**Course Math 214: Differential Equations (3 credits)**

**Fall 2021**



Instructor: Ahsan Chowdhury (achowdh6@gmu.edu)
Office hours: Exploratory Hall 4407 Tues/Thurs (11:45-12:45), Wed (1:30-2:20), and by appointment.

## Course Description

This course includes the study of first order differential equations, higher order linear differential equations, systems of linear first order differential equations, numerical methods, and their applications.

## Blackboard/Zoom Login Instructions

You will need a reliable computer and internet access to view course materials in Blackboard as well as attend Zoom class meetings. Log in to myMason to access our course Blackboard page. Our course typically use Acrobat Reader and Zoom. Your computer should be capable of running current versions of those applications. Please make sure to update your computer and prepare yourself to begin using the online format BEFORE the first day of class. Check the IT Support Center website. Navigate to the Student Support page for help and information about Blackboard. Also, make sure your computer is protected from viruses by downloading the latest version of Symantec Endpoint Protection/Anti-Virus software for free here.

## Required Textbooks

Elementary Differential Equations (11th edition, Boyce and DiPrima, ISBN: 9781119169741)

## Course Policies

**Instructor-Student Communication:** I will respond to your emails within 48 hours (I will not respond to emails over the weekend). Please read the syllabus and check the syllabus and logistics section of the discussion board prior to emailing me about logistics in this course. Math questions are difficult to resolve over email. Please post a photograph of both the problem, and what you have attempted on a math problem to the discussion board under the relevant unit. Email only after you have exhausted these options:

1. Read the syllabus.

2. Look at the announcements on Blackboard.
3. Listen carefully when I'm making announcements in class. This means you have to be on time.
4. If you miss class, ask another student what you missed. This is not a reason for emailing me.

All math questions should be asked in person after class, during office hours or with graduate teaching assistants.

**Late Assignments:** Assignments are considered late after the Canvas due date. Late assignments are only accepted if they meet the conditions in the Make-Up policy.

**Make-Up Policy:** If you have a valid reason for being unable to complete and/or submit an assignment, quiz, or exam at its scheduled time, you may have the opportunity to make up the assignment. This will occur at my discretion on an individual basis. If I approve of the make-up work, we will discuss the deadlines for that assignment. To increase the likelihood that this will occur, you should do the following:

• If you know you will be absent during a specific class meeting, contact me well in advance of that class meeting.
• If you miss a class meeting due to sudden illness or an emergency situation, contact me as soon as possible.

**Assignments Description**

**1. Quizzes (20%)**: Several written quizzes will be given to test that students are keeping up with material taught in class. Students should prepare for quizzes by reviewing the material from class and completing the assigned homework. Suggested problems from the textbook can be found on the syllabus should students need additional practice.
**2. Homework/Classwork (20%):** Both homework problems and classwork will contribute to your grade. Classwork will consist of problems sets to be worked on in groups. Problems not completed on the in-class problem sets are to be completed for homework and all work on problem sets is to be **turned in by Sunday of the following week unless otherwise stated in the course schedule**. Problem sets will draw from the textbook problems and/or from Rasmussen, C., Keene, K. A., Dunmyre, J., & Fortune, N. (2018). Inquiry oriented differential equations: Course materials**.**

**3**. **Tests (20% each)**

There will be 2 exams and a comprehensive final exam. If a student misses an exam and the conditions in the Make-Up policy are met, I will work with you to work out accommodations.

| | **Test Date** |
|---|---|
| **Test 1** | After Unit 5 |
| **Test 2** | Before Unit 12 |
| **Final Exam** | Sunday, December 12 **(time posted as soon as I know them)** |

The final exam is a required class meeting that will not be rescheduled for discretionary reasons, including conflicts with work schedules, conflicts with classes and exams at other colleges, and travel plans.

**Grading Scale**

The following percentages will be used in grading:

- 20% Quizzes
- 20% Written Homework
- 40% Tests (2 Tests) (20% each)
- 20% Comprehensive Final Exam

A 90% will guarantee an A, 80% a B, 70% a C, 60% a D. +/- Added at Instructor discretion

**Course Schedule (Tentative)**

| **Unit/Week (Monday-Sunday)** | **TOPIC/READINGS (Chapter in Boyce in parentheses)** | **ASSIGNMENTS DUE** |
|---|---|---|
| **Week 1 8/23** | Unit 1: Qualitative & Graphical Approaches (1) | • Quiz during recitation<br>• HW 1 due Sunday 8/29 by 11:59 PM |
| **Week 2 8/29** | Unit 2: A Numerical Approach (2.7) | • Quiz during recitation<br>• HW 2 due Sunday 9/5 by 11:59 PM |
| **Week 3 9/5** | Unit 3: An Analytic Approach (2.2) | • Quiz during recitation<br>• HW due Sunday 9/12 by 11:59 PM |

| Unit/Week (Monday-Sunday) | TOPIC/READINGS (Chapter in Boyce in parentheses) | ASSIGNMENTS DUE |
|---|---|---|
| **Week 4 9/12** | Unit 4: Linear Differential Equations (2.6) | • Quiz during recitation<br>• HW due Sunday 9/19 by 11:59 PM |
| **Week 5 9/19** | Unit 5: Uniquenesss of Solutions (2.8), Review | • **NO quiz during recitation**<br>• **HW due FRIDAY 9/24 by 11:59 PM** |
| **Week 6 9/26** | **Test 1 taken outside of class on Sunday, 9/26 (time posted as soon as I know them)**,<br>Unit 6: Autonomous Differential Equations (2.5) | • Quiz during recitation<br>• HW due Sunday 10/3 by 11:59 PM |
| **Week 7 10/3** | Unit 7: Modeling with Autonomous Differential Equations (2.3) | • Quiz during recitation<br>• HW due Sunday 10/10 by 11:59 PM |
| **Week 8 10/10** | Unit 8: The Effect of Varying a Parameter in Autonomous Differential Equations (n/a) | • Quiz during recitation<br>• HW due Sunday 10/17 by 11:59 PM |
| **Week 9 10/17** | Unit 9: Introduction to Systems (7.4, 9.1 (phase plane), 9.2 (autonomous systems and Stability), 9.4-9.5 (competing species/predator prey)) | • Quiz during recitation<br>• HW due Sunday 10/24 by 11:59 PM |
| **Week 10 10/24** | Unit 10: Spring Mass System and Linear System (7.5) | • Quiz during recitation<br>• HW due Sunday 10/31 by 11:59 PM |
| **Week 11 10/31** | Unit 11: Damped and Undamped Linear Systems (7.6), Review | • **NO quiz during recitation**<br>• **HW due FRIDAY 11/5 by 11:59 PM** |
| **Week 12 11/7** | **Test 2 taken outside of class on Sunday, 11/7 (time posted as soon as I know them)**,<br>Unit 12: Eigentheory Applied to Linear Systems (7.5, 7.6) | • Quiz during recitation<br>• HW due Sunday 11/14 by 11:59 PM |
| **Week 13 11/14** | Unit 13: Second Order Linear Differential Equations (3.1, 3.3, 3.4) | • Quiz during recitation<br>• HW due Sunday 11/21 by 11:59 PM |
| **Week 14 11/28** | Unit 14: Nonlinear Systems (9.2 (autonomous systems and Stability), 9.3 (locally linear systems)) | • Quiz during recitation<br>• HW due Sunday 12/5 by 11:59 PM |
| **Week 15 12/5** | Unit 15: Laplace Transforms (6.1,6.2, 6.4,6.5) | • Quiz during recitation |
| | final exam week | |

**University Policies and Resources**

a. Academic Honesty: You are expected to be familiar with and abide by the University's Honor Code. The Code can be found here. It is your responsibility to see me if you have questions about these policies. George Mason University has an honor code that states the following:

   *To promote a stronger sense of mutual responsibility, respect, trust, and fairness among all members of the George Mason University community and with the desire for greater academic and personal achievement, we, the student members of the University Community have set forth this:*

b. Students must follow the university policy for Responsible Use of Computing

c. **Student services**: The University provides range of services to help you succeed academically and you should make use of these if you think they could benefit you. **I also invite you to speak to me (the earlier the better).**

   **The Math Tutoring Center** is located in the Johnson Center Room 344. Help is available on a walk-in basis. For hours of operation see http://math.gmu.edu/tutorcenter.htm

   **The Volgenau School of Engineering** also offers peer tutors. http://volgenau.gmu.edu/undergraduates/peer-mentors

d. Students are responsible for the content of university communications sent to their George Mason University email account and are required to activate their account and check it regularly. All communication from the university, college, school, and program will be sent to students solely through their Mason email account.

e. The George Mason University Counseling and Psychological Services (CAPS) staff consists of professional counseling and clinical psychologists, social workers, and counselors who offer a wide range of services (e.g., individual and group counseling, workshops and outreach programs) to enhance students' personal experience and academic performance. Counseling Center: Student Union I, Room 364, 703-993-2380.

f. Students with disabilities who seek accommodations in a course must be registered with the George Mason University Office of Disability Services (ODS) and inform their instructor, in writing, at the beginning of the semester. All academic accommodations must be arranged through that office. Please note that accommodations MUST BE MADE BEFORE assignments or exams are due. I cannot adjust your grade after the fact.

g. Students must follow the university policy stating that all sound emitting devices shall be turned off during class unless otherwise authorized by the instructor.

h. The George Mason University Writing Center staff provides a variety of resources and services (e.g., tutoring, workshops, writing guides, handbooks) intended to support students as they work to construct and share knowledge through writing. University Writing Center: Robinson Hall Room A114, 703-993-1200. The writing center includes assistance for students for whom English is a second language.

i. Diversity: George Mason University promotes a living and learning environment for outstanding growth and productivity among its students, faculty and staff. Through its curriculum, programs, policies, procedures, services and resources, Mason strives to maintain a quality environment for work, study and personal growth.