

## Course Syllabus

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### Course Information

Course Number	PHYS 305
Course Title	Computational Physics
Term	Spring 2026
Days & Times	MW 1:30-3:20pm
Location	Keller Hall 413

### Professor Contact Information

Professor	Siqi Li
Email Address	siqili@hawaii.edu
Office Location & Hours	By appointment

### Course Prerequisites, Co-requisites, and/or Other Restrictions

- 152 or 272 or 272A, and MATH 244 (or concurrent) or MATH 253A (or concurrent); or consent
- No programming experience is assumed
- It's highly recommended to bring your own laptop. If you have difficulty accessing a laptop, please contact me.

### Course Description

This course provides an introduction to using numerical methods to solve physics problems. It is targeted towards students with a basic understanding of general physics, and no programming experience is assumed. We will learn to program in Matlab and Python. We will cover topics including derivatives, integration, differential equations, Monte Carlo methods, Fourier analysis, linear algebra, data analysis, and basic optimization tools.

### Class format

This is a combination of a lecture and laboratory course.

### Learning Objectives/Outcomes

At the successful completion of the course you will be able to

- Develop computational algorithms that adapt numerical methods to solving problems in theoretical, applied, and experimental physics
- Create your own python or matlab program to implement this algorithm, debug, compile, and run it, producing data which can then be used to assess the results of applying your algorithm
- Create computer-generated graphics to help display and disseminate your results
- Write a concise scientific report summarizing your computational physics results and graphics.

### Writing Intensive aspects:

Physics 305 is "writing intensive (WI)," that is to say, it satisfies your WI requirements, fulfilling one of your WI courses. To satisfy the WI requirement, each lab assignment will require a brief report of typically 2-4pp including graphics/figures and equations (unless specified otherwise). To do well on these reports, you will have to strive to make them complete and concise, describing clearly the problem you attempted to solve and the results of your efforts, whether or not the outcome met your expectations. We will learn to develop graphics, plots, and displayed equations to support these reports.