

Math 24 – Instructional Objectives and Student Learning Outcomes

The goal of this course is to provide students with the tools necessary to solve ordinary differential equations and application problems modeled by them.

Learning Objectives Students enrolled in this course will:	Student Learning Outcomes Students that successfully complete this course will be able to:
1. Learn to solve first-order differential equations.	a. Solve separable, homogeneous, exact, and linear first-order differential equations with and without initial conditions. b. Determine regions of the plane over which a given first-order differential equation will have a unique solution. c. Solve application problems modeled by separable, homogeneous, exact, linear first-order differential equations, and equations reducible to first-order differential equations.
2. Learn to solve linear differential equations of higher-order.	a. Determine if a set of functions is linearly dependent or independent by definition and by using the Wronskian. b. Construct a second solution of a differential equation from a known solution. c. Solve homogenous linear equations with constant coefficients. d. Solve non-homogeneous linear equations with constant coefficients using the methods of undetermined coefficients and variation of parameters. e. Solve application problems modeled by linear differential equations.
3. Learn to solve application problems modeled by a second-order differential equation.	a. Solve simple harmonic motion problems. b. Solve damped motion problems. c. Solve forced motion problems.
4. Learn to solve differential equations with variable coefficients.	a. Recognize and solve Cauchy-Euler equations. b. Use power series methods to solve differential equations about ordinary points. c. Use the Method of Frobenius to solve differential equations about regular singular points.
5. Learn to use Laplace transform methods to solve differential equations.	a. Find the Laplace transform of a function using the definition. b. Find the inverse Laplace function of a function. c. Use the Translation Theorems to find Laplace transforms. d. Find the Laplace transform of derivatives, integrals and periodic functions. e. Use the method of Laplace transforms to solve initial-value problems for linear differential equations with constant coefficients. f. Use the method of Laplace transforms to solve systems of linear first-order differential equations.
6. Learn to solve systems of equations of differential equations	a. Solve a linear system by the method of substitution. b. Write an nth order differential equation as a first-order system.

7. Learn to estimate solutions of a differential equation.	a. Solve a first-order initial value problem using Euler's method. b. Solve a first-order initial value problem using a second-order Runge-Kutta method.
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