HAMPDEN-SYDNEY COLLEGE

Math 243: Differential Equations (3 credits)
Fall 2025

Instructor	Brian Lins
Email Address	blins@hsc.edu
Course Meeting Time	MWF 11:30 - 12:20pm
Course Meeting Location	Pauley 222
Office Hours	WF 10:30 - 11:30am & W 2:30 - 4:00pm See the course website: `https://bclins.github.io`
Free Online Textbook	The Ordinary Differential Equations Project by Thomas W. Judson

Course Description

Analytic and numerical solutions of ordinary differential equations. Existence and uniqueness of solutions. Solutions of linear systems.

Course Learning Objectives

- Students will be able analyze differential equations graphically and numerically.
- Students will be able to identify the right techniques to solve simple differential equations analytically.
- Students will be able to formulate and solve differential equations that model physical, biological, or social systems, interpreting solutions in the context of real-world applications such as population dynamics, electrical circuits, or mechanical systems.

Required Materials

None. See the course website for links to the free textbook.

Attendance Policy

Attendance in this class is required. Repeated absences may result in a forced withdrawal from the course. You are responsible for any material you miss due to absence. Please let me know ahead of time if you know that you will not be able to attend class.

Grading Policy

The term grade will be based on the following factors.

Component	Proportion
Midterms	45%
Projects	10%
Quizzes	20%
Final Exam	25%

In-Class Problems

There is a saying that, "you learn math by doing math." This is very true! There will be homework problems assigned every week. These will be due on Fridays. I will not collect these problems however. Instead, you may consult your homework solutions class notes during the weekly quizzes.

Quizzes

Every Friday (except one weeks when there is a midterm exam) there will be a 10-15 minute quiz on recently covered material. Each quiz will have around 3 problems and will cover material similar to the homework problems. During quizzes you are allowed to use your notes and homework solutions. There are no make-up quizzes for absences. If you know that you will miss class on a Friday for an excused absence (athletic or other school sponsored event), then let me know in at least one day in advance so that we can arrange an alternative assignment. The lowest quiz grade will be dropped from the final average.

Projects

There will be three or four projects during the semester. These projects will require you to model real world phenomena and write your conclusions. The projects must by typed using a computer and you can e-mail them to me when they are due. If you wish, you may work with a partner on the project. If you do work with a partner, then you can both submit one file together, just be sure that both of your names are clearly listed on the file that you submit. Aside from work with your partner, all work should be your own. Each project will be graded holistically using the following rubric:

- Grade: A. Every part of the assignment is complete and your work is clear and correct.
- Grade: B. Almost every part of the assignment is complete and your work is clear. There may be a few minor mistakes, but no major errors.
- Grade: C. Most of the assignment is complete, but is either not clear or has significant mistakes.
- Grade: D. You turn in something, but it has major errors or omissions.

Projects will be assigned at least one week before they are due.

Exams

There will be three in-class midterm exams and a cumulative final. These exams will be announced in advance, and you will know exactly what concepts will be covered on each exam.

Course Schedule

The schedule below is tentative, and may be subject to change. Changes will be announced in class, and you are responsible for knowing about any changes even if you miss the class when they are announced.

Week	Topic
1	Separable differential equations
2	Numerical methods for ODEs
3	First order linear equations
4	Systems of differential equations
5	Solving systems numerically & analytically
6	**Midterm 1**, Linear algebra basics
7	Planar systems
8	Complex and repeated eigenvalues
9	Classification of planar systems
10	**Midterm 2**, Systems in higher dimensions
11	Homogeneous linear systems
12	Forcing and resonance
13	Nonlinear systems, **Midterm 3**
14	The Laplace transform

Late Work and Make-Up Assignment Policy

Please let me know in advance if you will be missing class. If you let me know ahead of time that you will be missing class for a school sponsored event, then we can plan an alternative assignment. If you don't let me know until after the fact, then it will be too late. There are no make-up quizzes. That's why I drop your lowest quiz grade.

Grading Scale

This course adheres to the grades and quality points described in the Academic Catalogue. Consult the Academic Catalogue for a detailed description.

Honor Code

Students are expected to abide by the Honor Code for all assignments unless a professor indicates otherwise. Students should consult the Academic Catalogue and The Key: The Hampden-Sydney College Student Handbook for the College's description of the Honor Code and what it identifies as infractions of the Honor Code.

Artificial Intelligence Policy

Artificial intelligence (AI) generators and large language models (LLMs) often rely on existing published materials, and copying or paraphrasing materials generated by AI without attribution is plagiarism. Professors may permit students to use AI generators or LLMs in a variety of ways in their own classes. Those students, however, must not assume that those policies transfer to other classes.

Accommodations

Hampden-Sydney College is committed to ensuring equitable access to its education programs for all students. Under the administration of the Department of Culture and Community, the Office of Accessibility Services (OAS) coordinates reasonable accommodations for qualified students with disabilities. If you wish to seek accommodations for this class, please contact Dr. Melissa Wood, Director of Title IX, Access, and Student Advocacy, at 434-223-6061 or at `mwood@hsc.edu`. Additional information may be found here: `https://www.hsc.edu/academics/academic-services/disability-services`. Appropriate documentation of disability will be required. For students who have an accommodations letter from OAS, it is essential that you correspond with your professor as soon as possible to discuss your accommodation needs for the course so that appropriate arrangements may be made.