MATH 238-009-Appld Diff Equations I

Spring 2024

Credit Hours: 3

Lecture

THE UNIVERSITY OF

ALABAMA

Contact Information

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Course Description

Introduction to analytic and numerical methods for solving differential equations. Topics include numerical methods and qualitative behavior of first order equations, analytic techniques for separable and linear equations, applications to population models and motion problems; techniques for solving higher order linear differential equations with constant coefficients (including undetermined coefficients, reduction of order, and variation of parameters), applications to physical models; the Laplace transform (including intial value problems with discontinuous forcing functions). Use of mathematics software is an integral part of the course. Computing proficiency is required for a passing grade in this course.

Core Attributes: Computer Science, Mathematics

Prerequisite(s): C- or higher in MATH 126 or C- or higher in MATH 146

Other Course Materials

1. **MATLAB:** Students will use MATLAB to complete projects in this course. Current students can download MATLAB for free through the UA Office of Information Technology. Link: https://oit.ua.edu/software/matlab/

2. **CALCULATOR:** You will ONLY be allowed to use the Casio fx-260-SOLAR or Casio fx-260 SOLAR II (available at University bookstores) on tests. Using a different hand-held calculator on a test is considered academic misconduct. Practice with it! You cannot get calculator help during testing.

3. **Pearson's MyLab Math:** You must have access to this software to do the homework assignments. You can use the link "Access MyLab" in your Blackboard to access Mylab Math

4. **Disability Statement:**
Students with disabilities must be registered with the Office of Disability Services (ODS) before receiving academic accommodations. If you have a disability, but have not registered with ODS, please call 205-348-4285 or visit www.odsonlineportal.ua.edu to register for services. ODS will provide access to your accommodations through the ODS Online Portal. Once ODS has approved your academic accommodations, you may use the ODS Online Portal to email the Faculty Notification Letter to your instructor. Accommodations are not provided until your instructor has received the emailed Faculty Notification Letter. Your instructor must receive the Faculty Notification Letter at least one week prior to a test to allow for accommodations on that test.
You will need to make an appointment with ODS for each test, including the final exam. Your test will be held at your regularly scheduled test time in the ODS building. If you have time extension but unable to stay later due to another class, email your instructor to reschedule a test time. This usually means taking the test in prior to your regularly

scheduled test time. This should also be done at least one week prior to a test to allow for accommodations on that test.

Required Texts

ACCESS GRANTED CODE / MATH 238/343 AGP (NAGLE/MYLAB FOR FUND. OF DIFF. EQUATIONS)
Subtitle: ACCESS GRANTED CODE / MATH 238/343 AGP (NAGLE/MYLAB FOR FUND. OF DIFF. EQUATIONS)
ISBN: 978-0-01-350000-9
Required or Recommended: Required

Student Learning Outcomes

• Students will be able to discriminate between reliable and less reliable information in their decision-making.
• Students will be able to develop effective mathematical communication skills.
• Students will use analytical methods for solving linear ordinary differential equations.
• Students will classify an ordinary differential equation in terms of its degree, linear or nonlinear, homogeneous non-homogeneous and pick the technique most likely to solve it.
• Students will learn the basics of the software MATLAB and utilize it to solve initial value problems.
• Students are introduced to the concept of mathematical modeling of simple physical, chemical and biological phenomena.
• Students will learn basic numerical techniques and use them to solve linear initial value problems.

Outline of Topics

- Chapter 1. Introduction [Sections 1.1-1.4]

- Chapter 2. First Order Differential Equations [Sections 2.1-2.3, 2.6]

- Chapter 3. Mathematical Models [Sections 3.2-3.3]

- Chapter 4. Linear Second Order Equations [Sections 4.1-4.6, 4.9]

- Chapter 5. Introduction to Systems [Sections 5.1, 5.2 (2 by 2 systems only)]

- Chapter 7. Laplace Transforms [Sections 7.1-7.7, (if time permits, 7.9, 7.8)]

Exams and Assignments

ASSIGNMENTS/HOMEWORK: We use Pearson's MyLab & Mastering for the homework assignments via Blackboard. All homework assignments are due by 11:59 pm on Sundays. There are no extensions or makeups on homework. Your 3 lowest homework scores will be dropped at the end of the semester.

MATLAB PROJECTS: The three projects will involve using MATLAB and will be assigned in Blackboard. Students are expected to use a text editor to write the report and submit a PDF file in Blackboard before the deadline. Further details will be provided when the projects are assigned.

TESTS and FINAL EXAM: There will be three midterm tests and a comprehensive final exam during the semester. The tests are in-person. If you are not able to take in-person tests, then you should drop the course. Makeup tests may be given if the student meets a certain criteria. See "Policy on Missed Exams and Coursework" section below for more details.

----------Math 238-009-----------
Test 1: Feb 09
Test 2: Mar 08
Test 3: Apr 19
Final Exam: May 01, 4:00pm - 6:00pm

You must be able to take the final exam at this time unless you satisfy the university's rules for resolving exam conflicts etc., as given in the exam schedule. If you cannot, then you should drop the course.

In order to take a test, you must bring your university ID with you. If your ID is on your phone, you must show it at the start of the test and then put your phone away.

Online Proctoring and Room Scan

This course may include online proctored exams that may require a room scan of your testing environment using your webcam. The room scan is required to ensure academic integrity. It is your responsibility to identify a testing location that allows you to comfortably complete the room scan without compromising your personal privacy. Students who are unable to identify an appropriate testing location for the room scan or who otherwise do not wish to take the exam online, should contact the course's instructor to discuss alternative testing options, including taking the exam in-person at an approved location. If you choose an in-person testing option, it is your responsibility to coordinate with the instructor to reserve your space in the testing location prior to the date of the exam. Additionally, you will be responsible for all fees associated with in-person proctoring and for presenting an approved form of identification at the testing location. Further, if the course uses any online exams developed by third party textbook publishers, you will also be subject to the publisher's terms and conditions related to online exams.

Grading Policy

Grades will be determined by homework (11%), quizzes (10%), projects (9%), three midterm tests (45%) and a comprehensive final exam (25%).

Percentage of Points	Letter Grade
[.97, 1.00]	A+
[.93, .97)	A
[.90, .93)	A-
[.87, .90)	B+
[.83, .87)	B
[.80, .83)	B-
[.77, .80)	C+
[.73, .77)	C
[.70, .73)	C-

Percentage of Points	Letter Grade
[.67, .70)	D+
[.63, .67)	D
[.60, .63)	D-
[0, .60)	F

Policy on Missed Exams and Coursework

Assignments/Homework: All homework assignments are due by 11:59pm on Sundays. There are no extensions or makeups on homework. Your 3 lowest homework scores will be dropped at the end of the semester.

Midterm Tests: The lowest midterm-test score will be replaced with the final exam score, provided the final exam score is higher. The final exam score cannot be replaced.

A makeup exam may be given in the following cases subject to verification: a serious illness or medical emergency, a University-sponsored event, a religious event, a family emergency, or recalled to active military duty. A makeup exam should be scheduled at least one week in advance, unless it is due to emergency situations. You must submit an official explanation and any supporting documents to mtlc.ua.edu/petition/.

Final Exam: To pass the class, the final exam must be taken at the scheduled time. The comprehensive Final Exam cannot be dropped. Students who will miss work due to official University business or military business must make other arrangements 3 days before the assignment deadline. Submit official UA/Military documentation at mtlc.ua.edu/petition/

Attendance Policy

Attendance is expected for all classes. Students are solely responsible for any work missed during an absence.
If The University cancels face-to-face classes, the course will continue using recorded or live online lectures. Further details will be given as necessary.

Generative AI Tools

AI use is not allowed

All submitted work must be produced by the students themselves, whether individually or collaboratively. Use of a generative AI tools such as ChatGPT to complete an assignment constitutes academic misconduct.

Notification of Changes

The instructor will make every effort to follow the guidelines of this syllabus as listed; however, the instructor reserves the right to amend this document as the need arises. In such instances, the instructor will notify students in class and/or via email and will endeavor to provide reasonable time for students to adjust to any changes.

Department of Mathematics Academic Misconduct Policy

1. During tests you may only use a calculator that has been specifically approved by the instructor. Using or being in possession of an unauthorized calculator will be considered academic misconduct.

2. Taking a test for another student will be treated as academic misconduct by both parties. In particular, showing an instructor a fake ID or another student's ACT card will be treated as academic misconduct.

3. Receiving or providing assistance of any kind during an exam will be treated as academic misconduct by both parties.

4. Cellphones must be turned completely off and placed with other belongings on the floor. All watches must be taken off and put away. DO NOT put your phone or watch in your lap or on your chair or desk. Physically holding or concealing on your person a phone, watch or other unauthorized technological device (including but not limited to headsets, earphones, earbuds, microphones, cameras, or scanning pens) will be treated as academic misconduct.

5. If you are seen using an unauthorized device, the instructor may request that you turn it over. It will be returned at the end of the exam. However, the instructor does not have to request your device in order to charge you with academic misconduct.

6. If for any reason you must have access to your phone while taking a test, you must inform an instructor prior to accessing your phone. The instructor must be present while you use the phone. Failure to do so will be treated as academic misconduct.

7. If necessary, scratch paper will be provided. No other paper is allowed; being in possession of any unauthorized papers will be treated as academic misconduct.

8. You may review your test before leaving the exam. You may not photograph your exam or write down or copy any information pertaining to the test, nor may you share any information about the test with anyone by any means. This includes sharing information by word of mouth, written correspondence, electronic device or any type of social media. Providing information about the test to other students will be treated as academic misconduct. Also, having in your possession information about any test prior to the test that was not given to you by the instructor will be treated as academic misconduct.

9. You may not leave your place during a test for any reason. This includes getting water or going to the restroom. You must take care of these things before the start of the test. If you leave your test without permission, your test will be collected and you will not be allowed to continue working on it.

10. Interrupting the exam or creating a disturbance to cause a distraction during the exam will be treated as academic misconduct.

In order to enforce these rules, an instructor may require you to do any of the following. Failure to comply will be treated as academic misconduct.

1. Sit in assigned seats prior to the start of the exam.
2. Require you to move to a new seat during the exam.

If you experience a disability requiring adaptive technology that could be mistaken for an unauthorized electronic device, please notify your instructor prior to the test.

MTLC Specific Policies

1. In the MTLC, you may only use either the **Casio fx-SOLAR SCHOOL** or the **Casio fx-260 SOLAR II.**

2. In the MTLC, swiping another student's ACT card will be treated as academic misconduct.

3. In the MTLC having any other website other than the test open during a test will be treated as academic misconduct.

4. In the MTLC, if you leave your computer during a test without permission, your exam will be closed and you will forfeit any remaining exam time.

Statement on Academic Misconduct

Students are expected to be familiar with and adhere to the official [Academic Misconduct Policy](#).

Statement On Disability Accommodations

The University of Alabama is committed to ensuring the full participation of all students in its programs. If you have a documented disability (or think you may have a disability) and need reasonable accommodation(s) to participate in this class, contact the Office of Disability Services (or ODS; 205-348-4285, ods@ua.edu, Houser Hall 1000, www.ods.ua.edu) as soon as possible. If you have been approved to receive accommodations through ODS, please meet with your instructor or College designee during office hours or by appointment to review your accommodation letter and discuss how accommodations can be implemented in this course.

Severe Weather Protocol

Please refer to the Severe Weather Guidelines located on the [Office of Emergency Management website](#).

Pregnant Student Accommodations

Title IX protects against discrimination related to pregnancy or parental status. If you are pregnant and will need accommodations for this class, please review the University's FAQs on the [UAct website](#).

Religious Observances

Under the Guidelines for Religious Holiday Observances, students should notify the instructor in writing or via email during the first two weeks of the semester of their intention to be absent from class for religious observance. The instructor will work to provide reasonable opportunity to complete academic responsibilities as long as that does not interfere with the academic integrity of the course. See full guidelines at [Religious Holiday Observances Guidelines](#).

UAct Statement

The University of Alabama is committed to an ethical, inclusive community defined by respect and civility. The [UAct website](#) provides extensive information on how to report or obtain assistance with a variety of issues, including issues related to dating violence, domestic violence, stalking, sexual assault, sexual violence or other Title IX violations, illegal discrimination, harassment, hate or bias incidents, child abuse or neglect, hazing, threat assessment, retaliation, and ethical violations or fraud.

Wellness Resources

College can be a stressful time. If you or someone you know is facing a challenging time or dealing with academic or personal stress, anxiety, depression, or other concerns, we strongly encourage and support you to seek assistance or to help friends find the care that they may need by reviewing the [Campus Resource List for Students](#).

If you are experiencing a personal crisis and need urgent assistance, you can also contact the following resources:

Counseling Center

Monday-Friday during routine Center hours (205-348-3863).

Weekends, holidays, after-hours (contact UAPD at 205-348-5454 and ask to speak with the on-call counselor).

You may also text BAMA to 741-741 to text with a trained volunteer.

Women and Gender Resource Center

Monday-Friday during routine Center hours (205-348-5040).

Weekends, holidays, after-hours: contact UAPD at 205-348-5454 and ask to speak to the on-call advocate for the WGRC.