NORTHERN NEW MEXICO COLLEGE

Course Number Course Name	Math 2410 Introduction to Applied Ordinary Differential Equations
Credit Value (Breakdown of theory and lab credits)	3 Theory
Catalog Course Description	An introduction to differential equations. Students will be able to classify, construct, and solve different types of equations. Systems of equations, Laplace transforms, series solutions, and numerical methods are introduced. Prerequisite: MATH 1520. (3, 3T+0L)
Course Student Learning Outcomes/Objectives /Competencies of the Course	**Student Learning Outcomes:** 1. First-order equations a. Solve linear, separable, exact, and Bernoulli equations. b. Use phase lines and direction fields to analyze the behavior of first-order equations. 2. Higher-order, constant-coefficient, linear equations a. Solve linear, constant-coefficient homogeneous equations. b. Solve linear, constant-coefficient non-homogeneous equations using undetermined coefficients and variation of parameters. c. Demonstrate that a set of solutions is a fundamental one. d. Determine a solution to an equation through reduction of order. 3. Laplace transforms a. Compute Laplace transforms and inverse-Laplace transforms of basic functions. b. Solve initial-value problems using the Laplace transform. c. Solve linear equations with discontinuous forcing functions involving the unit step function and the Dirac delta function. d. Apply convolutions with Laplace transforms. 4. Systems of equations a. Solve systems of linear, constant-coefficient, homogeneous equations. b. Use a phase plot to analyze the behavior of a system of equations. 5. Series solutions and non-constant-coefficient linear equations a. Determine a series solution of an equation about an ordinary point. b. Determine a series solution of an equation about a regular singular point. c. Determine the radius of convergence of a series solution. 6. Numerical methods a. Use a computational program to approximate solutions to an equation. b. Identify limitations of numerical methods. c. Use a computational program to analyze the behavior of an equation or system of equations. 7. Applications a. Create a differential equation or system of equations that models a given application. b. Analyze a differential equation that models a given application to determine the behavior of the model.
College-Wide Student Learning Outcomes	Math 2410 exposes students to the following NNMC College Wide Goals: *Critical thought: Students are required to analyze and synthesize information and draw reasoned conclusions.*

	Quantitative reasoning: Calculate, represent, apply, analyze, and communicate both quantitative and qualitative information.
Program Student Learning Outcomes measured	PSLO #3: Use linear algebra and matrices, vector analysis, ordinary differential equations, partial differential equations, or complex analysis to solve real world problems.