Syllabus
Math 225, Section 01: Introduction to Differential Equations
Spring 2011, MW 2:30–3:45 pm, MP 101

Instructor: Dr. Minkoff
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Office Hours: Mondays 4:00 – 5:00 pm or by appointment.

Prerequisite: Math 152 (or a comparable course). Math 251 is recommended.
Text: *An Introduction to Differential Equations and Their Applications*, by Farlow. Publisher: Dover Publications, Inc. 2006.

The course will cover Chapters 1–3, 5, 6, and part of 8.

Grades:

Homework	15%
Project	10%
Test 1	20%
Test 2	25%
Final Exam	30%
Total	100%

Homework assignments: There will be one homework due every week on Wednesday. Homework is to be turned in at the START of class on Wednesday or can be slipped under my office door *prior* to class on Wednesday if you must miss class for some reason. *Late homework will not be accepted.* However, your two lowest homework grades will not count towards calculation of your final grade. Whenever possible, homework will be graded and returned within one week of being collected.

The grader will check that all homework assigned has been done, but will only carefully grade selected problems. Please note that the homework constitutes a substantial portion of your overall grade. In order to learn the concepts and be able to apply them to solving problems on exams, etc., you are strongly encouraged to devote as much time as possible to working the homework problems. I encourage you to discuss the homework assignments with other students in the class. However, I expect the homework you submit for grading to be written up by you alone (this includes computer programs which must not be duplicates of programs other students turn in).

Project: In addition to the weekly homework assignments, there will be a class project. Students will work in teams to investigate and explain to the class an application problem of interest involving an ode. Detailed instructions to follow.

Tests: There will be two in-class exams (not including the final exam). No make-up exams will be given except *possibly* in the case of a serious emergency. **In such a case I must be notified**

in advance. There will be no exceptions to taking the final exam at the date, time, and place specified by the University (Friday 5/20/11 from 1:00–3:00 pm in MP 101). The final exam will be comprehensive.

Learning Goals and Course Motivation: Many physical phenomena are modeled by differential equations. In this class we will focus on ordinary differential equations (ode's) (equations which involve ordinary derivatives of functions). Example applications which are modeled by ordinary differential equations include mass-spring systems (harmonic oscillators), predator-prey problems (rabbits and foxes), population dynamics, chemical mixing problems, etc. Our primary goal in this class will be to learn basic techniques for solving ode's and systems of ode's by hand (analytically). We focus primarily on first and second-order equations with simple (often constant) coefficients. We will also discuss how one would approximate solutions to more complex equations by using numerical techniques (such as Euler's method).

Specifically, in this course you will:

1. Learn basic theory for when first-order ode's have (unique) solutions.
2. Learn graphical techniques for understanding qualitative aspects of solutions to ode's.
3. Learn basic techniques such as separation of variables and integrating factors for solving first-order ode's.
4. Learn simple numerical techniques such as Euler's method and higher-order Taylor series methods for approximating solutions to first-order equations on a computer. We also discuss the accuracy of these approximations (their error).
5. Learn techniques for solving second-order ode's by hand starting with homogeneous equations with constant-coefficients.
6. Learn how to solve nonhomogeneous second-order ode's and the principal of superposition to obtain the general solution to the ode.
7. Learn about integral transforms (the Laplace transform) and how transforms can be used to turn differential equations into algebraic equations which can be solved more easily.
8. Learn the most powerful technique for solving systems of first-order ode's – namely, eigenvalues and eigenvectors.

Academic Conduct:
I take academic dishonesty *very seriously* and will not tolerate it in this class in any form. Academic misconduct includes willfully cheating on or giving aid during an exam or copying homework assignments. Blatant copying on an exam or homework assignment will result in a grade of zero for that work.

The university now stipulates that the following be included in all class syllabi:

By enrolling in this course, each student assumes the responsibility of an active participant in UMBC's scholarly community in which everyone's academic work and behavior are held to the

highest standards of honesty. Cheating, fabrication, plagiarism, and helping others to commit these acts are all forms of academic dishonesty, and they are wrong. Academic misconduct could result in disciplinary action that may include, but is not limited to, suspension or dismissal.

To read the full Student Academic Conduct Policy, consult the *UMBC Student Handbook*, the *Faculty Handbook*, the *UMBC Integrity webpage* www.umbc.edu/integrity, or the *Graduate School website* www.umbc.edu/gradschool.

Class Attendance: I expect students to attend class and to turn up **on time**. Rarely do students do well in classes which they do not attend, and I will be less likely to give outside assistance to students who regularly miss class. Further, students arriving late for class disrupt the entire class. Students who consistently turn up more than a few minutes late for class or who regularly miss class may be docked points from their final grade.

Email: I am happy to answer questions about the class via email. However, it is much better for you if we can talk in my office at the board. Answers given over email will be brief and intended merely to answer your direct question rather than to explain concepts. I reserve the right not to respond to email if I feel it would be best for the student to discuss his/her question in person during my office hours. I will not respond to email which does not include the name of the sender.

Important Dates:

Date	Notes
1/26/11	First day of class
2/8/11	Last day to register
2/8/11	Last day to drop class (without "W" on transcript)
2/23/11	First Hour Exam
4/4/11	Second Hour Exam
4/8/11	Last day to drop class
4/25/11	Student Presentations
5/12/11	Last day of classes
5/20/11	Final Exam