

MAT 244 – ORDINARY DIFFERENTIAL EQUATIONS

4 hrs./wk. – 4 cr.

9/2019

BEGINNING FALL 2019

Catalog Description: A course in methods for solving ordinary differential equations. Introduction to classical equations and their solutions, physical applications, Laplace Transforms, numerical solutions, and Fourier Series.

Prerequisite: MAT 132 (grade of "C" or better).

Text: Fundamentals of Differential Equations and Boundary Value Problems. Nagle, Saff, Sinder, 7th ed. Pearson.

Syllabus

Period	Section	Topics
1,2	1.1, 1.2, 1.3, 1.4	Introduction, Direction Fields, Euler's Method
3, 4, 5	2.2, 2.3, 2.4, 2.6	Separable, Linear, Exact, Bernoulli, and Riccati Equations
6, 7	3.1 - 3.5	Applications (selected topics by instructor)
8	4.2, 4.7	Homogeneous Equations with constant coefficients
		Solutions to Linear Homogeneous Equations, Wronskian
9	4.2, 4.3	Repeated Roots and Complex Roots
10		Exam 1
11	4.4, 4.5	Nonhomogeneous Equations, Undetermined Coeff.
12	4.6	Variation of Parameters
13	4.7	Reduction of Order
14, 15	4.9, 4.10	Damped/Undamped, Forced Behavior, Resonance
16	8.2	Review of Power Series
17, 18, 19	8.3, 8.4, 8.5	Solutions to 2nd order Linear Equations w/ Variable Coeff.
		Cauchy-Euler Equation
20		Midterm
21, 22	7.2, 7.3	Definition of Laplace Transform
23, 24	7.4, 7.5	Solutions of Initial Value Problems
25, 26, 27	7.6	Step Functions, ODEs with Discontinuous Forcing Functions
28	7.7	Impulse Functions
29	7.8	Convolution Integral
30, 31	11.2	Two-Point Boundary Value Problems
32		Exam 2
33, 34	9.1, 9.2	Introduction & Matrices
35, 36, 37	9.3, 9.4, 9.5	Linear Algebraic Equations, Eigenvalues and Eigenvectors
38, 39, 40	9.5, 9.6	Homogeneous Linear Systems w/ Constant Coefficients
		Complex Eigenvalues
41, 42	10.3	Fourier Series
43	10.4	Fourier Sine and Cosine Series
44		Review
45		Final Exam

Students are expected to adhere to the policies of the County College of Morris. These can be accessed at www.ccm.edu/academics/academic-policies/.

Statement of Course LEARNING OUTCOMES

- Define, recognize, and classify differential equations.
- Identify and solve separable, homogeneous, exact, linear, Bernoulli, Riccati, and Clairaut's differential equations.
- Apply integrating factor when necessary.
- Understand the role of initial value problems.
- Apply differential equations to find orthogonal and oblique trajectories, as well as solve rate, force, motion, and electrical circuit problems.
- Solve differential equations using power series.
- Write and modify MATLAB code to solve differential equations numerically.
- Classify and solve systems of differential equations.
- Define and use a Laplace Transform to solve differential equations.
- Find Fourier Series representations of functions and find coefficients.