plan how best to coordinate your accommodations. I interact with the DRC regularly and am happy to work with them, and with you.

One more thing...

I am committed to doing everything I can to help you make the most of this course. If you have questions, comments, or suggestions regarding this class, please do not hesitate to contact me.

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First-Day Questionnaire

Please answer the following questions. Your answers to these questions will help me make decisions about how I teach this course, so your input is important! If there is a question you do not wish to answer, you may skip it.

1. What is your name? (If you have a middle name or nickname you prefer, please indicate this.)
If anyone has ever mispronounced your name, *ever*, please include a pronunciation guide for me, because I'm likely to mess it up too.
2. Where are you from?
3. How long have you been at UA? What is your major (if you have one)?
4. What do you hope to do after you finish school?
5. What is your favorite course that you have taken so far in college, and why? (If this is your first semester of college, tell me about your favorite course in high school.)
6. Tell me something interesting about you that has little or nothing to do with school or your future career.

7. If you needed to, could you make it to at least one of my office hours)?

8. For each of the following statements, please indicate (by circling a number) to what extent you agree or disagree with the statement. 1 = strongly disagree, 2 = disagree, 3 = neutral / no opinion, 4 = agree, 5 = strongly agree.

1 2 3 4 5 I enjoy doing math.

1 2 3 4 5 I find mathematics to be challenging.

1 2 3 4 5 I am a visual learner.

1 2 3 4 5 I am an auditory learner.

1 2 3 4 5 In order to learn a new skill, I need to practice it myself.

1 2 3 4 5 I would rather work with others than work by myself.

1 2 3 4 5 To understand something in math, I need to know why it works.

1 2 3 4 5 I understand an idea better if it can be expressed with a picture.

1 2 3 4 5 I want to know how mathematical ideas are used in real life.

1 2 3 4 5 I am anxious about taking tests, even if I have prepared for them.

1 2 3 4 5 I believe that I can earn an A in this course.

1 2 3 4 5 I am worried that I may work hard and still fail this class.