

Math 20E Vector Calculus Winter 2004

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| Office: | 5763 Applied Physics & Mathematics Building (APM) |
| Office Hours: | W 3:00p-3:50p, Tu 2:30p-4:00p, or by appointment |
| Meeting Times: | MWF 2:00p-2:50p |
| Room: | 115 Center Hall |
| Textbook: | <i>Introduction to Vector Analysis, 7th Edition</i> , Harry F. Davis and Arthur David Snider You may also be amused by the <u>optional</u> text <i>Div, Grad, Curl, and All That: An Informal Text on Vector Calculus</i> , by Harry Schey. |
| Prerequisites: | Math 20C or 21C |
| Course Webpage: | http://scicomp.ucsd.edu/~spav/class/2004W-M20E/ |
| Final Exam: | Monday March 15, 3:00p-6:00p |

Catalogue Description. *20E. Vector Calculus. (4) Change of variable in multiple integrals, Jacobian Line integrals, Green's theorem. Vector fields, gradient fields, divergence, curl. Spherical and cylindrical coordinates. Taylor series in several variables. Surface integrals, Stoke's theorem. Gauss' theorem and its applications. Conservative fields.*

Course Description. This course deals with *vector analysis*; we will examine methods for dealing with problems of “multidimensional flavor” that occur in engineering and sciences.

Grading Policy. Grading will be based upon performance in homeworks, two single hour exams, and a comprehensive final. The final quarter grade is subdivided as follows: Homework: 80 points; Midterm 1: 180 points; Midterm 2: 220 points; Final Exam: 320 points. This gives a total of 800 points. At the beginning of the quarter, I can only make the following guarantee: if you have at least 640 points at the end of the quarter, your final grade will be at least C-. Probably this “acceptable grade divider” will drift downward from 640 as the quarter progresses.

Frequently students are driven to ask for a change in grading policy late in the quarter. To make such a change would be unfair to any student who had already dropped the class thinking they couldn't pass. I expect that *any* grading scheme will be disagreeable to *some* student; the best anyone can hope for is a grading scheme which is agreeable to the majority, and which applies equally to all students. In any case, this is a calculus class, not a game show; there is no “deal-making.” If you get a perfect score on the final exam, I will buy you a candy bar, but you still may not pass the class—the final exam is only worth 40% of the final grade. The point of having midterm exams is to encourage students to review the material some time before 11pm the night before the final.

The dates and times for the midterms and final exam are listed in this syllabus: The first midterm is during class on Monday, January 26, the second is during class on Monday, February 23. The final is Monday, March 15 at 3pm. If you have known conflicts with any of these exams, I encourage you to switch to another section of 20E immediately. Legitimate, documented excuses for missing an exam will be dealt with individually.

I plan to have the first midterm exam returned before the end of the fourth week, *i.e.*, before the deadline to drop without a ‘W.’ Likewise, I plan to have the second midterm returned before the deadline to drop with a ‘W.’ The decision to drop the course is a serious one. However, I can

only advise you on how you are doing in this course; I am *not* qualified to advise you on your educational career and know little about the various majors and their requirements. Please consult your academic advisor for these matters.

Homework. There will be 10 homework assignments, each worth 10 points. Your lowest *and highest* homework score will be dropped. This minimizes the effect of outliers. Since your lowest homework score will be dropped, no late homework will be tolerated.

Homework is to be handed to the TA at the end of discussion section. I repeat: *no late homework will be tolerated*. Your TA has full discretion in grading the homework; do not irritate your TA by handing in dog-chewed, coffee-stained, unnamed, unstapled homework scribbled in illegible runes on diner napkins. The answers to the homework questions may be found in the back of the book. For this reason, unless a homework question is trivial (*i.e.*, no work is required), simply writing the answer to homework questions is not acceptable; you must *show all your work*. If you do not know whether a given homework question is trivial, you probably do not understand the question. Some of the homework assignments from the review chapters at the beginning of the quarter consist of mostly trivial questions. You are doing yourself a disservice if you merely copy the answers from the back of the book, as failure to comprehend this review material will certainly be fatal to your 20E career.

It is expected, and encouraged, that students will work together on the homeworks. This saves time (yours, mine, and the TAs'), builds leadership, and encourages cooperation. Each student must submit their own homework, written in their own hand (please no printouts, photocopies or faxes). Since the midterm exams follow the homework closely, it is strongly suggested that students pay careful attention to the homework.

Getting Help. I encourage you to attend my office hours, and the office hours of your TA. Students can also get help at the Department's Calculus Lab, located in AP&M 2402, and open weekdays. See (<http://www.math.ucsd.edu/frontdesk/roomschedule/2402.shtml>).

Help is also available from OASIS, which is a tutoring program requiring regular attendance. See (http://oasis.ucsd.edu/math_science.shtml)

Calculators. You may not use a calculator of any kind during the exams.

Academic Integrity Students are expected to adhere to the University's Policy on Integrity of Scholarship, found in the UCSD general catalogue. Minimum punishment for cheating on a midterm exam is a score of zero on that exam.

Course Webpage. The course page, (<http://scicomp.ucsd.edu/~spav/class/2004W-M20E/>) will include this syllabus and any updates, general announcements, some handouts and other materials.

Textbook and Handouts. A quick study of the text and of syllabi from other sections of 20E indicates that the text is not optimal for the purposes of 20E. We will skip some sections, and look at some sections out of order. In addition, we will spend a week or so working from a handout on multidimensional integrals, as this material is not covered sufficiently in the textbook. The handout will be available on the web, and will be something like the handout used in previous sections: (<http://www.math.ucsd.edu/~lindblad/20e/shenk.pdf>)

Inspirational and Irrelevant Filler.

"A teacher is better than two books."

—German proverb

"This isn't rocket science, this is brain surgery!"

—The Simpsons

"Everything is deemed possible except that which is impossible in the nature of things."

—California Civil Code # 1597

Course Schedule. The lecture schedule is tentative, but the homework and exam schedules are exact.

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| week 1 | M Jan 05 | review: §1.1-1.5,1.8-1.12 |
| | W Jan 07 | review: §1.8-1.12, 2.1, 2.2 |
| | Th Jan 08 | HW 1 $\left\{ \begin{array}{l} \S 1.3 \# 4, 5, 6, 7, 12, \\ \S 1.5 \# 4, 5, 10, \\ \S 1.8 \# 3, 7, 8, \\ \S 1.9 \# 1, 4, 7, 11, 21, \\ \S 1.10 \# 3, 4, 5. \end{array} \right.$ |
| | F Jan 09 | review: §2.1, 2.2 |
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| week 2 | M Jan 12 | §2.3 |
| | W Jan 14 | §3.1, 3.5 |
| | Th Jan 15 | HW 2 $\left\{ \begin{array}{l} \S 1.12 \# 1(a,d), 2, 7, 9, \\ \S 2.1 \# 1, 5, \\ \S 2.2 \# 2, 5, 8, \\ \S 2.3 \# 3, 5, \\ \S 3.1 \# 1, 4, 5, 6, 10(a), 14, 18, 34. \end{array} \right.$ |
| | F Jan 16 | §3.2, 3.3, 3.5 |
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| week 3 | M Jan 19 | no class |
| | W Jan 21 | §3.4, 3.5 |
| | Th Jan 22 | HW 3 $\left\{ \begin{array}{l} \S 3.2 \# 3, 4, \\ \S 3.3 \# 2, 3, 7, 8, \\ \S 3.4 \# 2, 4, 6, 7, 10. \end{array} \right.$ |
| | F Jan 23 | review |
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| week 4 | M Jan 26 | exam 1 covering §1.1–1.5, 1.8–1.12, 2.1–2.3, 3.1–3.5 |
| | W Jan 28 | §4.1 |
| | Th Jan 29 | HW 4 {§4.1 # 1, 2, 3, 7, 13. |
| | F Jan 30 | §4.3 |
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| week 5 | M Feb 02 | §4.2, 4.4 |
| | W Feb 04 | §4.6 |
| | Th Feb 05 | HW 5 $\left\{ \begin{array}{l} \S 4.3 \# 1, 2(a,b,c), 3(a,b,c), 4, 5. \\ \S 4.4 \# 1, 2, 6, 10, \\ \S 4.6 \# 1, 3, 5. \end{array} \right.$ |
| | F Feb 06 | §4.7 |
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| week 6 | M Feb 09 | §4.7 & (handout) Double and triple integrals |
| | W Feb 11 | (handout) Double and triple integrals, change of variables |
| | Th Feb 12 | HW 6 $\left\{ \begin{array}{l} \text{§4.7 \# 2, 3, 4, 6, 10, 11, 13, 15, 16,} \\ \text{(handout exercises)} \end{array} \right.$ |
| | F Feb 13 | (handout) change of variables, cylindrical & spherical coords |
| week 7 | M Feb 16 | no class |
| | W Feb 18 | §4.9 |
| | Th Feb 19 | HW 7 {§4.9 # 3(a), 5, 7, 11, 13, 15, 16, 17, 20, 21, 26. |
| | F Feb 20 | §4.9 & review |
| week 8 | M Feb 23 | exam 2 covering §4.1–4.4, 4.6, 4.7, handouts, 4.9 |
| | W Feb 25 | §5.1 |
| | Th Feb 26 | HW 8 {§5.1 # 6, 9, 10. |
| | F Feb 27 | §5.4 |
| week 9 | M Mar 01 | §5.5 |
| | W Mar 03 | §5.2 |
| | Th Mar 04 | HW 9 $\left\{ \begin{array}{l} \text{§5.4 \# 5, 6, 7, 8, 9, 12,} \\ \text{§5.5 \# 1, 2, 5, 6,} \\ \text{§5.2 \# 1, 3, 5, 6, 9.} \end{array} \right.$ |
| | F Mar 05 | §5.3 |
| week 10 | M Mar 08 | §5.7 |
| | W Mar 10 | §5.8 |
| | Th Mar 11 | HW 10 $\left\{ \begin{array}{l} \text{§5.3 \# 3, 4,} \\ \text{§5.7 \# 1(a,b,c),} \\ \text{§5.8 \# 2(a), 4, 5, 8, 10.} \end{array} \right.$ |
| | F Mar 12 | review |
| finals | M Mar 15 | Final Exam. 3:00p-6:00p |