

Math 6345 – Advanced ODEs

Semester: Fall 2023 CRN 17968

Meeting times: MW 3:00 –4:15pm

Room: MCS 212

Instructor: Dr. Danny Arrigo

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Office location: MCS 201

Office telephone No.: 450-5668

Office hours: MWF 1-2pm, TR 2:40-3:30pm

Textbook: A second course in elementary differential equations, by Paul Waltman, Dover Publications

Prerequisites

Before enrolling in this course, you must have taken an introductory course in ordinary differential equation (*i.e.* Math 3331 or an equivalent).

Introductory Remarks

In an introductory course in ordinary differential equations (ODEs), you learned several techniques on how to solve ODEs. In this course, we are now concerned in the qualitative behavior of solutions than the quantitative behavior.

Course Description

Topics include linear systems of differential equations; existence and uniqueness; systems with constant coefficients; periodic systems and Floquet theory; existence, uniqueness, continuation of solutions of nonlinear systems; properties of solutions of linear and nonlinear systems; behaviors near equilibrium and the stability of equilibrium; stable/unstable manifolds, the Hartman-Grobman theorem and the center manifold theorem; the Poincare-Bendixson theorem.

Course Outline

Chapter 0 – Review of basic ODEs

Chapter 1 – Systems of linear ODEs,

Chapter 2 – Two-dimensional autonomous systems

Grades

Your grade for this course will be determined by homework and a final examination. The homework will count 75% of your final grade and the final exam 25% of the total grade.

Grade		Grade Scale	
Homework:	75%	90% - 100%	A
Final	<u>25%</u>	80% - 89%	B
	100%	70% - 79%	C
		60% - 69%	D
		0% - 59%	F

Final Date to Withdraw - Nov. 15, 2023

Final date to officially withdraw from Aug. 24 – Dec. 15 classes from the university with a W grade unless already dropped for non-attendance. After this date, no withdrawals are permitted and no W grades are recorded.

Lecture Format

Typically, lectures are MW from 3:00 – 4:15pm. We will usually have 45 min lectures and the remaining time for discussion. I have lecture notes on my webpage.

Attendance

Attendance is highly recommended. If you are absent for approximately 10% without a valid excuse, where appropriate, you will be dropped from the course. It is a good idea to form small groups to work together in doing homework problems. You will learn from each other and your progress will be more rapid. However, joint work (or copying) during tests and exams is forbidden – the University has an academic dishonesty policy that you can find in the student handbook. Severe penalties apply.

University policy on Academic Integrity and Academic Misconduct

The University of Central Arkansas affirms its commitment to academic integrity and expects all members of the university community to accept shared responsibility for maintaining academic integrity. Students in this course are subject to the provisions of the university's Academic Integrity Policy, approved by the Board of Trustees as Board Policy No. 709 on February 10, 2010, and published in the *Student Handbook*. Penalties for academic misconduct in this course may include a failing grade on an assignment, a failing grade in the course, or any other course-related sanction the instructor determines to be appropriate. Continued enrollment in this course affirms a student's acceptance of this university policy.

Plagiarism

Plagiarism can be defined as the use of someone else's words without proper acknowledgement of that use. If you use someone else's words or the written words of the instructor in the assignment, you must put them in quotations and provide a reference for the source. Paraphrasing the words of others by only changing a few words is also considered plagiarism. For more information about plagiarism, please see UCA's statement on plagiarism at <http://uca.edu/academicaffairs/files/2012/08/Plagiarism.pdf>. Plagiarism is academic misconduct and will result in appropriate disciplinary action.

The Americans with Disabilities Act statement

The University of Central Arkansas adheres to the requirements of the Americans with Disabilities Act. If you need an accommodation under this Act due to a disability, please contact the UCA Disability Resource Center, 450-3613.

Building Emergency Plan statement

An Emergency Procedures Summary (EPS) for the building in which this class is held will be discussed during the first week of this course. EPS documents for most buildings on campus are available at <http://uca.edu/mysafety/bep>. Every student should be familiar with emergency procedures for any campus building in which he/she spends time for classes or other purposes.

The Title IX disclosure

In furtherance of its core values— academic vitality, integrity, and diversity—UCA is dedicated to promoting a campus community free from discrimination. Title IX of the Education Amendments Act of 1972 requires all educational institutions to address gender-based discrimination on campus, and UCA implements these Federal requirements through a fair, consistent, and appropriate process of investigation and adjudication. Please see UCA's Title IX website (<https://uca.edu/titleix/>) for the university's policy, relevant forms, training opportunities, and related information.

Departmental Policy

Use of cell phones (including texting), MP3 players, web browsers, ear buds/plugs is NOT ALLOWED during class time. Cell phones must be set to silent/vibrant mode while in class. Instructors may also disallow use of any other technology not relevant to the instruction. Use of any type of laptop during class time requires consent of the instructor.

Covid-19

All students are expected to know and comply with university policy related to Covid-19. For information and resources, see <https://uca.edu/coronavirus/>

Other Policies

Students should familiarize themselves with all policies listed in the UCA *Student Handbook*, such as the Sexual Harassment Policy and Academic Policies.