

MATH 327: DIFFERENTIAL EQUATIONS

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Semester Hour Credits: 3

PREREQUISITE: Math 121 or the equivalent (full calculus course, including power series and partial derivatives).

COURSE DESCRIPTION:

First order differential equations, linear ordinary differential equations, systems of equations, applications of differential equations, and existence and uniqueness of solutions.

TEXT:

Bronson, Richard. *Schaum's Outline Series, Theory and Problems of Differential Equations* (Second Edition). ISBN 0-07-008019-4 New York: McGraw-Hill, 1994.

You may wish to use mathematical software to check your answers and to graph solutions. You may download a limited-time version of Scientific Notebook at <http://www.mackichan.com/snbk/download/orderblk.htm>

COURSE OBJECTIVES:

1. To obtain a working knowledge of the analytic and numeric techniques of solving ordinary differential equations of order n .
2. To examine applications of differential equations in various disciplines.
3. To improve the student's ability to think and write in a mathematically mature fashion.
4. To use differential equations for mathematical modeling.
5. To use computing tools to help solve problems.

MAJOR TOPICS:

1. Preliminaries: Definitions, elimination of arbitrary constants, families of curves.
2. Equations of order one: Isoclines, existence of solutions, solution methods (separation of variables, exact equations, integrating factors), applications of first order equations.
3. Linear differential equations: Linear independence, the Wronskian, existence and uniqueness, differential operators, solving constant coefficients equations, non-homogeneous equations and undetermined coefficients, variation of parameters, solution by inspection, reduction of order, Laplace transforms, inverse transforms, applications of higher order LODE's.
4. Systems of equations: Elementary eliminations, matrix algebra, eigenvalues, non-homogeneous systems.
5. Numerical methods for solving differential equations: Euler's method, Taylor series, Runge-Kutta.