

Math 232, Differential Equations (Winter 2007)

Course Outline

About the course:

Math 232 is an introductory course on differential equations, intended for students with a knowledge of first-year calculus. The main aim of the course is to introduce the standard methods of solving first and second-order linear differential equations. The students will be able to recognize some important types of differential equations as they occur in numerous applications, and develop the skills to solve homogeneous and nonhomogeneous linear differential equations. A variety of examples, modeling problems, and applications will be considered and some qualitative aspects of the theory will be touched upon.

Recommended Text:

*Differential Equations
and Their Applications*

An Introduction to Applied Mathematics, 4th edition
by Martin Braun
Springer 1993.

Course webpages:

Course homepage: <http://www.mast.queensu.ca/~math232/>

[Course WebCT site](#)

Grading scheme :

Homework	20%
Midterm Exam	20%
Final Exam	60%

Assignments will be posted on the [homework page](#). No paper assignments will be handed out. There will be 11 assignments in all, one per week except the reading week, and your lowest assignment score will be dropped. Solutions will be posted after the due dates. You should be able to check your marks anytime on WebCT.

Important Dates:

Due dates for the **assignments** can be found on the [homework page](#).

The **midterm exam** will be held on **Wednesday, February 14th**.

The **final exam** will be held during the **12-28 April** exam period, at a time and place to be available on the [exam information page](#)

Course Policies:

- First-year calculus is a prerequisite for this course, and it is your responsibility to review relevant topics from Differential and Integral Calculus that you learned in previous classes. If you foresee any difficulties in meeting this requirement, please talk to me.
- Students are encouraged to work together on assignments. Two students can hand in a single write-up for each assignment and both students will get the same mark in such a case. Names cannot, however, be added or deleted after the submission.
- Late submission of assignments will not be accepted.
- You are permitted to use Casio Fx-991 series calculators on midterm and finals exams.

Tentative lecture schedule and topics covered from the book

(Please note that,
even though the topics
to be covered will
remain the same, the
actual schedule could
change depending on the
pace of the lectures.

)

Week 1: Introduction, Newton's second law, definition of a DE, order of a differential equation, linear DEs, meaning of solutions, homogeneous first-order linear differential equations and their solutions, initial value problems (Section 1.2 of text).

Week 2: Non-homogeneous first-order linear ODEs, integrating factors (Section 1.2 ends), separable equations (Section 1.4).

Week 3: Mathematical Modeling: Radioactive dating (Sections 1.3), Population models (Section 1.5).

Week 4: Population models (Section 1.5 ends), Mixing problems (Section 1.8).

Week 5: Newtonian mechanics (not from the text), Exact equations and why we can't solve very many DEs (Section 1.9).

Week 6: Geometric view of DEs (not from the book), Second-order linear DEs, algebraic properties of solutions (Section 2.1).

Week 7: Reading week (No lectures).

Week 8: Linear DEs with constant coefficients (Section 2.2), The nonhomogeneous equation (Section 2.3).

Week 9: The nonhomogeneous equation (Section 2.3 ends), the method of variation of parameters (Section 2.4), the method of judicious guessing (Section 2.5).

Week 10: Mechanical vibrations (Section 2.6), The method of Laplace transforms (Section 2.9), some useful properties of the Laplace transform (Section 2.10).

Week 11: Some useful properties of the Laplace transform (Section 2.10 ends), The convolution integral (Section 2.13)

Week 12: The convolution integral (Section 2.13 ends). Qualitative theory of DEs (Section 4.1).

Week 13: Predator-Prey problems (Section 4.10).

Course material online

[\[Course announcements\]](#) [\[Homework\]](#) [\[Back to Course Homepage\]](#)

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