



Computational Physics PHY 314

Professor Info —

- Dr. Dylan McNamara
- Office Hrs: Fri 1:20-3:00pm
- CE 1110
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Course Info —

- PHY 321 or MAT 361
- M/W
- 3:30-4:45
- CE 1127

Lab Info —

- M/W
- during class TBD
- CE 1127

Overview

Computation in physics has become the third realm of physics expertise. Before this, physicists were grouped into two categories: theoretical and experimental. Now we add computational to the mix. The other point worth making at the start, is that physics has long focused on linear problems. That was because we didn't have computers to tackle nonlinearity. Now we do. And this course is really a deep dive into nonlinear science as much as it's physics. Of course we will keep a physicist's mindset but we won't prevent ourselves from exploring cool problems in biology, chemistry, and even social science. Buckle up!

Material

Required Texts

Sayama. *Introduction to the Modeling and Analysis of Complex Systems*. It's FREE!! There's a link on my webpage.

Grading Scheme

70%	Computational Modeling Projects
20%	Final Project
10%	Participation in reading discussions

Grades will follow the standard scale: A = 89.5-100; B = 79.5-89.4; C = 69.5-79.4; D = 60-69.4; F <60. Curving is at the discretion of the professor.

Late Policy

Late projects will only be allowed for students who have a substantiated excuse approved by the instructor *before the due date*. Leaving a phone message or sending an e-mail without confirmation is not acceptable.

FAQs

? Do I need to know how to code to begin the course?

! Nope. I'll assume nobody knows anything about coding. So we will start slow.

? Are there exams?

! No again. Just smaller projects and a big final project.

? What actual prereqs do I need?

! It would be great if you aren't afraid of an ordinary differential equation.

? What coding language do we use?

! Python.

UNCW Discrimination Policy

In this classroom, we respect and understand that all people are welcome here. We have a no tolerance policy for discrimination of any kind. Everyone has a right to be here without regard to race, color, religion, language, pregnancy, ancestry, age, gender, national origin, sexual orientation, gender identity, gender expression, mental or physical disability, genetic information, marital or veteran status.

Discrimination constitutes any unlawful distinction, preference, or detriment to an individual as compared to others that is based on one of the characteristics protected by federal law, state law or university policy, as listed in Policy 02.230 Equal Opportunity and Affirmative Action.

Those protected characteristics include race, sex (such as gender, gender identity, marital status and pregnancy), age, color, national origin (including ethnicity), religion, disability, sexual orientation, political affiliation, veteran status, military service member status, genetic information or relationship to other university constituents – except where sex, age or ability represent bona fide educational or occupational qualifications or where marital status is a statutorily established eligibility criterion for State funded employee benefit programs.

Seahawk Respect Compact

In the pursuit of excellence, UNC Wilmington actively fosters, encourages, and promotes inclusiveness, mutual respect, acceptance, and open-mindedness among students, faculty, staff and the broader community.

We affirm the dignity of all persons.

We promote the right of every person to participate in the free exchange of thoughts and opinions within a climate of civility and mutual respect.

We strive for openness and mutual understanding to learn from differences in people, ideas and opinions.

We foster an environment of respect for each individual, even where differences exist, by eliminating prejudice and discrimination through education and interaction with others.

Therefore, we expect members of the campus community to honor these principles as fundamental to our ongoing efforts to increase access to and inclusion in a community that nurtures learning and growth for all.

Statement Regarding Violence and Harassment

UNCW practices a zero tolerance policy for any kind of violent or harassing behavior. Students who experience an emergency of this type should contact the police at 911 or UNCW CARE at (910) 962-2273. Resources for students concerned with a violent or harassing situation can be located at the UNCW Crisis Resources page.

Students should be aware that all university employees, including instructors, are obligated to communicate any report of alleged sexual misconduct, on or off-campus, to the Dean of Students. Three university entities are confidential resources exempt from this obligation. They are CARE, the Counseling Center, and the Abrons Student Health Center.

Class Schedule

MODULE 1: I teach you

Week 1: 1/13, 1/15	Introduction and Python	Assign Project 1
Week 2: 1/22	Discrete Time Models/Maps	
Week 3: 1/27, 1/29		Assign Project 2
Week 4: 2/3, 2/5	Continuous Time Models/ODEs	
Week 5: 2/10, 2/12	Bifurcations	Assign Project 3
Week 6: 2/17, 2/19		Assign Project 4
Week 7: 2/24, 2/26	Chaos	
Week 8: 3/10, 3/12		Assign Project 5
Week 9: 3/17, 3/19		Assign Final Talk Topic
Week 10: 3/24, 3/26	Cellular Automata	
Week 11: 3/31, 4/2	Fields/PDEs	Assign Project 6
Week 12: 4/7, 4/9		Assign Project 7
Week 13: 4/14, 4/16	TBD	

MODULE 2: You teach me

Week 14: 4/21, 4/23	Student talks	
Week 15: 4/28	Student talks	
Week 16	FINAL EXAM	May 6 3:00-6:00
