

## THE COURSE

Math 2243, Fall '02, Linear Algebra and Differential Equations.

Meets 2:30pm-3:20pm MWF in MoosT 2-690,

and at 2:30 (§§031-2) or 3:35 (§033) for Discussion Sessions on TuTh.

Locations: §031: 1701 Univ, 14; §032: FolH 214; §033: EddyH 102.

## INSTRUCTOR

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Office Hours – TBA, MWF

## TEXT (ISBN 0-13-263757-X):

*Differential Equations and Linear Algebra*, 2<sup>nd</sup> edition, by Stephen Goode; Prentice–Hall 2000

## INTRODUCTION

Math 2243 is an introductory course on two related subjects, Linear Algebra and Ordinary Differential Equations (ODE). The first is applied in the second in essential ways.

Linear Algebra includes methods for solving systems of linear equations (the unknowns all appear to the first power, alone or multiplied by constants, and possibly added to other unknowns multiplied by constants). But Linear Algebra also is concerned with the study of mathematical systems consisting of objects that can always be added, always multiplied by constants, now to be called *scalars*, with the results of addition and scalar multiplication always being objects still within the system. This study includes the ways in which lines and planes and solid space and hyperspace and so on fit together. Tho there is much of a geometric flavor, there is also abstraction, that you will perhaps encounter here for the first time. Abstraction is good because it allows us to use methods learned, in one context, in other contexts that may be vastly different in some ways, but that in other ways really the same. Abstraction is bad because it demands that we be discriminating in what we look for when we are faced with a mathematical problem.

We will study Differential Equations with one independent variable, often thought of as time. These are called Ordinary Differential Equations (ODE). A function of time may arise in a mathematical model of a physical or other sort of process, it being related in some interdependent way with one or more of its derivatives. The interdependence usually gives an equation, that might be easy to solve or virtually impossible. We'll study some easy methods of solution, and some not so easy, and we hope you develop strategies for attacking problems efficiently. One thing that happens is that some differential equations can best be solved using complex number, so we'll have to get you familiar with complex numbers.

The course consists of Lectures, the more formal part, and Discussion Sessions, that are very important. They allow you to develop problem-solving and application skills in a less formal setting than Lectures. You need to learn to ask questions in both parts, Lecture and Discussion Section!

## MATERIAL COVERED

The text is divided into Chapters, which are divided into Sections. For example, 2.2 refers to section Two of Chapter Two, a section we won't cover but which you should read and use whenever you can. We are supposed to cover these sections:

1.1–1.7,	6 lectures;
2.1, 2.3–2.6,	6 lectures;
3.1–3.6,	5 lectures;
4.4,	1 lecture;
5.1–5.6,	6 lectures;
6.1, 6.2, 6.5–6.7,	6 lectures;
8.1–8.8, 8.11, 8.12,	11 lectures.

This is one of the first times this text has been used here. Please write down your comments from time to time and give them to me or to your TA so they can be shared and given to the Director of Undergraduate Studies.

## GRADING

There will be 3 Midterm Tests. **Tentative Test dates: Sept 30, Oct 23, Nov 18.** Your TA will announce, and discuss with you, other grading matters, such as Homework and Quizzes, early in the semester.

Each Test may involve material covered in lectures up to the Test. Thus, you are responsible for material covered in the lectures!

**Calculator policy** Calculators will not be allowed on Tests or on the Final. Ask your TA whether or not calculators will be allowed on Quizzes. Test problem computations will be designed to be easily done. You should use calculators and computers to help you check your work when you study, work on (possible) Projects or Special Problems.

Your overall grade in this course will reflect what you did in it, not your ability or potential. It is very important, then, for you to be able to put your work on paper, under time pressure. If you have problems taking tests, there are people on campus who might be able to help you overcome them. Ask about it at an office hour!

You'll have a GPA grade for each "Grading Item:" each Test, your TA's term score for you, and the Final. The weighting of the grades, though subject to change, is, at present: 35% for Tests, 30% for TA scores and 35% for the Final. The weights may have to be changed if a Project is offered or if Special Problems are assigned. Grades will perhaps amount to 80–85% for A, 65–70% for B, 50–55% for C, 40–45% for D.

**How to compute your GPAs.** Each grading item will have "Gradelines" assigned to it. For example, if the B gradeline is 70, the A gradeline is 85, and your score is 80, then your GPA grade,  $G$ , for that item is  $G := 3 + \frac{80 - 70}{85 - 70} = 3.67$  (rounded to 2 places). In other words, your GPA grade is B, plus 2/3 of the way between B and A. Your GPA grade,  $G$ , on any grading item is computed using your score on it, and numbers  $g$  (the grade corresponding to the highest gradeline smaller or equal to your score),  $glb$  (the highest gradeline smaller than or equal to your score),  $gla$  (the lowest gradeline greater than your score):

$$G = g + \frac{\text{your score} - glb}{gla - glb}$$

where  $glb$  is the gradeline just below your score,

$gla$  is the next gradeline - above your score,

and  $g$  is the grade number: 5 for a 100% score, 4 for the A gradeline, 3 for B, etc.

If your score falls on a gradeline, then  $G = g$ . If your score is 100% on a grading item, your  $G = 5$ .

When the  $G$  are multiplied by their weights, and added, the result is your GPA grade for the course. If your total is within 0.025 of one of the University of Minnesota's official GPA numbers that define one of the valid letter or letter-plus-or-minus grades, your grade is "borderline." Case-by-case decisions are made then, whether to award the higher or the lower grade. One important factor is the direction your grades have taken at the course's end.

**Be sure to talk to me in advance if you have to miss a Test!** If you do miss a Test, and you don't make arrangements in advance, your  $G$  for that Test is zero! Your TAs will have their own policies about missed assignments.

If, for documented reasons beyond your control, you're passing and you can't complete the course, your grade up to that point may "stay with you" as part of an Incomplete; all I's must be issued according to department guidelines.

## SCHOLASTIC CONDUCT

Please read the (appropriate for you) notices in the IT Bulletin, the CLA Bulletin, and so on. You are encouraged to work with others in understanding what problems say, setting up solutions, and so on. If you get ideas from a reference or from someone else, GIVE CREDIT! You must submit as YOUR work only what YOU have written up yourself, in your OWN words: DON'T COPY! Graders will be asked to bring answers that look alike to my attention.