

SYLLABUS FOR MATH 2552: Differential equations

1. COURSE NAME: Math 2552: Differential equation
2. SEMESTER: Summer 2026
3. COURSE INSTRUCTOR: Heinrich Matzinger. E-mail: matzi@math.gatech.edu
4. COURSE DESCRIPTION:
Introduction, linear equations, and Euler's method 1.1-1.4
First order differential equations and systems of two first order equations 2.1-2.7; 3.1-3.7
Systems of n first order equations; Nonlinear equations and stability 6.1-6.7; 7.1-7.6
Second order linear equations; Laplace transform methods 4.1-4.7; 5.1-5.9
5. COURSE OBJECTIVES:
By the end of this course, students will:
 - Develop an understanding of differential equations as mathematical models for real-world phenomena.
 - Learn standard analytical techniques for solving ordinary differential equations (ODEs).
 - Interpret solutions qualitatively and quantitatively using graphical and numerical methods.
 - Apply differential equations to problems in physics, biology, engineering, and economics.
 - Build a foundation for more advanced study in mathematics, science, and engineering.

APPROVED COURSE LEARNING OUTCOMES:

- First-Order Differential Equations, Classify first-order ODEs (separable, linear, exact, etc.), Solve separable and linear first-order differential equations, Apply integrating factors to solve linear equations, Solve initial value problems (IVPs), Model real-world problems (e.g., growth/decay, mixing problems),
- Second-Order Linear Differential Equations, Solve homogeneous second-order linear ODEs with constant coefficients, Determine general and particular solutions,
- Solve nonhomogeneous equations using methods such as: Undetermined coefficients, Variation of parameters, Apply initial/boundary conditions to find specific solutions, Analyze mechanical systems (e.g., spring-mass systems, damping).

- Systems of Differential Equations: Formulate and solve systems of first-order linear differential equations, Use eigenvalues and eigenvectors to solve linear systems, Analyze stability and long-term behavior of solutions.
6. REQUIRED COURSE MATERIAL: TEXT BOOK: Differential Equations: An Introduction to Modern Methods & Applications, by James R. Brannan and William E. Boyce (Third edition); John Wiley and Sons, Inc.
 7. GRADING POLICY AND WEIGHTING: Midterm1=33%, Midterm2=33%, midterm3=33%.
 8. ATTENDENCE POLICY not mandatory but strongly encouraged except on Midterms and when indicated by instructor by E-mail.
 9. ADDITIONAL CRITERIA FOR SUCCESFUL COMPLETITION OF THE COURSE:none
 10. Academic honesty / academic integrity statement (Georgia Tech Honor Code) : Georgia Tech aims to cultivate a community based on trust, academic integrity, and honor. Students are expected to act according to the highest ethical standards. Review Georgia Tech's Honor Code and the student Code of Conduct. Any student suspected of cheating or plagiarism on a quiz, exam, or assignment will be reported to the Office of Student Integrity, who will investigate the incident and identify the appropriate penalty for violations.
 11. STATEMENT ABOUT ACCEPTABLE STUDENT CONDUCT(Student-Faculty Expectations Agreement) At Georgia Tech, we believe that it is important to strive for an atmosphere of mutual respect, acknowledgement, and responsibility between faculty members and the student body. The Student-Faculty Expectations articulate some basic expectations that you can have of me and that I have of you. In the end, simple respect for knowledge, hard work, and cordial interactions will help build the environment we seek. Therefore, I encourage you to remain committed to the ideals of Georgia Tech while in this class.
 12. Statement about services offered through the Office of Disability Services : If you are a student with learning needs that require special accommodation, contact the Office of Disability Services (404-894-2563) as soon as possible to make an appointment to discuss your special needs and to obtain an accommodations letter. Please also e-mail me as soon as possible in order to set up a time to discuss your learning needs.