Intro to Physics Computation
Fall Quarter 2021
Physics 40

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Physics 317

Lectures: M,W 3:10-4:00 PM in Kerr 293

Lab: Section 1: T,H 3:40-5:30 PM (Physics 185)

Text:
Online lecture notes at `https://www.scipy-lectures.org`
Lab Manual available on course website
Gezerlis "Numerical Methods in Physics with Python" is available online at the UC Davis library.

Lab Instructor: Keerthi Vasan (kvch@ucdavis.edu)

Office Hours: See course website.

Course Description: Introduction to programming with examples from numerical analysis and computational physics. Introduction to modern tools used for scientific analysis and computer algebra.

Lectures: The primary emphasis of this course will be on learning by doing. The purpose of the lecture is enrichment to better prepare you for the lab activities. The lectures will be a mix of traditional board lecture and projected live computing.

Labs: The computing labs are the essential activity for this course. Attendance will be taken during the first lab of each week. The lab activities may be finished outside of lab, but must be posted to the course website by Friday evening in order to be graded. If you do not complete an assignment, submit what you were able to finish before the deadline.

Quizzes: Starting in Week 2, there will be a short low-stakes quiz at the start of each Wednesday lecture.

Interviews: Each week I will select a subset of students for a brief interview during the Thursday lab section.

Late and Missing Evaluations:
You should always submit whatever you have completed from the week's lab assignments before the Friday deadline. Each student may submit or update one week's worth of lab assignments by the following Monday night (Tuesday if Monday is a holiday) after the deadline, twice during the quarter, with no penalty. At the end of the quarter, before the final exam, students may update one week's worth of lab assignments which will replace their original grade. The lowest quiz grade will be dropped, but not if more than one quiz was excused for another reason. One lab absence will be excused when computing the attendance grade.

Final Grades: The final grades will be based on a weighted average of the lab exercises, exams, quizzes, interviews, and lab attendance.

Jupyter Notebooks:
The lab manual describes numerical problems which you should complete with Scientific Python in Jupyter Notebooks. Even though you may work together, each student must maintain their own notebook for each lab. Details on preparing and submitting your notebooks to the course site are provided in lab manual.

Pencil and Paper:
Occassionally, the lab manual will assign pencil and paper computations. When requested, take a picture of your pencil and paper computations, or scan them to PDF, and submit it to the course website along with your Jupyter Notebook.

Reinventing the Wheel:
There are many exercises in this course which involve implementing software that is likely already available elsewhere. This approach is usually a bad idea. It is a programming *anti-pattern* called "Reinventing the Wheel". Generally one should use library functions instead of homemade solutions whenever possible, as the library versions are thoroughly debugged. In this case, however, we are doing this deliberately as an exercise. Even when you are quite experienced at programming, you will sometimes opt to re-implement something as a learning experince, just as we are doing here. The anti-pattern would be to continue using the homebrew solution after the learning experience, instead of using a superior existing solution.

You may use the internet to search for solutions to specific technical challenges, but you *may not* search for top-level solutions to the assignments. So "how to use a while loop in Python" is perfectly fine but "how to sum fractions in Python" is not. The interviews and quizes are designed to check that you understand the completed exercises at a level that would be difficult to reach with cut-and-paste.

Campus Ready:
Please review the information for students provided at:

`https://campusready.ucdavis.edu/students-and-families`.

Daily Symptom Survey:
You must complete the daily symptom survey and receive an "Approved" status to attend any in-person activities. The instructor may spot check your daily symptom survey, so be prepared to present it. The instructor may ask all attending students to forward them their daily symptom survey on any particular day. If your status from the daily symptom survey prohibits attending a required in-person course activity, forward the results to your instructor and follow the instructions below.

Inability to Attend in Person:
Office hours will always be available remotely without restriction. If you are unable to attend a required activity in person, you may assume the following accommodations:

- Miss all quizes during a ten-day period
- Reschedule an interview during a ten-day period to a later date
- Attend all lab sections remotely during a ten-day period

Note that these accommodations must be made within the same ten-day period. All students are entitiled to this accommodation with no need for documentation. With documentation for one ten-day period, the student is entitled to a second ten-day period of accommodation. **Any further accommodations should be pursued through the Student Disability Center (SDC)**.

Here is a hypothetical example. You are symptomatic and miss lecture and two quizes for ten days. You attend office hours remotely over zoom. You are allowed to attend lab remotely over zoom even though you have not provided any documentation. On Friday, you teleconference with your doctor and send a doctor's note to your instructor. This changes your prior (undocumented) absence to documented, even though the doctor's note doesn't cover the entire ten-day period. Later in the quarter, you become sick and miss another ten-day period. You may exercise the same accommodations as before without the need to provide any further documentation.

Missed Exams:
There is no option to take exams remotely. Students that miss an exam (or exams) for a documented absence, who are otherwise passing the course, may elect to receive an incomplete (I) for the course. A single comprehensive make-up exam will be offered at a later date, and the final grade will use the score from the make-up exam to replace the missed exam (or exams).

Course Schedule:
Note that the dates refer to lectures. The lab date is the next day. The topics and schedule may be adjusted while the course is in progress.

Week	**Lab Date**	**Lab**
1	22 Sep	Installation
2	27 Sep	Binary Numbers
	29 Sep	(catch-up)
3	4 Oct	Sequences and Series
	6 Oct	Quadratic Equation and Prime Numbers
4	11 Oct	TBD
	13 Oct	TBD
5	18 Oct	TBD
	20 Oct	TBD
6	25 Oct	TBD
	28 Oct	TBD
7	1 Nov	TBD
	3 Nov	TBD
8	8 Nov	TBD
	10 Nov	TBD
9	15 Nov	TBD
	17 Nov	TBD
10	22 Nov	TBD
	24 Nov	(Cancelled)
11	29 Nov	TBD
	1 Dec	TBD