Experimental Techniques
Winter Quarter 2021
Physics 80

UCDAVIS
DEPARTMENT OF PHYSICS

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Physics 317

Lectures: M,W 11:00-11:50 AM Remote Instruction

Lab: Section 1:   M,W 12:10-2:30 PM Remote Instruction
Section 2:   T,R 3:10-5:30 PM Remote Instruction

Text: Online lecture notes at `https://www.scipy-lectures.org` plus lecture notes on RLC circuits and Data Analysis on the course website.

Office Hours: M 11:00-11:50 AM (lecture zoom session)

Lab Instructor: Junying Huang (jyghuang@ucdavis.edu)

Course Description:
This course has been substantially revised for remote teaching. Statistical analysis of experimental data, data analysis using Scientific Python, computational physics, and analysis of electronic circuits. If logistics allow, the course will include experimental study of electronic circuits using take-home lab kits.

Online Solution Services:
You may not use online solution services for any of the problems assigned for this course, including homework, labs, quizzes, or exams, To do so is a violation of the UC Davis academic code of conduct (plagarism and/or unauthorized collaboration) I will deploying several counter measures designed to discourage the use of these services. If monitoring these sites with out department account suggests these measures have been ineffective, we will have a synchronous final exam.

Lectures:
The lectures will be a hybrid between (optional) synchronous and asynchronous content. Short videos which cover the core lecture content will be posted on the course website. The Wednesday lecture period will be reserved for optional synchronous informal lecture to review the material, answer questions, and solve example problems. Please prepare for these

lectures by watching the videos and reading the corresponding lecture notes.

Homework:
There will be approximately five homework assignments, based on the lecture material. **To minimize the effectiveness of cheating, homework scores will be based solely on whether a legitimate attempt was made.** Homework and due dates will be posted on the course website. You may collaborate on homework problems, but each student should provide their own solution.

Midterm Exams: There will be one or more take-home midterm exams.

Final Exam:
The final exam will be take-home, unless I find evidence that the take-home exams have been compromised. For this reason, reserve the scheduled final exam slot: Mar 17, 2021 at 10:30 AM.

Lab Activities:
The lab activities are the most important component of this course. The lab activities have been redesigned to accommodate remote instruction. They may be completed asynchronously, but the lab TA will be available remotely during your scheduled lab section to answer questions. You may work alone or in groups of two. Groups of three will be allowed, with lab TA permission, in exceptional circumstances.

Logbooks:
Most scientist these days employ a mixture of handwritten and digital logbooks. Quick notes and sketches about procedures, calculations, and the results of simple measurements are often most conveniently handwritten. Extensive data collection and detailed analysis are usually done entirely on a computer. You should keep a hand-written log book for the quick notes, but in some cases, you will be asked to keep an ASCII text file as a simple digital logbook.

Jupyter Notebooks:
Most of the lab assignments involve the completion of a Jupyter Notebook. Each lab partner should write their own notebook, but you may share your working code. Place the name of the lab, the date of the lab, and the name of your lab partners in the first cell as a comment, even though you are each keeping your own notebook.

Start each of your notebooks with the magic python function `%pylab inline` to load numpy as np, matplotlib as plt, and show plots as cell output (inline).

Make sure all of your output is visible, print your notebook as a PDF file, and post the PDF file to the course web site. Each Jupyter Notebook will be graded on a 100 point scale.

Course Schedule:
Note that the dates refer to lectures. For section 2, the lab date is the next day, so e.g. the "Plotting" lab is on 14 Jan. The topics and schedule may be adjusted while the course is in progress. The lecture refer to chapters in the lecture notes for Analysis (A), Fourier (F), and Passive Electronics (P), so, e.g. "A1" is "Analysis of Experimental Data, Chapter 1".

Week	Date	Lecture	Lab
1	4 Jan	(async)	(no lab)
	6 Jan	(async)	(no lab)
2	11 Jan	(async)	Intro. to Scipy
	13 Jan	Recap A. 1	Plotting
3	20 Jan	(async)	(catch-up)
4	25 Jan	(async)	The Monte Carlo method
	27 Jan		(catch-up)
5	1 Feb	(async)	Limits of Distributions
	3 Feb	Recap A. 2	(catch-up)
6	8 Feb	(async)	Uncertainties
	10 Feb	Problems	(catch-up)
7	17 Feb	Recap A.3	(catch-up)
8	22 Feb	(async)	Curve Fitting
	24 Feb	Pre-cap P.1	Ideal Gas
9	1 Mar	(async)	(catch-up)
	3 Mar	Pre-cap P.2	(catch-up)
10	8 Mar	(async)	TBD
	10 Mar	Review	(catch-up)