Math 896-503 - Multivariable Analysis **Summer 2009**

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Office Hours: 10:30 to 11:30, M-F

FINAL EXAM Friday, July 10, 12:45-2:20

You are welcome to drop by outside of office hours although I may be busy (in which case we can make an appointment), or out of the office (leave a message, preferably using email).

Prerequisite Permission of the instructor.

Textbook *Advanced Calculus of Several Variables*, C.H. Edwards Jr., Dover, 1995, ISBN: 0-486-68336-2.

Other References These are other books that treat the same material in different ways.

- *Calculus in Vector Spaces*, L.J. Corwin & R.H. Szczarba, 2nd Ed., CRC Press, 1994, ISBN: 0-8247-9279-3.
- *Advanced Calculus*, G.B. Folland, Prentice-Hall, 2002, ISBN: 0-13-065265-2.
- *Analysis On Manifolds*, J.R. Munkres, Westview Press, 1997, ISBN: 0-201-31596-3.
- *Calculus on Manifolds*, M. Spivak, 5th Ed., Westview Press, 1971, 0-8053-9021-9.
- *Schaum's Outline of Advanced Calculus*, Robert C. Wrede, Murray Spiegel, 2nd Ed., McGraw-Hill, 2002, ISBN: 0-07-137567-8.

Course Goals The goals of this course are

(1) cover multivariate calculus the 'right' way (using ideas from linear algebra)
(2) give an integrated treatment of both the computational and conceptual aspects,
(3) connect the geometric and algebraic points of view.

Syllabus A detailed syllabus will be posted on the course website as material is covered. Here is the core material in the course:

- Limits and Continuity
- The Derivative (properties, chain rule, higher order, mixed partials, Taylor's Theorem)
- Applications (optimization, constrained optimization)
- Integration (properties, iterated integrals, change of variables, improper)

The last half (or so, depending on how things go) of the course will cover some subset of the following topics, depending on the class's preferences. Vector fields and the generalized Stokes' Theorem; Special functions, such the gamma and beta functions; Calculus of Variations; Fourier Series and Integrals; Geometry of Curves and Surfaces.

Expectations Performance at a high level is expected. At a minimum, this means knowing the material from the prerequisite courses, reading the textbook before lectures, taking notes during lectures, and doing the homework afterward. If you want to pass this class, plan to spend an average of two hours outside the class for every hour in class.

Grading I expect n and m to be between 12 and 15.

comprehensive final exam	100	100
mid-term exam	100	100
n assignments	$175/n$ each	175
m quizzes	$25/m$ each	25
total		400

Grade Scale I may lower the following cutoffs.

A+	360	B+	320	C+	280	D+	240
A	340	B	300	C	260	D	220
A-	330	B-	290	C-	250	D-	200

Exams There will be two exams, a midterm exam at the end of the 3rd week and a final exam, as listed above. Makeup tests will be given only for University sanctioned reasons and require appropriate documentation. The final will be comprehensive, although there will be a slightly higher emphasis on the material since the midterm.

Assignments Assignments are *vital* to understanding the material of the course. There will be daily assignments of 1 to 3 questions, usually due at the start of the following class. While late assignments may occasionally be accepted, this is entirely at the instructor's discretion. So be prepared to explain why you are unable to turn the assignment in on time. Turning assignments in late will typically involve a penalty of 5 to 10 percent.

Assignment solutions should be in your own words and you should fully understand everything you turn in. It is okay to talk to other students about the assignment questions in general terms, but not to copy their solutions out in detail. For example, "To do question 2, you need to use the Implicit Function Theorem and then divide out the extra factor of $x^2 - 2$." is okay. Any assistance from anyone other than the instructor should be acknowledged in your assignment.

Quizzes Quizzes will be take 2-5 minutes at the start of class on Wednesdays and Fridays (or Tuesdays and Thursdays, if we switch to meeting 4 days a week). They will ask for either a definition or the statement of a theorem. They are intended to be easy points for those who review their notes and keep up with the material. There are no quizzes on the week when we have the midterm or during the final week of classes.

Academic Dishonesty Academic dishonesty includes cheating on any test, plagiarism, fabricating an otherwise justifiable excuse to avoid or delay timely submission of academic work, and helping or attempting to help another student commit academic dishonesty. For a comprehensive list, see Section 4.2 of the Student Code of Conduct. In particular, plagiarism includes three acts: "(1) failing to cite quotations and borrowed ideas, (2) failing to enclose borrowed language in quotation marks, and (3) failing to put summaries and paraphrases in your own words" (Hacker, A Writer's Reference, 4th Edition, p. 83).

I can, and will, lower grades, up to giving an F in the course, of students caught committing academic dishonesty. As this is an advanced course, I will view academic dishonesty in this course particularly seriously. Both the determination of academic dishonesty and the penalty can be appealed (again, see Section 4.2 of the Student Code of Conduct).

Department Grading Appeals Policy The Department of Mathematics does not tolerate discrimination or harassment on the basis of race, gender, religion, or sexual orientation. If you believe you have been subject to such discrimination or harassment, in this or any other math course, please contact the department. If, for this or any other reason, you believe your grade was assigned incorrectly or capriciously, then appeals may be made to (in order) the instructor, the department chair, the department grading appeals committee, the college grading appeals committee, and the university grading appeals committee.