MATH 550 Vector Analysis
Syllabus for Spring, 2012

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Text. Required: *Vector Calculus*, sixth edition, by Jerrold E. Marsden and Anthony J. Tromba.

Overview. This course is an extension of MATH 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.

Course content. After a fairly quick review of the vector material from MATH 241 (extracted from chapters 1, 2, and 4), we will focus on the main material of the course, namely the "Big Three" Theorems of Green, Stokes, and Gauss, and how to use them. This material is set up in chapter 7 (we'll just do a few selections from 7.7), and is fully developed in chapter 8 (selections from 8.5, 8.6 as time permits). Time permitting, we will work on understanding the "Change of Variables" Theorem from chapter 6. 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 see some of this. 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.

Learnimg Outcomes. Student will demonstrate an understanding of the calculus of vector functions by solving problems in the context of vector fields (e.g., by distinguishing gradient fields from non-gradient fields), line integrals, surface integrals, divergence and curl. They will be able to exploit algebraic and geometric methods to compute integrals using the theorems of Green, Stokes and Gauss, as well as direct computation using parameterizations

Grades. Three major tests will be given, each worth 100 points. Scheduled dates are Friday, 21 September (day 12), Wednesday, 17 October (day 23) and Monday, 19 November (day 36). 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 140 points; it is scheduled for Monday, 10 December at 12:30. Your percent score on the final exam will replace your lowest (or missing) exam score, provided this helps you. **No exemptions will be granted**. A total of 560 points may be earned:

Exams (3)	300	
Final	140	
Quizzes	60	(best six)
Homework	60	(scaled score)

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. The final grade will be based on the total number of points; on a percent basis it will fall close to the scale just mentioned. Note that the deadline to drop this course without a grade of WF is Thursday, 11 October; 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 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 42 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 6 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 9 or more classes, your grade will drop by a full grade point.