MATH 550 Vector Analysis
Syllabus for Spring, 2008

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Text. Required: *Vector Calculus*, fifth edition, by Jerrold E. Marsden and Anthony J. Tromba. This is the MATH 250 textbook that was used last semester and for the last several years. It is a bit more sophisticated than the 141-142-241 text that some of you have used, but we will fill in the gaps, if any, for those of you coming out of that sequence. I have left a copy of second edition of a different text that I have used in the past (by Susan Colley) in the undergraduate study room (LC 311); I will be supplementing our text by problems from hers, which tend to be more geometrical than analytical. You are welcome to come by my office anytime, and if the door is open, come on in, and feel free to consult the Student Solution Manual or the Instructor's Solution Manual.

Overview. This course is an extension of MATH 250 (or 241), and has much the same problem solving character with a dose of theory and abstraction (more in this respect than you typically see in 241). Proofs will be given in class, and you will be expected to do some computationally driven proofs on your own, but the course will not have the really proof oriented character as, say, MATH 554. In this regard it makes a nice transition from calculus to the higher level theoretical math courses; you will find this course will greatly enrich your understanding of Linear Algebra, for example.

Course content. The course covers chapters 6, 7 (just selections from 7.7), 8 (selections from 8.5, 8.6 as time permits) of the text, as well as material from the first five chapters that may have been brushed aside in MATH 250 or 241. Our goal is to understand the "Change of Variables" Theorem and the "Big Three" Theorems of Green, Stokes, and Gauss, and how to use them. Development of your geometric intuition will be an important goal throughout.

Computer graphics play an increasingly important role in understanding geometry in 3-D. I hope we will have the opportunity to make several "field-trips" to the computer lab, where you will use pre-prepared programs in Maple to visualize three dimensional structures. If you feel comfortable enough with Maple, you will be welcome to use it for ordinary homework assignments. Some graphing calculators do much the same thing, and you may use these for homework and exams as well. You may not use "computer" calculators such as the TI-89 or 92 on exams.

Grades. Two major tests will be given, each worth 120 points. Scheduled dates are Tueday, 19 February and Thursday, 3 April. At least seven ten-point quizzes will be given; the six highest scores will be counted. **No make-ups will be given on quizzes or exams**. Selected homework problems will be collected and graded; the total will be scaled to 60 points. There will be a final exam, worth 180 points; it is scheduled for Thursday at 9:00 am on 1 May. It will be in two

parts: part A, worth 120 points, will be somewhat comprehensive–it will recap the material of the first two exams, and will replace the lower of these two exam scores if this helps you; part B, worth 60 points, will cover the material of the course that was not covered by the first two exams. **No exemptions will be granted**. There will be 35 points available for "other activities." This will range from small points for putting problem solutions up on the board (which includes answering questions on them and explaining them!), to construction of wire, plaster, clay, or computer models of interesting solids and surfaces that illustrate significant points of the math, to mini-projects, group projects, or class mini-lectures on related applications, particularly from physics and engineering, in short to doing something of significant mathematical content that is related to the course material and that really grabs you. Don't leave this to the end; it can be worth real credit, but may take substantial time–and I do expect everyone to do SOMETHING (keep me informed of your ideas before you plunge in). A total of 575 points may be earned:

Exams (2)	240	
Final, part A	120	
Final, part B	60	
Quizzes	60	(best six)
Homework	60	(scaled score)
"Other"	35	(up to you)

Letter grades will be announced separately for each exam, for the final, and for the other items. They will generally fall close to the (percent) scale 85–100 A, 75–84 B, 65–74 C, 55–64 D, below 55 F, but will vary up or down. Note that the deadline to drop this course without a grade of WF is Monday 25 February; you should have a pretty good idea before then how you are doing.

Collaboration. One of the goals of this course is to learn how to communicate mathematical ideas. By all means form study groups to discuss the homework problems (but give them a fair shot first before you ask others for their ideas). I hope many of you will also take advantage of presenting problems, or longer mini-lectures, in class; there is no better way to learn something than to explain it to others.

Attendance. Ten bonus points will be awarded for perfect attendance, 5 for only one absence. No excuses will be considered in this regard. This class has 28 meetings; university policy states that if more than 10% of the meetings are missed, whether excused or unexcused, then the instructor may impose a penalty. This is a relatively small class and each and every one of you has something to contribute, and not all topics will be presented exactly as in the text. Therefore, if you miss 4 or more class sessions, I will lower your grade by half a grade point (from an A to a B+, or a C+ to a C, for example), and if you miss 7 or more classes, your grade will drop by a full grade point.