MAT244F Ordinary Differential Equations (Fall 2012)

Section L0101: MTR 10-11 LM 162 (Lash Miller: 80 St. George)
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Section L5101: W 6-9 LM 162 (Lash Miller: 80 St. George)
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Course Website: http://www.math.utoronto.ca/~mein/teaching/244F.html
Please check regularly for updates, including recommended exercises, course handouts, and office hour times and locations. Grades will be found on the Portal website: https://portal.utoronto.ca

Marking scheme:
There will be three quizzes, two midterms and a final exam. The **term mark** will be calculated with the following weights: midterm 1 = 40%, midterm 2 = 40%, 3 quizzes = 20%. The **course mark** is calculated as either 60% final exam mark + 40% term mark, or 60% term mark + 40% final exam mark, whichever gives the better result.

Important Dates:
Sept 25: **Quiz #1** for L5101 (Bazett)
Sept 26: **Quiz #1** for L0101 (Meinrenken)
Oct 8: Thanksgiving (no classes)
Oct 10: **Midterm #1** 6:10-7:00pm, location TBA
Oct 24: **Quiz #2** for L0101 (Meinrenken)
Oct 25: **Quiz #2** for L5101 (Bazett)
Nov 4: Last day to drop course from academic record and GPA
Nov 7: **Midterm #2** 6:10-7:00pm, location TBA
Nov 12-13: Fall break (no classes)
Nov 21: **Quiz #3** for L0101 (Meinrenken)
Nov 22: **Quiz #3** for L5101 (Bazett)
Dec 4: End of classes
Dec 5: "Make up for Monday classes"
Dec 6: 6-8pm Review for L5101 to make up for lost time due to midterms

The quizzes will take place during class. (You have to write your quiz in your own section!) The date/time for the final exam will be announced later.

Academic Integrity: Please familiarize yourself with the University policy regarding academic integrity (http://www.artsci.utoronto.ca/osai/students)

Textbook:
William Boyce, Richard DiPrima: *Elementary Differential equations and Boundary Value Problems (9th edition),* Wiley
or
William Boyce, Richard DiPrima: *Elementary Differential equations (9th edition),* Wiley

Course Outline:

1. Introduction (1.1, 1.2)
    - Types of differential equations (1.3)
    - Direction fields for first order ODE's, isoclines (1.1 + extra material)
2. First order ODE's
    - Separable ODE's (2.2)
    - Linear first order ODE's: Integrating factor (2.1)
    - Exact first order ODE's (2.6)
    - Existence and uniqueness theorem for first order ODE's (2.4)
    - Autonomous equations (2.5)
    - Applications, modeling (2.3, 2.5)
    - Numerical techniques: Euler's method (2.7)
3. Second order linear ODE's
    - Existence and uniqueness theorem (3.2)
    - Wronskians (3.2)
    - Constant coefficient second order ODE's (3.1)
    - Complex roots (3.3)
    - Repeated roots, reduction of order (3.4)
    - Inhomogeneous equations: Undetermined coefficients, variation of parameters (3.5, 3.6)
    - Applications: Oscillations, vibrations (3.7, 3.8)
4. Higher order linear ODE's
    - Existence and uniqueness (4.1)
    - Fundamental systems of solutions, Wronskians (4.1)
    - Constant coefficient ODE's (4.2)
    - Inhomogeneous equations: Undetermined coefficients, variation of parameters (4.3, 4.4)
5. Systems of first order ODE's
    - Relation with higher order ODE's (7.1)
    - Review of some linear algebra (7.2, 7.3)
    - Existence and uniqueness (7.4)
    - Constant coefficient systems (7.5)
    - Complex eigenvalues, repeated eigenvalues (7.6, 7.8)
    - Fundamental matrices (7.7)
    - Inhomogeneous systems (7.9)
6. Nonlinear Differential Equations and Stability
    - Phase portraits (9.1)
    - Autonomous systems and stability (9.2)
    - Linearizations (9.3)
    - Applications (9.4, 9.5)
7. Series Solutions of Second Order Linear Equations
    - Review of power series (5.1)
    - Series solution near ordinary point (5.2, 5.3)
    - Examples
8. Review

Practice Problems:
A series of highly recommend problems will be posted on the course website, updated periodically. These are for practice, not to be handed in. However, quizzes will contain problems mainly from the practice problems.