Minnesota State University Moorhead

MATH 366: Differential Equations

A. COURSE DESCRIPTION

Credits: 3

Lecture Hours/Week: 3

Lab Hours/Week: 0

OJT Hours/Week: *.*

Prerequisites:
This course requires the following prerequisite
MATH 323 - Multi-Variable and Vector Calculus

Corequisites: None

MnTC Goals: None

Classify a differential equation. Solve a variety of ordinary differential equations and initial value problems using a variety of techniques, including finding exact solutions, numerical solutions, and power series solutions. Be able to discern qualitative information from a differential equation without finding an explicit or implicit solution. Students must meet the prerequisite or be concurrently enrolled in MATH 323.

B. COURSE EFFECTIVE DATES: 11/12/1996 - Present

C. OUTLINE OF MAJOR CONTENT AREAS

1. Solutions of differential equations and initial value problems
2. Existence and unicity of solutions
3. Modeling of real-life problems via differential equations
4. First-order equations: direction fields, autonomous differential equations, separable equations, linear equations, exact equations, solutions by substitutions
5. Higher-order differential equations, linear equations with constant coefficients, undetermined coefficients, variations of parameters, Cauchy-Euler equation
6. Linear and nonlinear models
7. Modeling with higher-order differential equations
8. Series solutions of differential equations, solutions about ordinary and singular points
9. Numerical methods: Euler and Range-Kutta methods
10. The Laplace Transform, the Dirac Delta Function

D. LEARNING OUTCOMES (General)

1. Classify a differential equation.
2. Solve a variety of ordinary differential equations and initial value problems using a variety of techniques, including finding exact solutions, numerical solutions, and power series solutions.
3. Be able to discern qualitative information from a differential equation without finding an explicit or implicit solution.
4. Clearly express mathematical/logical ideas in writing.
5. Apply higher-order problem-solving and/or modeling strategies.
6. Use a symbolic and numerical computing software to solve differential equations, graph their solutions, and use numerical methods to solve real-life problems.

E. Minnesota Transfer Curriculum Goal Area(s) and Competencies

   None

F. LEARNER OUTCOMES ASSESSMENT

   As noted on course syllabus

G. SPECIAL INFORMATION

   None noted