Differential Equations

Math 2320.221H2
Spring 2025
M W 5:30 pm – 7:20 pm, STEM 115

Instructor Information
Dr. Jason Duvall
jduvall3@com.edu
409.933.8381

Student (Office) Hours and Location
M	3:15 – 4:15	STEM 325.18
	4:15 – 5:15	Tutoring Center
T	12:30 – 2:30	STEM 325.18
W	3:15 – 5:15	STEM 325.18
Th	12:30 – 2:30	STEM 325.18

Required Textbook/Materials
The textbook used in this course is Fundamentals of Differential Equations, 9th ed. by R. Kent Nagle, published by Pearson. The homework and quizzes as well as the e-text and videos for this course are online at mymathlab.com, which you can access through Brightspace.
Note: Course materials are available for free via MyLab Math in Brightspace/D2L (no purchase necessary).

Course Description
Ordinary differential equations, including linear equations, systems of equations, equations with variable coefficients, existence and uniqueness of solutions, series solutions, singular points, transform methods, and boundary value problems; application of differential equations to real-world problems. Prerequisite: MATH 2414 with grade "C" or better.

Course Requirements
- **Homework**: There will be a homework assignment for each section we cover in class to be completed online using MyLab Math. You can retry any homework question you answer incorrectly as many times as you like until you get the correct answer.
- **Quizzes**: There will be at least four quizzes to be completed online using MyLab Math. You can retake each quiz once to improve your score; the higher score will be recorded. There may also be regular in-class quizzes.

- **Exams**: There will be either three or four exams (depending on timing) and a comprehensive final exam. The final exam and all but one of the exams will be completed in class, and one exam will be completed online.

Determination of Course Grade/Detailed Grading Formula
- Your final numerical grade will be determined by the following formula:
  10% (HW Avg) + 10% (Quiz Avg) + 60% (Exam Avg) + 20% (Final Exam)
- Your final letter grade will be assigned according to the following formula:
  A: 90–100   B: 80–90   C: 70–80   D: 60–70   F: 0–60

Late Work, Make-Up, and Extra Credit Policy
Late homework and quizzes may be submitted with a 20% penalty. In-class tests must be taken at the scheduled time. Make-up tests for missed exams will only be given at the discretion of the instructor if the student notifies the instructor as soon as possible about the absence.

Attendance Policy
Attendance is required.

Communicating with Your Instructor
ALL electronic communication with the instructor must be through your COM email. Due to FERPA restrictions, faculty cannot share any information about performance in the class through other electronic means.

Student Learner Outcomes

Student Learner Outcome	Maps to Core Objective	Assessed via
1. Identify homogeneous equations, homogeneous equations with constant coefficients, and exact and linear differential equations.	Communication Skills	Exam
2. Solve ordinary differential equations and systems of equations using direct integration, separation of variables, reduction of order, methods of undetermined coefficients and variation of parameters, series solutions, operator methods for finding particular solutions, and Laplace transform methods.	Empirical and Quantitative Skills	Exam
3. Determine particular solutions to differential equations with given boundary conditions or initial conditions.	Empirical and Quantitative Skills	Exam
4. Analyze real-world problems in fields such as Biology, Chemistry, Economics, Engineering, and Physics, including problems related to population dynamics, mixtures, growth and decay, heating and cooling, electronic circuits, and Newtonian mechanics.	Critical Thinking Skills	Exam

Academic Dishonesty
College of the Mainland is committed to a high standard of academic integrity. All students are responsible for honesty and independent effort. Incidents of academic and scholastic dishonesty (including cheating, plagiarism, and collusion) will be addressed in a manner that is not inconsistent with College Policy and the Student Handbook. Specifically, any student found to have been academically dishonest on an assignment,

quiz or exam will receive a zero for that assignment, quiz or exam and he or she will be referred to the administration for further disciplinary action.

Student Concerns

If you have any questions or concerns about any aspect of this course, please contact your instructor using the contact information provided above. If, after discussing your concern with the instructor, your concern persists, please contact Leslie Richardson, Mathematics Department Chair, at lrichardson@com.edu.

Institutional Policies and Guidelines

Grade Appeal Process

Concerns about the accuracy of grades should first be discussed with the instructor. A request for a change of grade is a formal request and must be made within six months of the grade assignment. Directions for filing an appeal can be found in the student handbook:
https://www.com.edu/student-services/docs/Student_Handbook_2024-2025_v2.pdf.
An appeal will not be considered because of general dissatisfaction with a grade, penalty, or outcome of a course. Disagreement with the instructor's professional judgment of the quality of the student's work and performance is also not an admissible basis for a grade appeal.

Academic Success and Support Services

College of the Mainland is committed to providing students with the necessary support and tools for success in their college careers. Support is offered through our Tutoring Services, Library, Counseling, and through Student Services. Please discuss any concerns with your faculty or an advisor.

ADA Statement

Any student with a documented disability needing academic accommodations is requested to contact:
Kimberly Lachney, Student Accessibility Services Coordinator
Phone: 409-933-8919
Email: AccessibilityServices@com.edu
Location: COM Doyle Family Administration Building, Student Success Center

Textbook Purchasing Statement

A student attending College of the Mainland is not under any obligation to purchase a textbook from the college-affiliated bookstore. The same textbook may also be available from an independent retailer, including an online retailer.

Withdrawal Policy

Students may withdraw from this course for any reason prior to the last eligible day for a "W" grade. Before withdrawing students should speak with the instructor and consult an advisor. Students are permitted to withdraw only six times during their college career by state law. The last date to withdraw from the 1st 8-week session is February 26. The last date to withdraw from the 16-week session is April 21. The last date to withdraw for the 2nd 8-week session is April 30.

FN Grading

The FN grade is issued in cases of *failure due to a lack of attendance*, as determined by the instructor. The FN grade may be issued for cases in which the student ceases or fails to attend class, submit assignments, or

participate in required capacities, and for which the student has failed to withdraw. The issuing of the FN grade is at the discretion of the instructor. The last date of attendance should be documented for submission of an FN grade.

Early Alert Program

The Student Success Center at College of the Mainland has implemented an Early Alert Program because student success and retention are very important to us. I have been asked to refer students to the program throughout the semester if they are having difficulty completing assignments or have poor attendance. If you are referred to the Early Alert Program you will be contacted by someone in the Student Success Center who will schedule a meeting with you to see what assistance they can offer to help you achieve your academic goals.

Resources to Help with Stress

If you are experiencing stress or anxiety about your daily living needs including food, housing or just feel you could benefit from free resources to help you through a difficult time, please click here https://www.com.edu/community-resource-center/. College of the Mainland has partnered with free community resources to help you stay on track with your schoolwork, by addressing life issues that get in the way of doing your best in school. All services are private and confidential. You may also contact the Dean of Students office at deanofstudents@com.edu or communityresources@com.edu.

Nondiscrimination Statement

The College District prohibits discrimination, including harassment, against any individual on the basis of race, color, religion, national origin, age, veteran status, disability, sex, sexual orientation, gender (including gender identity and gender expression), or any other basis prohibited by law. Retaliation against anyone involved in the complaint process is a violation of College District policy.

Course Schedule

Week 1
- 1.1 Background
- 1.2 Solutions of Initial Value Problems
- 1.3 Direction Fields
- 2.1 Introduction: Motion of a Falling Body
- Quiz 1 *(1.1 – 1.3)*

Week 2
- 2.2 Separable Equations
- 2.3 Linear Equations
- 2.4 Exact Equations
- Review for Exam 1
- Exam 1 *(1.1 – 1.3, 2.1 – 2.4)*

Week 3
- 3.4 Newtonian Mechanics
- 3.5 Electrical Circuits
- Quiz 2 *(3.4 – 3.5)*
- 4.1 Introduction: The Mass-Spring Oscillator
- 4.2 Homogeneous Linear Equations: The General Solution

Week 4
- 4.3 Auxiliary Equations with Complex Roots
- 4.4 Nonhomogeneous Equations: The Method of Undetermined Coefficients
- 4.5 The Superposition Principle and Undetermined Coefficients Revisited
- 4.6 Variation of Parameters
- Review for Exam 2
- Exam 2 *(3.4, 3.5, 4.1 – 4.6)*

Week 5
- 5.4 Introduction to the Phase Plane
- 6.1 Basic Theory of Linear Differential Equations
- Quiz 3 *(5.4, 6.1)*
- 6.2 Homogeneous Linear Equations with Constant Coefficients
- 6.3 Undetermined Coefficients and the Annihilator Method

Week 6
- 6.4 Method of Variation of Parameters
- Review for Exam 3
- Exam 3 *(5.4, 6.1 – 6.4)*
- 7.2 Definition of Laplace Transform

- 7.3 Properties of the Laplace Transform
- 7.4 Inverse Laplace Transform
- Quiz 4 *(7.2 – 7.4)*

Week 7
- 7.5 Solving Initial Value Problems
- 7.8 Convolution
- Review for Exam 4
- Exam 4 *(10.1 – 10.8)*

Week 8
- Review for Comprehensive Final Exam
- Comprehensive Final Exam

Due dates for all assignments are listed in MyLab Math.
This schedule is subject to change.