

# PHY 250: Applied Math for Science & Engineering

Fall 2024, MWF 9:15am – 10:20am, Olin Hall Room 220 — 4 credits



## Dr. Chris Nolting

Office Hour (Olin 213 or Meet)

MWTF 1:30pm (subject to change)

Or email me and we'll find a time!



[meet.google.com/zmh-kkcx-gno](https://meet.google.com/zmh-kkcx-gno)

## Contact:

[nolting@gustavus.edu](mailto:nolting@gustavus.edu)

## Mathematical Methods

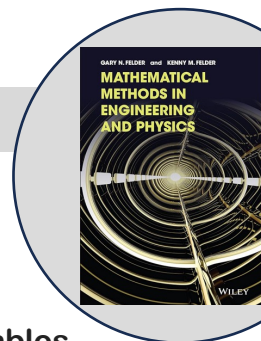
Physics is the application of mathematical methods used to study and understand the world around us. This means we often need a wide variety of mathematical tools to solve the problems that we face. Rather than take separate courses to learn each of those tools, we will aim to learn what we need for the types of problems you'll be facing in upcoming courses. We'll learn how to calculate the magnetic field from a loop of current, how to solve for the motion of coupled oscillators, and how heat diffuses away into the surrounding environment.

## Course Topics

In this course, we will study: ordinary & partial differential equations, multivariable calculus, partial derivatives, integrals in multiple dimensions, Taylor series, complex numbers, linear algebra, and Fourier transformations. We'll apply these mathematical concepts to physics examples and exercises. We will also learn the use of some computational tools along the way.

## What do I need for this course?

- A Book: For this course we'll be using **Mathematical Methods in Engineering and Physics** by Gary Felder & Kenny Felder.
- Pen or Pencil: for notetaking and completing in class activities
- Laptop or Notebook: To take notes.
- Optional: Schaum's Outline of Mathematical Handbook of Formulas and Tables



## Course Structure & Moodle

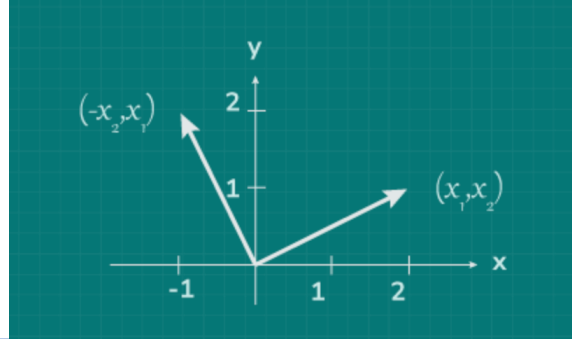
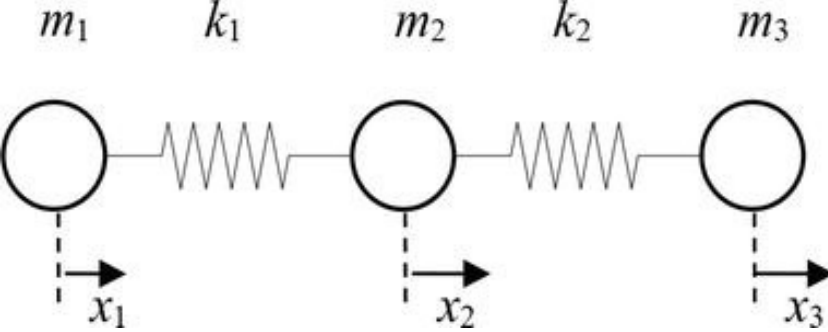
The course will meet Monday, Wednesday, and Friday for 65 minutes.

Generally, course meetings will be broken into lectures and group based concept exercises. Weekly homework assignments will be due on Fridays. At the end of every other chapter, we will have a short quiz, often on Mondays for half of the period.

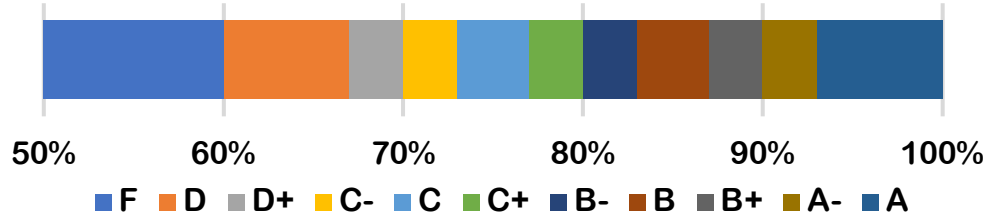
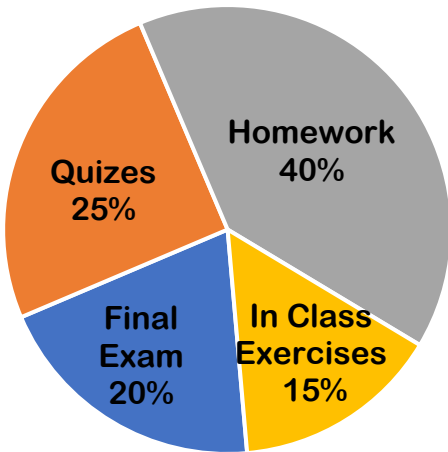
We will utilize Moodle for posting course materials as well as posting grades throughout the semester. I will post this syllabus, as well as lecture recordings, homework assignments in-class exercises, and supplementary content (videos, articles, study aids, etc.) on recent course topics.

# Course Schedule (subject to change)

M 9/2/24	-----	M 10/7/24	<b>Q2 + 2.1-2.2</b>	M 11/11/24	<b>Q4 + 9.3-9.4</b>
W 9/4/24	Intro + 1.1-1.2	W 10/9/24	2.3-2.4	W 11/13/24	Advising
F 9/6/24	1.3-1.5	F 10/11/24	<b>HW5 + 2.5-2.7</b>	F 11/15/24	<b>HW9 + 9.5-9.6</b>
M 9/9/24	1.6 & 4.1-4.2	M 10/14/24	3.1-3.3	M 11/18/24	10.1-10.3
W 9/11/24	4.3-4.4	W 10/16/24	3.4	W 11/20/24	10.4-10.6
F 9/13/24	<b>HW1 + 4.5-4.6 &amp; 4.8</b>	F 10/18/24	<b>HW6 + 3.5</b>	F 11/22/24	<b>HW10 + 10.7-10.8</b>
M 9/16/24	<b>Q1 + 5.1-5.2</b>	M 10/21/24	Fall Break	M 11/25/24	10.10, 10.12
W 9/18/24	5.3-5.4	W 10/23/24	Fall Break	W 11/27/24	Thanksgiving
F 9/20/24	<b>HW2 + 5.6-5.7</b>	F 10/25/24	Fall Break	F 11/29/24	Thanksgiving
M 9/23/24	5.8 & 5.10	M 10/28/24	<b>Q3 + 6.1-6.2</b>	M 12/2/24	<b>Q5 + 11.1-11.2</b>
W 9/25/24	8.1-8.3	W 10/30/24	6.3-6.5	W 12/4/24	11.3-11.5
F 9/27/24	<b>HW3 + 8.4-8.5</b>	F 11/1/24	<b>HW7 + 6.6-6.7</b>	F 12/6/24	<b>HW11 + 11.6-11.7</b>
M 9/30/24	8.6-8.8	M 11/4/24	6.8-6.9	M 12/9/24	12.1-12.2
W 10/2/24	Nobel	W 11/6/24	7.1-7.3	W 12/11/24	12.3
F 10/4/24	<b>HW4 + 8.9-8.11</b>	F 11/8/24	<b>HW8 + 9.1-9.2</b>	F 12/13/24	<b>Q6 + Review</b>
Final Exam: TBD				M 12/16/24	Review



## Grading Policy



- The lowest homework score and the lowest quiz score will each be dropped
- In class exercises will be graded for participation, not correctness
- Quizzes will be completed at the end of every other chapter, often on Mondays for half the class period.

### Homework

Problems will be assigned every other week, graded, and returned to the student. Work must be turned in on time. Extensions may be given for extenuating circumstances. Be sure to use symbolic form and provide units for your final answers. While you are encouraged to collaborate on homework, you are expected to turn in your own work. The lowest homework score will be dropped, with the remaining accounting for a total of 40% of the total grade.

### Quizzes

There will be 6 quizzes throughout the semester, encompassing the material covered in lecture since the most recent previous quiz. The lowest quiz score will be dropped, with the remaining accounting for a total of 25% of the total grade.

Should extenuating circumstances cause you to miss a quiz, please contact me (ahead of time if possible) and we may be able to find an alternative time to take the quiz.

## How to succeed in class

- Attend & participate in every lecture. In class exercises are worth 15% of your grade, and your classmates and I will be available to help you with the concepts.
- Read the sections of the textbook we will cover before attending class. Seeing material multiple times helps reinforce it, you'll be better prepared for in-class exercises, and I will be there to answer any questions you have on the topic.
- Watch or read any supplementary materials I post to Moodle. These may be exciting physics news or applications of the ideas that we are discussing in class
- Attend office hours if you have any problems.
- Give feedback. If anything is not working for you, let me know and I will work to address the problem. We're in this together.

# Attendance

Attendance in person for lecture will count toward your grade via your participation in the practice exercises we will be doing during class. These will help you master the concepts you will need for your homework, quizzes, and exams. Your assignment won't be graded for its correctness, but for your effort. This is your opportunity to try your hand with a new concept while I am there to answer your questions and help you. These exercises may be at times completed in groups or individually, depending on the exercise, and will be turned in at the end of class.

## Mental and Physical Wellbeing

The Gustavus community is committed to and cares about all students. If you or someone you know expresses any mental health concerns or experiences a stressful event that can create barriers to learning, Gustavus services are available to assist you. You can learn more about the broad range of confidential health services available on campus at <https://gustavus.edu/counseling/> and <https://gustavus.edu/deanofstudents/services/>.

## Academic Accommodations

Gustavus Adolphus College is committed to ensuring equitable and inclusive learning environments for all students. If you have a disability and anticipate or experience barriers to equal access, please speak with the accessibility resources staff about your needs. A disability may include mental health, attentional, learning, chronic health, sensory, physical, and/or short-term conditions. When appropriate, staff will guide students and professors in making accommodations to ensure equal access. Accommodations cannot be made retroactively; therefore, to maximize your academic success at Gustavus, please contact them as early as possible. Accessibility resources staff are located in the Academic Support Center (<https://gustavus.edu/asc/accessibility/>). The Accessibility Coordinator ([ascsupport@gustavus.edu](mailto:ascsupport@gustavus.edu) or x7227) in the Academic Support Center can provide further information

## Academic Accommodations for Religious Observance

A student whose religious observance conflicts with a course requirement may request an academic accommodation from the instructor. Students should normally make such requests in writing by the end of the second week of classes, but there may be exceptions. Students may also request accommodations for religious traditions surrounding death and dying when the need arises. The Chaplains' Office annually publishes a multifaith holiday calendar with accommodation notations. You can find it here:

<https://gustavus.edu/chaplain/multifaith/>. However, this list is not exhaustive and observances are not necessarily days when individuals will not attend work or school. There are also different levels of observance in different traditions. The Chaplains' Office is available for consultation on any requests for accommodation that are not included in their calendar.

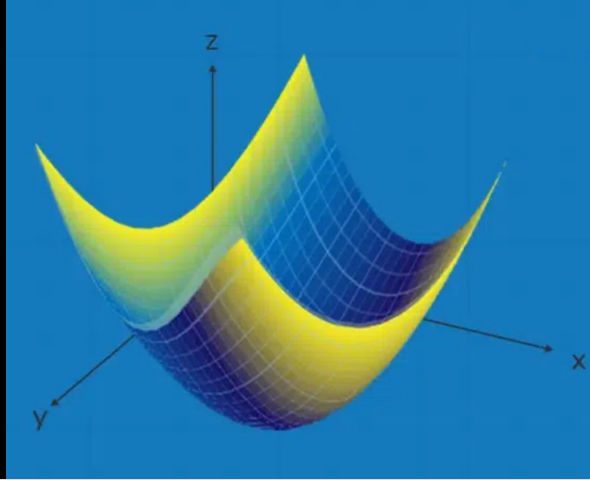
Signal



Winding



Transform



## Title IX: Sexual Misconduct Prevention and Resources

Gustavus Adolphus College recognizes the dignity of all individuals and promotes respect for all people. As such, we are committed to providing an environment free of all forms of discrimination including sexual and gender-based discrimination, harassment, and violence like sexual assault, domestic violence, dating violence, and stalking. If you (or someone you know) has experienced or is experiencing these types of behaviors, know that you are not alone. Resources and support are available; you can learn more online at <https://gustavus.edu/titleix/>.

Please know that if you choose to confide in me, I am required by the College to report to the Title IX Coordinator, because Gustavus and I want to be sure you are connected with all the support the College can offer. Although it is encouraged, you are not required to respond to outreach from the College if you do not want to. You may speak to someone confidentially by contacting the Sexual Assault Response Team (SART/CADA), Chaplains, Counseling Center, or Health Service staff; conversations with these individuals can be kept strictly confidential. SART/CADA can be reached 24 hours a day at 507-933-6868. You can also make a report yourself, including an anonymous report, through the form at <https://gustavus.edu/titleix/>.

## Multilingual Student Support

Some Gusties may have grown up speaking a language (or languages) other than English at home. If so, we refer to you as “multilingual.” Your multilingual background is an incredible resource for you, and for our campus, but it can come with some challenges. You can find support through the College’s Writing Center. The Writing Center (<https://gustavus.edu/writingcenter/>) offers tutoring from peers (some of whom are themselves multilingual) who can help you do your best writing. You can meet with Writing Center tutors at any point in the writing process, from beginning an assignment to editing a final draft. This year, the Writing Center will also offer writing-support sessions for small groups of MLL students.



# Academic Integrity:

Gustavus Adolphus College is proud to operate under an honor system ([https://gustavus.edu/general\\_catalog/current/acainfo](https://gustavus.edu/general_catalog/current/acainfo)). I am required to report violations of the Academic Honesty Policy to the Provost's Office. It is your responsibility, as a student, to ask questions if you are not sure about situations such as when and how to cite a source, sharing data with lab-mates, and avoiding inadvertent cheating when working in groups. If you are unsure if you might be violating this policy, ask!

The overarching principle of the Academic Honesty Policy is that students shall submit their own work, in fairness to others and to self. I want you, a developing scholar, to be able to take pride in your own academic work and to maintain your academic integrity. Citations must accompany any use of another's words or ideas that are not common knowledge. Quoting or paraphrasing from electronic sources without proper citation is as serious a violation as copying from a book or other printed source. **Using content generated by an artificial intelligence third-party service or site (AI-generated content) without proper attribution or authorization would also be a form of plagiarism.** A student may not submit work that is substantially the same in two courses without first gaining permission of both instructors. Ask me if you have questions about a particular assignment or kind of work. Unauthorized aid during any online exams and assignments is every bit as serious and inappropriate as it would be in an in-person course. In fact, in the online environment it is sometimes easier for faculty to detect violations.

The sanction in this course for a violation of the Honor Code involving plagiarism, copying another student on an exam, or other kinds of cheating on a single assignment will usually be an "F" on the plagiarized assignment or exam. For a more significant event, I, your professor, reserve the right to assign you a grade of "F" for the course. In addition, for any Honor Code violation, I will notify the Provost's Office. A letter will be generated by the Provost's Office and sent to you. The letter will remain on file. There will be no further consequence, beyond the course penalty and the letter, if you do not commit any further Honor Code violations. Repeat offenses could ultimately lead to dismissal from the College. You have the right to appeal any Honor Code violation through an Honor Board hearing process. In this course, I aim for you to learn how to cite sources properly, do your own work on all exams, and function as a scholar with integrity. Please feel welcome to ask questions about the important matter of Academic Honesty and let me know how I can best support your learning.

## Honor Code & Pledge

As a community of scholars, the faculty and students of Gustavus Adolphus College have formulated an academic honesty policy and honor code system, which is printed in the Academic Bulletin and the Gustavus Guide. As a student at Gustavus Adolphus College I agree to uphold the honor code. This means that I will abide by the academic honesty policy, and abide by decisions of the joint student/faculty Honor Board.

On my honor, I pledge that I have not given, received, or tolerated others' use of unauthorized aid in completing this work.