

Moberly Area Community College Common Syllabus

MTH250 Differential Equations

Current Term

Instructor:**Office number:****Office hours:****Response Time:** I typically respond to student emails within 24 hours, Monday through Friday.**Contact information:****Classroom number:****Section number(s):****Class days and time:****Catalog Description:** MTH250 Differential Equations (3-0-3)

Topics include differential equations of first order and first degree, applications of first order, first degree differential equations, homogeneous linear differential equations with constant coefficients, Laplace transforms, power series, series solutions, and numerical solutions of differential equations.

Prerequisite: MTH203 with a grade of "C" or higher

Text(s):

Title:	<i>Differential Equations with Boundary Value Problems Etext</i>
Author:	Polking
Edition:	2 nd Edition
Publisher:	Pearson
ISBN:	978-0-321-99810-1

Other Required Materials:

None

Purpose of Course: Differential equations will provide students with a working knowledge of advanced mathematical concepts used to model physical systems and other applied problems. It provides a solid foundation for further study in mathematics, the sciences, and engineering.

Course Objectives (CO): Upon successful completion of this course, students will be able to:

1. Classify Differential Equations
2. Understand the Slope Field of a Differential Equation
3. Solve Separable, Homogenous, and Exact Equations
4. Solve First Order Linear Equations
5. Understand Linear Independence and Span
6. Calculate and Use Wronskians
7. Find Eigenvalues and Eigenvectors

8. Solve Second Order Linear Equations with Constant Coefficients
9. Solve Higher Order Linear Equations with Constant Coefficients
10. Use the Laplace Transform to Solve Differential Equations
11. Use Series to Solve Differential Equations
12. Solve Systems of First Order Homogenous Linear Equations with Constant Coefficients
13. Use Differential Equations to Solve Basic Modeling Problems
14. Use Differential Equations to Solve Vibration Modeling Problems
15. Use Differential Equations to Solve Forced Vibration Modeling Problems
16. Use the Euler Method to Approximate Solutions of Differential Equations

Course Content: A minimum course consists of the selected material in chapters 1-5, 8 and 10.

- Chapter 1: What is a Differential Equation
- Chapter 2: Second Order Linear Equations
- Chapter 3: Qualitative Properties and Theoretical Aspects
- Chapter 4: Power Series Solutions and Special Functions
- Chapter 5: Numerical Methods
- Chapter 8: Laplace Transforms
- Chapter 10: Systems of First Order Equations

Statement to Connect Course with Institutional Student Level Outcomes:

In compliance with MACC's Institutional Student Level Outcomes, the student who successfully completes this course will be able to meet the following institutional learning outcomes:

- **Higher Order Thinking:** Students will demonstrate the ability to distinguish among opinions, facts, and inferences; to identify underlying or implicit assumptions; to make informed judgments; to solve problems by applying evaluative standards; and to reflect upon and refine those problem-solving skills. This outcome involves creative thinking, critical thinking, and quantitative literacy.

Evaluation of Student Learning: Grades will be calculated in the Canvas gradebook where 60% mastery will be necessary for completion of the course. Students who wish to transfer or who are enrolled in special programs may also have a minimum of 70% mastery required. Please check with your transfer institution or program director. Grades will be updated at least after each chapter test throughout the semester in the Canvas gradebook.

The grading scale will be structured as follows:

- A - 90 - 100%
- B - 80 - 89%
- C - 70 - 79%
- D - 60 - 69%
- F - 59% or below

Points will be accumulated by:

Homework/Quizzes: 10%

Chapter/Unit Tests: 65%

Final Exam: 25%

(Instructors can take away from Homework/Quiz category to add to tests, but homework and quizzes cannot be more than 10%)

Testing Expectations:

This is a credit-bearing course. Retakes of tests are not allowed for individual students. Contact the Math Department Coordinator and/or refer to the course pages in the Math Department Canvas Shell for guidelines.

Description of Major Assignment(s)/Project(s):

Per instructor's policy

Schedule of Student Assignments/Activities:

Instructors will identify a Student Assignment/Activities schedule. Instructors have the prerogative to construct the schedule by class periods, weeks, or an overview of topics to be covered.

Collegewide Policies:

All faculty and students need to be aware of collegewide policies and procedures. Statements on Academic Dishonesty, ADA, Attendance, Title IX, and other important collegewide policies can be accessed by clicking on the following: [Collegewide Policies in Student Resources](#).

Tentative Schedule MTH 250 – Differential Equations

Week 1	Welcome & Syllabus Classifying Differential Equations Slope Fields	Separable Equations Homogenous Equations
Week 2	Exact Equations Integrating Factors for Exact Equations	First Order Linear Equations
Week 3	Review	Exam 1
Week 4	Vector Spaces Subspaces	Linear Independence Span Bases
Week 5	The Wronskian Homomorphisms	Eigenvectors Eigenvalues
Week 6	Review	Exam 2
Week 7	First Order Linear Homogenous Constant Coefficient Equations First Order Linear Non Homogenous Constant Coefficient Equations Second Order Linear Homogenous Constant Coefficient Equations	Second Order Linear Non Homogenous Constant Coefficient Equations
Week 8	Second Order Linear Non Homogenous Constant Coefficient Equations	Higher Order Linear Homogenous Constant Coefficient Equations Higher Order Linear Non Homogenous Constant Coefficient Equations
Week 9	Review	Exam 3
Week 10	Step Functions The Dirac Delta Function Convolutions	The Laplace Transform
Week 11	Solving with Laplace Transforms Solving with Laplace Transforms Step	Solving with Laplace Transforms Impulse Solving with Laplace Transforms Convolution
Week 12	Review	Exam 4
Week 13	Series Solutions Systems of First Order Homogenous Linear Equations with Constant Coefficients	Systems of First Order Homogenous Linear Equations with Constant Coefficients
Week 14	Modeling Vibrations Forced Vibrations	The Euler Method
Week 15	Review	Exam 5
Week 16	Final Exam	