

Northwest Arkansas Community College
Science and Mathematics Division

Discipline Code

MATH

Course Number

2584

Course Title

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

4 credit hours

Contact hours

60 contact hours

Load hours

4 load hours

Semesters Offered

Fall and Spring

ACTS Equivalent

No ACTS equivalency

Grade Mode

A-F

Learning Outcomes

Upon successful completion of this course students will exhibit mastery of certain knowledge and basic skills. These skills include, but are not limited to:

- Classify and solve first -order differential equations according to their types including separable, linear, exact, homogeneous, and Bernoulli.
 - Solve nth order linear equations using the method of undetermined coefficients and variation of parameters.
 - 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.
 - Use Laplace transforms to solve initial value problems with constant coefficients.
 - Solve first order linear systems of differential equations.
 - 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.
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- **General Education Outcomes Supported**
 - Students develop higher order thinking skills.
 - Students achieve mathematical literacy

Standard Practices

Topics list

- Introduction to Differential Equations including terminology
- Solving First-Order Differential Equations
- Modeling with First-Order Differential Equations
- Solving Higher-Order Differential Equations
- Modeling with Higher-Order Differential Equations
- The Laplace Transform
- Solving Systems of Linear First-Order Differential Equations Using Eigenvalues and Eigenvectors

Learning activities

- Courses must, at a minimum, cover the core learning outcomes for each topic. Faculty may add to these outcomes, but may not omit any of them.
- The content of the course may be taught with or without the use of a graphing calculator as deemed appropriate by the instructor.

Assessments

- There will be a common departmental portion on the required comprehensive final exam.
- These questions will be in direct support of the Learning Outcomes.
- Instructors will report the results of the individual departmental questions when grades are submitted.

Grading Guidelines

- At least 70% of the student's final grade should come from proctored work.