

Course Objectives/Course Outline
Spokane Community College

Course Title: Elementary Differential Equations

Prefix and Course Number: MATH 274

Course Learning Outcomes:

By the end of this course, a student should be able to:

- Communicate mathematical ideas in both every day and mathematical language using appropriate vocabulary and notation
- Set up and solve first order differential equations by a variety of methods
- Set up and solve second order and higher order differential equations, including constant and undetermined coefficients
- Construct and apply appropriate differential equations to model a scenario
- Understand solution construction including the difference between families of solutions and a particular solution specific to a given initial value
- Employ Laplace transforms to solve certain differential equations
- Use basic power series methods to solve linear differential equations
- Recognize and solve systems of differential equations – including using numerical methods

Course Outline:

I: First Order Equations

1. Introduction to differential equations and solutions
2. Initial value problems
3. Separable equations
4. Linear equations
5. Exact equations
6. Substitutions

II: Modeling (Applications)

1. Orthogonal Trajectories
2. Growth (e.g. Populations)
3. Heating & Cooling
4. Electrical Circuits
5. Numerical Methods

III: Higher Order Equations

1. Homogeneous & Linear Equations (with constant coefficients; including initial value and boundary value problems).
2. Methods of Undetermined Coefficients
3. Variation of Parameters
4. Reduction of Order
5. Applications (e.g. Mass-Spring)

IV: Laplace Transforms

1. Definition and Properties of the Laplace Transform
2. Inverse Laplace Transform
3. Solutions with Laplace Transform

V: Extensions & Applications of Differential Equations

1. Introduction to Power Series solutions of Differential Equations
2. Introduction to Matrices & Linear Systems of Differential Equations
3. Solving Homogeneous Linear Systems