Syllabus

PH 365: Computational Physics Lab I
Fall 2024

Instructor
Professor Patti Hamerski

Learning Assistants
Mateo Hall
Vincent Vaughn-Uding

Course Credits
1

Class Meetings
Monday/Wednesday 2:00-3:20pm
Weniger 328

Office Hours
Friday 2-3pm
Held hybrid in Weniger 485 and on Zoom:

- Meeting ID: 952 2669 7573
- Password: 365
- https://oregonstate.zoom.us/j/95226697573?pwd=A6Gt7sX3JivhEVX7a1ZZOujX3p4f3H.1

Also available by appointment if needed, just email me: patti.hamerski@oregonstate.edu

Prerequisites and Course Coordination

PH 213 is a prerequisite.

This course is expected, but not required, to be taken alongside PH 315 and PH 335 -- some activities may align with material from these courses.

Course Description

This is a project-driven laboratory experience in computational physics. No prior computing experience needed. We will learn the basics of programming in Python in the context of doing physics. Topics to be covered will coordinate at times with PH 315 and PH 335. This course is the first in the sequence of computational physics lab courses, PH 365, 366, and 367.

Learning Goals

1. Develop proficiency using basic Python programming tools and implementing them in code
   (a) Understand structure and syntax of basic programming tools
   (b) Implement basic programming tools to serve the purpose of a given problem or to leverage the

surrounding code

    (c) Combine basic programming tools to solve more complex coding problems

2. Connect basic programming tools to physics practices, and build strategies for doing physics with code and interpreting code outputs in terms of the relevant physics

    (a) Describe possible outcomes of programming tools in terms of their uses in physics

    (b) Develop and test algorithms for solving various types of physics problems using code

    (c) Interpret code outputs in terms of the physical insights that can be made from them

3. Use programming libraries like NumPy and Matplotlib to add simplicity and efficiency to code and create models of physical phenomena

    (a) Structure and manage the files on one's own computer to set up and access a dummy library in Python

    (b) Use library functions from NumPy to simplify and add efficiency to some implementations of basic programming tools

    (c) Use library functions from NumPy and Matplotlib to model and visualize physical phenomena in code

4. Communally construct best practices for writing code, sharing it with peers, and using external resources to help with coding

    (a) Establish class practices for including clear comments in code, structuring code in an accessible format, and providing explanations of computational methods

    (b) Present code, share constructive feedback between peers, and integrate feedback into the coding process

    (c) Construct class strategies and norms for debugging and effectively using and citing external resources (e.g., textbooks, online resources, generative AI)

Topics Covered

- Working in Python notebooks
- Computing arithmetic
- Variables in programming
- Lists and indexing
- Loops
- Code library usage
- File management
- NumPy arrays
- Vectorization
- Plotting in Matplotlib
- Conditional statements
- Writing functions
- Variable scope
- Euler's method

Course Activities

You are expected to bring laptops (if you have one) to each class meeting. We have extra laptops stored in the classroom for anyone who forgets or who does not own a laptop. We will primarily use Jupyter for coding

activities, and instructions for accessing those can be found in the **Anaconda Setup** file on Canvas. We will also use our course Canvas page to organize course materials and submit in-class assignments.

During class, you will work collaboratively on computing assignments where you will learn how to program in Python and apply computing tools to physics problems. There will be whiteboards provided for planning purposes, and you can use them as a problem-solving tool. Because there is no work outside of class periods, the class activities are the primary mode of learning in this course. At the end of each class, there will be time for discussion to reflect on what was learned and the challenges encountered during the session. Active participation in these discussions is expected.

During weeks 5 and 10, we will spend the 2 class periods working on a mini-project. These are more open-ended, longer in-class assignments. Collaboration is welcome during these mini-projects, but you will be expected to submit your own work.

A more detailed schedule can be found on Canvas in the **Course Calendar** file.

Grading Information

Because this is a 1-credit course where all of the work takes place during class meetings, the graded components are based entirely on in-class activities.

Participation and in-class assignments: 60% (drop 2 lowest scores)
Mini-project 1: 20%
Mini-project 2: 20%

Grading Scale (for a numerical grade x/100):
$93 \leq x$: A
$90 \leq x < 93$: A-
$87 \leq x < 90$: B+
$83 \leq x < 87$: B
$80 \leq x < 83$: B-
$77 \leq x < 80$: C+
$73 \leq x < 77$: C
$70 \leq x < 73$: C-
$67 \leq x < 70$: D+
$63 \leq x < 67$: D
$60 \leq x < 63$: D-
$x < 60$: F

Accommodations and Disability

There are many physical, mental, and social expectations imposed on you to participate in this course. These include being physically present in class, communicating in a group setting, managing time and pacing, retaining spoken and written information, planning and executing open-ended problem solutions, asking for help, using a screen for an extended period, and more. It's understandable that you might need permanent or temporary accommodations to help you engage fully.

If you have any concerns about disability or accommodations, you can reach out to me and/or go through Disability Access Services (DAS) to receive formal approval for accommodations. Small accommodations can

be made easily and quickly, but for longer term concerns or more complicated accommodations, please reach out to me and/or go through DAS as soon as you can to ensure I can provide the proper support.

Official statement: Accommodations for students with disabilities are determined and approved by DAS. If you, as a student, believe you are eligible for accommodations but have not obtained approval please contact DAS immediately at 541-737-4098 or at https://ds.oregonstate.edu. DAS notifies students and faculty members of approved academic accommodations and coordinates implementation of those accommodations. While not required, students and faculty members are encouraged to discuss details of the implementation of individual accommodations.

Generative AI Policy

You are allowed to use generative AI tools (e.g. ChatGPT, Dall-e, etc.) in this class. With that said, you are responsible for the information you submit based on an AI query (for instance, that it does not contain misinformation or unethical content). Your use of AI tools must be properly documented and cited in order to stay within university policies academic integrity and student conduct. As a class, we will have opportunities to discuss and agree on what proper documentation can mean. Remember, AI is not likely to generate a response that would be seen as quality work, and should be modified and improved.

Generative AI is not inherently bad or scary, in the same way that a calculator does not have to be bad or scary for math. Generative AI tools such as ChatGPT can be an excellent starting point and a place to begin inquiry or access help during the computing process. However, please be aware that ChatGPT is not a replacement for human thinking and learning. Robots lack empathy and nuance. You will still be expected to engage reflectively and earnestly with this tool. We will have opportunities to do this collectively.

Prioritize Your Health

You are encouraged to seek treatment when you feel sick. Please do your best to take care of yourself, both physically and mentally. There are campus resources to support you physical and mental health:

- Student Health Services: https://studenthealth.oregonstate.edu/
- Counseling and Psychological Services (CAPS): https://counseling.oregonstate.edu/

Basic Needs

Success at OSU means knowing and using your resources. One helpful resource is the community of staff available at the Basic Needs Center (BNC) for support (https://studentlife.oregonstate.edu/bnc). Students can drop in during open hours and talk with a BNC student leader for resources, ideas and strategies connected to basic needs challenges.

The BNC is often known for its food pantry, but there are other resources connected to groceries and affording food often available and staff who can help you work through housing stressors. Undergraduate students, living in Oregon are especially encouraged to explore SNAP (up to $194 in grocery money each month for eligible students) as a resource. Domestic undergraduate students living in Oregon are more likely than not to be eligible for SNAP and BNC staff are skilled with helping students navigate this process.

- SNAP FAQs for OSU students: https://studentlife.oregonstate.edu/bnc/food-security/snap-food-stamps/frequently-asked-questions-about-snap

Children in Class

Many students, staff, and faculty at OSU are parents. At times, I expect children to be present in academia some form.

Exclusively breastfeeding babies are welcome in class as often as is necessary to support the breastfeeding relationship. Students should not have to choose between feeding their baby and continuing their education. You and your nursing baby are welcome in class.

For older children and babies, minor illnesses and unforeseen disruptions in childcare often put parents in the position of having to choose between missing class to stay home with a child and leaving them with someone you or your child does not feel comfortable with. While this is not meant to be a long-term childcare solution, occasionally bringing a child to class in order to cover gaps in care is perfectly acceptable.

I ask everyone in class to please help me create a welcoming environment that is respectful of all students, including those with parenting responsibilities.

When you need to bring your baby or child to class, please sit close to the door so that if your little one needs special attention and is disrupting learning for other students, you can easily step outside until their need has been met.

I hope that you will feel comfortable disclosing your student-parent status to me. This is the first step in me being able to accommodate any special needs that arise. I am happy to problem solve with you in a way that makes you feel supported as you strive for school-parenting balance.

Registration and Enrollment

All students are subject to the registration and refund deadlines as stated in the Academic Calendar: https://registrar.oregonstate.edu/osu-academic-calendar

Code of Conduct

Students are expected to comply with the University code of conduct: https://beav.es/codeofconduct.

The Code of Student Conduct prohibits Academic Misconduct and defines it as: Any action that misrepresents a student or group's work, knowledge, or achievement, provides a potential or actual inequitable advantage, or compromises the integrity of the educational process.

If you're not sure whether an action constitutes academic misconduct, please ask, or consult more details here: https://studentlife.oregonstate.edu/studentconduct/faculty-info

Your Rights as a Student

Copied from Associated Students of Oregon State University (ASOSU): https://asosu.oregonstate.edu/advocacy/rights

Oregon State University students have the right to...

1. ...express differing opinions and dissent on campus.
2. ...associate and assemble to collectively express, promote and defend common interests.
3. ...exercise the practice of religion free from discrimination.
4. ...academic advising that is accurate and can be relied upon for progress towards graduation.
5. ...have their voice heard in all university policymaking decisions that impact students.

6. ...a campus free of discrimination and harassment based on one's race, color, gender identity or expression, religion, age, national origin, disability, marital status, parental status, sex, sexual orientation, genetic information or veteran status.
7. ...complete a course of study should the university discontinue a course of study.
8. ...due process in all university disciplinary processes.
9. ...an equal opportunity to learn and to participate and benefit from the academic community.
10. ...meet with and engage with course instructors and professors during their office hours.
11. ...the protection of student educational records and confidential information.
12. ...be graded in accordance with the course syllabus and the quality of their work.

If you feel any member or party of the university is violating your rights as a student, please contact ASOSU at 541-737-9200 or asosu.advocacy@oregonstate.edu

Reach Out for Help

University students encounter setbacks from time to time. If you encounter difficulties and need assistance, it's important to reach out. Consider discussing the situation with an instructor or academic advisor. Learn about resources that assist with wellness and academic success at https://counseling.oregonstate.edu/reach-out-success.

If you are in immediate crisis, please contact the Crisis Text Line by texting OREGON to 741-741 or call the National Suicide Prevention Lifeline by dialing 988 (available 24 hours a day / 7 days a week).

Other crisis lines:

OSU CAPS: Campus counseling office a crisis line which can also be used to schedule a visit

- Dial 541-737-2131
- Scheduling available Monday through Friday, 10am to 4pm
- Help is available after-hours: Press 1
- https://counseling.oregonstate.edu/main/accessing-our-services

National Sexual Assault Hotline: Routes to a local sexual assault service provider, who can provide confidential support and connect you to resources in your area

- Available 24 hours a day / 7 days a week
- Dial 800-656-4673
- Chat online: https://hotline.rainn.org/online

Love is Respect: Information, support, and advocacy to young people who have questions or concerns about their dating relationships

- Available 24 hours a day / 7 days a week
- Dial 866-331-9474
- Text LOVEIS to 22522
- https://www.loveisrespect.org/

The Trevor Project: For lesbian, gay, bisexual, transgender and questioning (LGBTQ) young people

- Available 24 hours a day / 7 days a week
- Dial 866-488-7386
- Text START to 678-678
- https://www.thetrevorproject.org/get-help/

Trans Lifeline: A trans-led organization that offers direct service, material support, advocacy, and education

- Peer support hotline available 10am to 6pm Pacific, Monday through Friday
- Dial 877-565-8860
- https://translifeline.org/hotline/

Veterans Crisis Line: Confidential help for veterans and their families

- Available 24 hours a day / 7 days a week
- Dial 988 and Press 1
- Text 838-255
- https://www.veteranscrisisline.net/

Friends for Survival: National support for survivors grieving the suicide death of a loved one

- Phones answered 7 days a week
- Dial 916-392-0664
- https://friendsforsurvival.org/

Sexual Misconduct and Mandatory Reporting

A confidential campus resource for survivors of sexual assault is the Center for Advocacy, Prevention & Education (CAPE), which cultivates a survivor-centered, trauma-informed culture of consent. They aim to create lasting social change and eliminate gender-based violence through shared goals of comprehensive sexual health education, action-oriented prevention and compassionate survivor support.

- Dial 541-737-2030 for safe, confidential support and resources
- CAPE: https://cape.oregonstate.edu/

As your instructor, I cannot be a completely confidential resource. Most OSU employees are mandated by the university to report any knowledge of sexual misconduct involving anyone affiliated with OSU or occurring on OSU property or at an OSU event. This means informing OSU's office of Equal Opportunity and Access (EOA) of what happened. At this point, EOA will review the report and reach out to you via your university email to invite you in to discuss your concerns and refer you to CAPS and CAPE. You can choose whether or not you would like to engage with EOA, or any other resources provided.

- EOA: https://eoa.oregonstate.edu/
- Reporting Obligations and Processes: https://eoa.oregonstate.edu/employee-reporting-responsibilities

You can still ask me to help direct you to resources without requiring me to report to EOA, as long as you share minimal details or simply ask for resources directly. For example, you can ask me:

- "I'm worried about something that happened involving me/a friend, and I'm not sure where to ask for help."

- "I'm in a crisis. I can't share details, but I'm not sure where I can turn to right now."
- "Can you walk me through the campus resources for survivors of sexual assault?"

With that said, you are still allowed to disclose to me that sexual assault or some other form of misconduct happened, just know that I cannot offer professional help, and I will be required to report the incident. If you wish to discuss an incident with me, I will never ask detailed or invasive questions, and I will keep everything you tell me private and confidential outside of my obligation to report to EOA.

I am also a mandatory reporter of child abuse and neglect. More information here: https://hr.oregonstate.edu/mandatory-reporting-child-abuse-neglect

Active Shooter Response

If we hear gunshots or become aware of an active shooter nearby, we will follow the Run, Hide, Fight protocol.

Evaluate: Try to remain calm, and quickly decide how to protect your own life

- Try to warn others to run away (get out/evacuate)
- Once you are safe, have one person call 541-737-7000 and 911 and provide:
    - "This is (name), (give your location) and we have an active shooter at (building on OSU campus) gun shots fired"
    - If you are able to see the shooter, give a description of the shooter's sex, race, clothing, type of weapon(s), location last seen, direction of travel, and any other identifying details, if known
    - If you have observed any victims, provide the location seen and a description

Run: Get out of the area

- The main escape route from Weniger 328 is the stairwell directly across the hallway
- If that southwest stairwell is not usable:
    - There are three other stairwells in the other three corners of Weniger
    - Windows on the third floor or lower can also be used to exit the building
- Leave belongings behind
- Run in a zig-zag
- Keep your hands visible
- Do not attempt to move wounded people, but if you feel there is time to stop and stop someone's bleeding, do it quickly and escape

Hide: If you cannot run away, find a place to hide where the active shooter is less likely to find you

- The default hiding place is Weniger 328
    - The two hallway doors are windowless and remain locked from the inside at all times
    - The two interior doors lead to offices 332A and 332B, which also remain locked from hallway access
- Do not pull the fire alarm. An alarm can cause hiding people to evacuate the building and put them in potential danger
- Move away from the doors
- Do not trap yourself or restrict your options for movement
- If the active shooter is nearby:

- Silence all devices and footsteps
- Hide behind large items, such as desks
- Remain quiet
- Do not open the door or make noise until you are sure it is safe

Take Action: If you cannot run or hide, remain calm

- After dialing 911, leave the line open and allow the dispatcher to listen
- Only when your life is in danger, try to harm the active shooter:
    - Throw items and improvise weapons
    - Get a group of people together to fight against the shooter
    - Act as aggressively as possible against the shooter
    - Attempt to disarm or knock out the shooter
- Do not occupy cell phone bandwidth with calls or messages to anyone not involved in the emergency

Further resources:

- https://emergency.oregonstate.edu/emergency-management/emergency-procedures/active-shooter
- https://app.hazadapt.com/hazards/active-shooter

Syllabus Writing Resources

Some syllabus language was borrowed and adapted from many of the resources listed throughout the syllabus, as well as these resources:

- OSU DAS Faculty Guidelines: https://ds.oregonstate.edu/facultyguidelines
- Kate Birdsall's Generative AI policy and #iteachmsu: https://iteach.msu.edu/iteachmsu/groups/ai-education/stories/2766/challenge_id/391/level_id/1
- Melissa Cheyney's policy on children in class and The Young Mommy Life blog: http://www.theyoungmommylife.com/2013/01/25/student-parents-syllabus/
- OSU Basic Needs Statement: https://studentlife.oregonstate.edu/bnc/about-bnc/osu-basic-needs-statement
- Oregon Crisis Lines: https://www.oregon.gov/oha/ph/preventionwellness/safeliving/suicideprevention/pages/crisislines.aspx