

NorthWest Arkansas Community College  
Division of Science and Mathematics

### Course Number and Title

MATH 2584, Differential Equations with Laplace Transforms

### Catalog Description

Topics in this first course in differential equations will include first and second order ordinary differential equations; Laplace Transforms; systems of ordinary differential equations and eigenvectors.

### Prerequisites

MATH 2564 with a grade of C or better

### Credit hours/Contact hours/Load hours

4 credit hours/ 4 contact hours/ 4 load hours

### Target Audience/Transferability

This course is intended for students who are enrolled in a transfer degree such as the Associate of Science and will be obtaining a technical, science or mathematics based degree at a four year institution. It is designed to transfer to a university as a first course in differential equations.

### Student Learning Outcomes

Students who are successful in Differential Equations will be able to:

- 1) Classify and solve first -order differential equations according to their types including separable, linear, exact, homogeneous, and Bernoulli.
- 2) Solve nth order linear equations using the method of undetermined coefficients and variation of parameters.
- 3) Determine Laplace and inverse Laplace transforms and apply their operational properties in the context of the translation theorems, the Convolution Theorem, and the Dirac Delta Function.
- 4) Use Laplace transforms to solve initial value problems with constant coefficients.
- 5) Solve first order linear systems of differential equations.
- 6) Create and analyze mathematical models using first order differential equations to solve application problems such as mixture problems, population modeling, deflections of beams, and harmonic motion.

### Topics

1. Introduction to Differential Equations including terminology
2. Solving First-Order Differential Equations
3. Modeling with First-Order Differential Equations
4. Solving Higher-Order Differential Equations
5. Modeling with Higher-Order Differential Equations

6. The Laplace Transform
7. Solving Systems of Linear First-Order Differential Equations Using Eigenvalues and Eigenvectors

### Forms of Assessment

Assessment of student learning outcomes will be administered according to the math department's current assessment plan.