SUNY Geneseo
Department of Physics and Astronomy
Class: MW 12:30 pm; ISC 229
Web: https://tildesites.geneseo.edu/~pogo

Online Office Hours:
MTWR 8:30-9:20; MW 9:30-10:20; T 2:00-2:50
(https://discord.gg/GjkWREU)

Dr. Pogo
Office: ISC 228D
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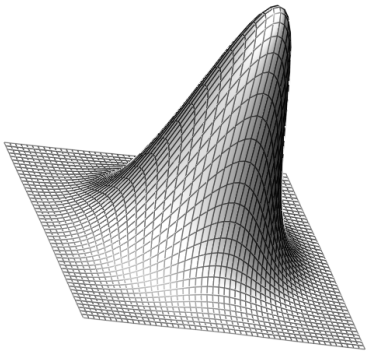
Mathematical Methods For Physicists

(Phys 228-01)

Spring 2026



What am I doing here? At the end of this course, your skill with a variety of commonly used mathematical and numerical methods in physics in engineering (as listed below) will be substantially increased. You should already have some prior exposure to most of these techniques through your calculus and differential equations courses. We will focus on the practical rather than the theoretical aspects of each technique, but there will naturally be some theory involved. The topics include derivatives and partial derivatives, infinite series (including Fourier series and Taylor series), vector calculus, complex numbers, linear algebra and tensors, differential equations, and probability. There will also be some examination of commonly used numerical techniques.

What do I have to read? The textbook is: *Mathematical Methods in the Physical Sciences*, by Mary Boas (3rd edition, Wiley). This book is very readable.

How will I be graded? Your grade will be determined by:

Assignments & quizzes:	35%
Participation in Office Hours	5%
Exams (3 total):	60%
	100%

Final Exam: The final exam will be held on Thursday, May 14, 2026, from noon to 2:30 pm, and will be comprehensive.

Assignments: Homework will be done primarily on CAPA this semester. However, some assignments will also require submission of Mathematica documents, or other supporting written work. This work will be graded on clarity (a combination of neatness and completeness) and *presentation quality*. Be warned: an answer is not the same as a solution. Assignments that are too hard to understand are also too hard to grade, and will receive zeroes.

Here are some tips for successful Mathematica submissions:

- Use the correct filename, EXACTLY. Do not change or misplace a single character, including spaces.
- In a text cell, put your name and the assignment number into the top of the worksheet. Also, label each individual problem with the corresponding problem number in a text cell.
- Do the assignment correctly. Make sure your final solution is not just a "naked" number floating without sufficient context.
- Choose reasonable and unique variable names.
- Run your *entire* notebook as a whole before submitting! ! ! !
- Appearance counts: your work should be reasonably spaced and (* documented *).
- Supplement your equations with text and/or diagrams when necessary. A third party who is not in the class should be able to determine both the question *and* the answer from your solution, without needing to even see the assignment itself.
- Plots should have a sufficient and reasonable range for the independent variable. Contour and surface plots should have correct aspect ratios.

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What is the course schedule? Here is a tentative schedule of topics for the semester:

Class	Date	Topic
1	Wednesday, January 21	Infinite Series [Ch. 1]
2	Monday, January 26	Series II; Taylor series and approximations of derivatives [Ch. 1]
3	Wednesday, January 28	Vector calculus I: dot, cross, del, and grad [Ch. 6]
4	Monday, February 2	Vector calculus II: divergence, curl, Laplacian [Ch. 6]
5	Wednesday, February 4	**Numerics:** Plotting with Mathematica
6	Monday, February 9	Derivatives/Chain rule [Review/Ch. 4]
7	Wednesday, February 11	Complex analysis I [Ch. 2]
8	Monday, February 16	Complex analysis II [Ch. 2]
9	Wednesday, February 18	**Numerics:** General computing with Mathematica
10	**Monday, February 23**	**Exam #1 (covers classes 1-8)**
11	Wednesday, February 25	Linear algebra I [Ch. 3]
12	Monday, March 2	Linear algebra II [Ch. 3]
13	Wednesday, March 4	**Numerics:** Curve fitting
14	Monday, March 9	Eigenvalues & Eigenvectors [Ch. 3]
15	Wednesday, March 11	Tensors [Ch. 10]
		No class: Spring Break
16	Monday, March 23	Coordinate Transformations [Ch. 10]
17	Wednesday, March 25	Multi-variable integration review with **Numerics** [Review/Ch. 5]
18	Monday, March 30	1st order ordinary differential equations (separation of variables) [Ch. 8]
19	Wednesday, April 1	2nd order ordinary differential equations (constant coefficients) [Ch. 8]
20	**Monsday, April 6**	**Exam #2 (covers classes 9-17)**
21	Wednesday, April 8	**Numerics**: Differential equations (Mathematica DSolve, NDSolve)
22	Monday, April 13	Fourier series I [Ch.7]
23	Wednesday, April 15	Fourier series II & Fourier Transforms [Ch. 7]
24	Monday, April 20	Partial differential equations (heat equation) [Ch. 13]
	Wednesday, April 22	***No class: GREAT Day***
25	Monday, April 27	Partial differential equations (wave equation) [Ch. 13]
26	Wednesday, April 29	Probability: interpreting a pdf, counting, "choosing" [Ch. 15]
27	Monday, May 4	Probability: common distributions (normal, binomial, Poisson) [Ch. 15]
28	Wednesday, May 6	Statistics: standard deviation [Ch. 15]
{29}	***Thursday*, May 14**	**Final Exam (comprehensive): noon**

Assignments are due every Thursday morning from January 29 through April 30 (except March 19). Also, because "study day" is a Thursday, the due date for Assignment #14 is extended to Friday, May 8.

What if I have trouble with the homework? Visit me during online office hours (see times listed above) and I'll try to point you in the right direction. In fact, you are *required* to use office hours to ask a relevant question at least once in each of two different calendar months. Remember that all learning and all skill comes from doing, not seeing. Every part of every problem that you let somebody else do for you is something that you are deciding that you just don't want to learn. You will not have their help on exams!

So for this course, use of online homework solutions (e.g., Chegg) or AI (e.g., ChatGPT) is considered academic dishonesty. Do your own work!

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Learning Outcomes

At the end of this course, students will:

- Gain proficiency in taking derivatives and partial derivatives
- Gain proficiency in the use of geometric series, power series, Fourier series, and Taylor series
- Gain proficiency in the use of vectors and vector operators
- Gain proficiency in the use of complex numbers
- Gain proficiency in the use of linear algebra and tensors
- Gain proficiency in the use of differential equations
- Gain proficiency in basic probability and statistical analysis
- Gain proficiency in some basic types of numerical analysis using tools in Mathematica and Excel
- Learn multiple practical uses for each of the above topics.

College Policies that are not specific to this course:

https://bulletin.geneseo.edu/content.php?catoid=22&navoid=958