

Course Syllabus
Differential Equations
MATH 200

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SECTION 1

Course Introduction

Credit Hours: This course is 4 U.S. semester credits. The class consists of 50 classroom hours with an additional 8-10 hours spent outside the classroom, including excursions, visits to professional organizations, and activities.

Prerequisite Courses: Calculus I and Calculus II

Course Introduction:

Germany has played a central role in the development of mathematics, physics, and engineering. Among its most influential mathematicians is Gottfried Wilhelm Leibniz. Born in Leipzig in 1646, Leibniz made foundational contributions to calculus and is also credited with helping establish the field of differential equations. He introduced the term *aequatio differentialis*, Latin for “differential equation,” reflecting the emerging mathematical language used to describe changing quantities.

In this course you will cover material related principally to differential equations dealing with ordinary differential equations. Differential Equations are an important tool in Science and Engineering and are commonly associated with understanding population dynamics, radioactive decay, and certain chemical reactions. The content of this course will thus focus on first-order differential equations, higher-order differential equations, Laplace transforms, series solutions of linear differential equations, and the theory of linear systems.

In addition to the cognitive and knowledge skills listed above, students in this course will consider the contributions of Germans in science, mathematics, technology, and engineering through experiential learning components.

Course Learning Outcomes

At the end of this course students will be able to:

1. Recognize differential equations and their solutions.
2. Understand directional fields and trajectories of solutions of ordinary differential equations.

3. Compute solutions of first-order and higher-order differential equations.
4. Find the Laplace transform of a given function.
5. Solve linear differential equations.
6. Formulate differential equations with initial values and boundary values from real world applications.

Assessment

- A Achievement that is outstanding relative to the level necessary to meet course requirements.
- B Achievement that is significantly above the level necessary to meet course requirements.
- C Achievement that meets the course requirements in every respect.
- D Achievement that is worthy of credit even though it fails to meet fully the course requirements.
- P Achievement that is satisfactory, which is equivalent to a C- or better (achievement required for a P is at the discretion of the instructor but may be no lower than equivalent to a C-.)
- NP Represents failure (or no credit) and signifies that the work was either (1) completed but at a level of achievement that is not worthy of credit or (2) was not completed and there was no agreement between the instructor and the student that the student would be awarded an I (see also I).
- I (Incomplete) - Assigned at the discretion of the instructor when, due to extraordinary circumstances, e.g., hospitalization, a student is prevented from completing the work of the course on time. Requires a written agreement between instructor and student.

Grading Scale (Based on points)

95 – 100	⇒ A	77 – 79	⇒ C+	59 – Lower	⇒ E
90 – 94	⇒ A-	74 – 76	⇒ C		
87 – 89	⇒ B+	70 – 73	⇒ C-		
84 – 86	⇒ B	67 – 69	⇒ D+		
80 – 83	⇒ B-	60 – 66	⇒ D		

Distribution of Course Points

Attendance and participation 10%

Active participation in class discussions. Engagement in group activities and simulations. Contribution to discussions during experiential visits.

Chapter Quizzes 60%

Students will have a quiz after the end of each chapter.

Final Exam 30%

Students will have a final-term exam on the second half of the course.

Academic Policies

All program participants recognize and accept that the **CEPA ESC Academic Policies** apply to this course as well as to any other course offered through the European Study Center. These policies, which govern academic standards, expectations, and requirements for all CEPA ESC program participants, are published on the **CEPA ESC website** and are also accessible at any time through the **Policies tab** in the CEPA mobile app. You are required to read and understand these policies as they form part of the binding academic framework for this program.

Please ensure you **review the full CEPA ESC Program Policies** document as soon as possible and inquire with CEPA support staff or your faculty if you have questions, requests or concerns.

Course-Specific Applications and Clarifications

While all CEPA ESC Academic Policies apply uniformly across ESC programs, the instructor may provide additional course-specific details or clarifications regarding how certain policies are implemented in this course (for example, participation expectations, assignment formats, or submission procedures). Any such course-specific guidance is intended to supplement—not replace or contradict—the official CEPA ESC Academic Policies. In cases of discrepancy, the CEPA ESC Academic Policies take precedence.

SECTION 2

General

Homework assignments are recommended, not required, as they will not be turned in for grades. However, they are intended to help you understand the class material, and to stay on track in the course. Questions on the assignments will be addressed at the beginning of each class session, as well as during each week's Reading Day (week review and practice).

Class Meets:

Weekly throughout the term, usually in five, 1 hour 45 minute sessions
Detailed course schedule with hours and locations of classes is TBC.

Class Schedule and Sequence of Instruction

Class Session	Date	Course Content	Assignment
Week 1	Class 1	Introduction, Ch 1.1 - Definitions and Terminology	Ch 1.1 – 1, 3, 5, 9, 17
	Class 2	Ch 1.2 – Initial Value Problems	Ch 1.2 – every other odd
	Class 3	Ch 1.3 – Differential Equations as Mathematical Models	Ch 1.3 – every two odds

	Class 4	Week review and practice	Study for Week 1 Quiz
	Class 5	Chapter 1 Quiz	
Week 2	Class 6	Ch 2.1 – Solution Curves without a Solution	Ch 2.1 – 21, 23, 25, 27
	Class 7	Ch 2.2 – Separable Variables, Ch 2.3 – Linear Equations	Ch 2.2 – every two odds Ch 2.3 – every two odds
	Class 8	Ch 2.4 – Exact Equations, Ch 2.5 – Solutions by Substitutions	Ch 2.4 – every other odd Ch 2.5 – every other odd
	Class 9	Ch 2.5 – Euler’s Method	Ch 2.6 – 1, 3, 5, 7
	Class 10	Reading Day - Week review and practice	Study for Week 2 Quiz
Week 3	Class 11	Review of Ch 2, Chapter 2 Quiz	
	Class 12	Ch 4.1 – Preliminary theory – Linear Equations, Ch. 4.2 – Reduction of Order	Ch 4.1 – every other odd up to 25 Ch 4.2 – every other odd
	Class 13	Ch 4.3 – Homogeneous Linear Equations with Constant Coefficients, Ch. 4.4 Undetermined Coefficients – Superposition Approach	Ch 4.3 – every two odds Ch 4.4 - every two odds
	Class 14	Ch. 4.4 Undetermined Coefficients – Superposition Approach, Ch 4.6 Variation of Parameters	Ch 4.6 – every other odd
	Class 15	Reading Day - Week review and practice	Study for Week 3 Quiz
Week 4	Class 16	Review of Chapter 4, Chapter 4 Quiz	
	Class 17	Ch 7.1 Definition of the Laplace Transform, Ch 7.2 Inverse Transforms and Transforms of Derivatives	Ch 7.1 – every other odd Ch 7.2 – every other odd up to 31
	Class 18	Ch 7.3 – Operational Properties I	Ch 7.3 – every three odds
	Class 19	Ch 7.4 – Operational Properties II	Ch 7.4 – every two odds
	Class 20	Reading Day - Week review and practice	Study for Week 4 Quiz
Week 5	Class 21	Review of Chapter 7, Chapter 7 Quiz	
	Class 22	Ch 8.1 – Preliminary Theory – Linear Systems	Ch 8.1 – every odd
	Class 23	Ch 8.2 – Homogeneous Linear Systems	Ch 8.2 – every two odds
	Class 24	Real World Problem Modeling (Ch 3, Ch 5)	Ch 3 in Review – 1, 3, 5, 13 Ch 5 in Review – 1, 5, 9, 17, 21
	Class 25	Reading Day - Week review and practice	Review Ch. 1, 2, 4, 7, 8
Week 6	Class 26	Review of Ch. 1 and 2	Review Ch. 1, 2
	Class 27	Review of Ch. 4	Review Ch. 4

	Class 28	Review of Ch 7 and 8	Review Ch. 7, 8
	Class 29	Reading Day - Week review and practice	Review Ch. 1, 2, 4, 7, 8
	Class 30	Final Exam	

Instructional Materials

(These may be available through your on campus electronic library. Relevant chapters will be provided for students who do not have access to the electronic version.) Choose one of the following:

1. Dennis G. Zill and Warren S. Wright. Differential Equations with Boundary-Value Problems. 10th Edition, 2024.
2. Dennis G. Zill. A First course in Differential Equations with Modeling Applications, 12th Edition, 2024.