

This syllabus is supplementary to the one you should have already received from the instructor. In case you have any questions on this syllabus and the one you received in class, you should talk to me as soon as possible.

1 Contact Information

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 Course Webpage: <http://amath.colorado.edu/courses/2350/2010Spr/>

2 Objective of the Recitation

- an extension of material you learn in class.
- forum for sharing and reinforcing ideas and concepts on calculus .

3 TA's role

- facilitate the students to grasp the various intricacies and logistics pertaining to the course.
- initiate and enhance mathematical maturity, primarily founded on the important principles of vector calculus.
- encourage students to utilize office hours for help on homework and review for exams.

4 Modus Operandi

- recitation will be based on handouts on important topics from the week that will be provided to the students at the beginning of every recitation. (*however I highly recommend you to read the text book, please remember that being able to read a scientific/technical book is an integral part of a student's evolution into the beautiful world of science.*)
- emphasis will be on absorbing the crux of the topics as opposed to mechanical problem solving skills.
- extension of calculus concepts developed in class to solve real world problems (*we will see lots of examples and applications of topics you learn in class - historically this has been the most fun part and the core theme of most of my previous recitations.*)

5 Homework

- any random 5 problems from the entire week's assignment will be graded, each problem will be worth 5 points and 5 bonus points on presentation and completion, the aggregate of all homework scores will be normalized to 100 points.
- points will be based on precision of mathematical statements and arguments as opposed to mere ability to arrive at the correct answer.
- at the end of the semester the lowest homework set from an entire week will be dropped !

6 Quiz

- 3 in class quizzes (10 points each) the week before the exam, primarily to prepare you for the test.
- 1 take home quiz (20 points) to test your understanding and grasp of the material (*feel free to take my help and talk amongst your math friends, but mere copying is a faux pas !*)

I strongly believe in the myth that *Calculus is positively MathemaGical* and part of my job is to unravel a few magical aspects of Calculus. Remember the first and foremost question should always be ... *Why something works ?* and not *How ?*

... who is with me ? 🧐🤔🤖

A snapshot from the future ...

1. **from scalars to Vectors** ☺ *a sense of direction is of paramount importance in life !*
2. **Cartesian co-ordinate system vs Polar co-ordinate system** *but why ? ...orbital motion may be !* 🎵
3. **Curvature, Torsion radial and tangential acceleration** *and the merry-go-round* ☺
4. **Directional derivatives, Gradients constrained optimization** *someday you will learn about the famous steepest descent and conjugate gradient algorithms !*
5. **Moments and center of mass** *and the hovering child ! ... math or magic ?*
6. **Divergence** *what does it tell us ? Why is this useful ?..... and a glimpse into the world of thermodynamics, expansion of gases?*
7. **Curl** *... and to all the aerospace engineers \Rightarrow Vorticity is defined as the curl of the velocity i.e. tendency for elements of the fluid to **spin**. but why is that important ? Hmmm have you ever noticed that there is always a minimum time gap between 2 consecutive aircraft take offs from the same runway ? Why so ?*



Figure 1: A NASA study on wingtip vortices qualitatively illustrates the wake turbulence

What is the take home message ? Think of the consequences of an aeroplane flying into such a wake turbulence high vorticity !oops ! So next time when you calculate the curl of a velocity vector (or any vector for that matter), you better get the math right because there are lives at stake here ! ☺