# Math 250: Multivariable Calculus

## Spring 2009

|  |  |  |
|---|---|---|
| Instructor | : | Maria R. D'Orsogna |
| Lectures | : | Tu-Th 5:30 - 6:45pm in JR 243 |
| Office hours | : | Wed 11-12 am and 2-3 pm in Santa Susana Hall 123 |
| Contact | : | dorsogna@csun.edu or (818) 617 - 2703 |
| Textbook | : | Calculus, 6th edition, Thompson, James Stewart |

**Course description:**

Math 250 is the last section of your Calculus series. In this class we will use everything we know about single variable calculus and try to extend it to the multidimensional case. We will learn how to integrate and differentiate when more than one variable is present. Of course this is very important, since the world we live in is inherently three dimensional, and often one dimensional descriptions are not adequate to fully capture the properties we are interested in. Most systems from science, engineering and the social sciences have been analyzed through the lens of multivariable calculus. As an example, modeling physical phenomena such as fluid dynamics, or surface science requires a deep knowledge of multivariable calculus. Here, we often need not just one variable for space, but two or three to describe a surface or a volume. Sometimes we may even need four variables, three for the three spatial variables and one for time. If you want to study string theory, there you may need many many more!

At times, the passage from one dimension to higher ones, is trivial. But in some cases, counter-intuitive results can arise. For example, in space, a limit may be different whether one approaches a point in space along a certain trajectory, rather than another one. We will also learn the meaning of concepts such as partial derivatives, curls, divergences and gradients, which are all vector or scalar combinations of derivatives. We will also study some fundamental theorems of vector calculus such as Green's theorem, Stokes' theorem, the divergence theorem and the gradient theorem.

**Evaluation**:

Your grade will be based on weekly homework assignments (10 % each of your grade), three midterms (20 % of your grade) and a final cumulative exam (30 % of your grade). You will be allowed to drop the two lowest scores of your homework sets. A grade of F will be given to those who do not show up for the final exam. No make-up exams will be given, except for extreme circumstances, so talk to me within the first two weeks of class if there are time conflicts. The midterms will be on January $29^{th}$, February $26^{th}$ and April $2^{nd}$.

**Homework**:

Expect a lot of homework: math is like going to the gym, you will gain muscles only if you keep practicing and practicing. It would be great if you wanted to work out even more problems than what assigned to you, and just to become better. Late homework will not be accepted under any circumstance. Calculators are superbanned. Copying is not allowed. Please write out clearly on your tests, as it will make everyone's life easier.

**Approximate Class Schedule**:

Week 1: Sections 13.1 - 13.2        Week 8 Sections 15.7 - 15.8
Week 2: Sections 13.3 - 13.4        Week 9: Sections 16.1 - 16.2
Week 3: Sections 13.5 - 13.6        Week 10: Sections 16.3 - 16.4
Week 4: Sections 14.1 - 14.2        Week 11: Sections 16.7 - 16.8
Week 5: Sections 14.3 - 15.1        Week 12: Sections 17.1 - 17.2
Week 6: Sections 15.2 - 15.3        Week 13: Sections 17.3 - 17.4
Week 7: Sections 15.4 - 15.6        Week 14: Sections 17.5 - 17.6

The date of final exam will be announced during the semester.