

# Math 6345 – Advanced ODEs

Semester: Fall 2021 CRN 17968

Meeting times: T,Th 12:15 –1:30pm

Room: MCS 212

Instructor: Dr. Danny Arrigo

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Webpage: <http://danielarrigo.com>

Office location: MCS 201

Office telephone No.: 450-5668

Office hours: TBA – Either in person or virtually in Blackboard Collaborate

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

Cellphones: Please turn **off** all cell phones before class!

## 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

Chapter 3 – Existence theory (some notes supplied),

## Grades

Your grade for this course will be determined by homework and a final examination. Your homework will be assigned regularly should be uploaded to Blackboard Friday's by 4:30pm. 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. 5, 2021**

Final date to officially withdraw from Aug. 19 – Dec. 10 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 T,Th from 12:15 – 1:30pm. We will usually have 45 min lectures and the remaining time for discussion. As we are in an unusual year, we might have to alter this format. I have lecture notes on my webpage.

Wearing face masks and social distancing will be strictly adhered to.

In the event that we need to go online, the classes will be held in Blackboard's Collaborate Ultra. In this case, there will probably be news of this on UCA's webpage but I will also communicate this to you via an email (so check your emails regularly). In the case that you need to isolate, please contact me immediately so we can make provisions.

### **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. If the instructor of this class needs to be informed of your disability in order to assist with any appropriate accommodations, please contact the instructor during the first week of classes.

### **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**

If a student discloses an act of sexual harassment, discrimination, assault, or other sexual misconduct to a faculty member (as it relates to "student-on-student" or "employee-on-student"), the faculty member cannot maintain complete confidentiality and is required to report the act and may be required to reveal the names of the parties involved. Any allegations made by a student may or may not trigger an investigation. Each situation differs and the obligation to conduct an investigation will depend on those specific set of circumstances. The determination to conduct an investigation will be made by the Title IX Coordinator. For further information, please visit: <https://uca.edu/titleix>. *\*Disclosure of sexual misconduct by a third party who is not a student and/or employee is also required if the misconduct occurs when the third party is a participant in a university-sponsored program, event, or activity.*

### **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.

### **Other Policies**

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

### **Face Coverings**

Wearing a cloth face covering has been shown to be one of the most effective ways to help reduce the spread of COVID-19. When we all wear face coverings, our chances of spreading the virus are dramatically reduced. This fall, students, faculty and staff will be required to wear face coverings in enclosed spaces — in classrooms, hallways, lobbies, restrooms, stairwells and

elevators — and in any situation outdoors where maintaining six feet from others is not possible. However, students will not be required to wear face coverings while in their dorm room or in their own personal space. **All students are expected to comply with the University policy regarding face coverings.**

Some students may be unable to wear a face covering due to a documented medical condition. For information on face mask exemptions, visit the [UCA Disability Resource Center](#) website, email [drc@uca.edu](mailto:drc@uca.edu) or call (501) 450-3613.

For additional information on the Covid-19 please see <https://uca.edu/coronavirus/students/>