Experimental Techniques
Winter Quarter 2019
Physics 80

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Physics 317

Lectures: M,W 11:00-11:50 PM in Rm. 152 Roessler (moved from Rm. 285 Physics)

Lab: Section 1: M 12:10-2:40 PM in Rm. 152 Roessler

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

Office Hours: M 3:00-4:00 PM in Physics 317

Lab Instructor: Samuel Heppelmann, sheppelmann@ucdavis.edu

Quizzes: There will be occasional low-stakes single-problem quizzes during lecture.

Final Exam: Wed, March 20 at 1:00 pm in 285 Physics

Homework: There will be approximately five homework assignments, based on the lecture material. Do not post the problems to internet forums. To minimize the effectiveness of cheating, homework scores will be based solely on whether a legitimate attempt was made. The best way to prepare for the exams and the quizzes is to solve problems yourself or within a study group. Always be prepared to explain your work.

Course Description: This course is an introduction to experimental laboratory techniques and data analysis. Laboratory techniques include electronics circuits and optical systems and related test equipment. Data analysis based on scientific python includes statistical and systematic analysis, curve fitting, and noise.

Lab Safety: You should complete the online course for Electrical Safety at `http://safetyservices.ucdavis.edu/training/electrical-safety`.

Labs: You are expected to attend every lab session. The TA will take attendance at the start of each lab, therefore, if you arrive late, you should check in with the TA. Most labs have one or more sign-off points where you are expected to show the TA your result. If

time permits, the TA may ask a questions of each lab partner. For example, to describe the purpose of a particular line of code. When appropriate, you may be assigned a grade for neatness of your experimental setup and/or code.

There is no opportunity to make-up labs that are missed or not completed during the designated time. Instead, your worst two lab scores will be dropped from your final grade.

Pre-Lab Calculations: If assigned, pre-lab calculations are due at the start of lab. They will be left at the front of the class in case you need to consult them during lab.

Lab Reports: Most scientist 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. But data collection and detailed analysis are done entirely on a computer.

Each student will maintain a personal handwritten logbook (For this class, any bound notebook will do, including spiral bound, but not loose leaf paper) in order to record notes on the procedure, as well as record observations and simple measurements. The handwritten logbook will remain in the lab to be graded periodically and eliminate the risk of being lost. Extensive analysis and final plots will be submitted online. Place the names of all lab partners in the top cell of the notebook, then print it as a PDF and upload to Canvas at the end of lab. One submission per team.

Tentative Course Outline: This is the first time this course has been offered, so the topics and schedule may be adjusted while the course is in progress.

Week	Dates	Lecture	Lab
1	7 Jan	Introduction	(no lab)
	9 Jan	Scientific Python	Plotting
2	14 Jan	RLC Circuits	DC Circuits
	16 Jan		Thevenin Equivalent Circuits
3	23 Jan		Time Varying Signals
4	28 Jan		RC amd RL Transient Signals
	30 Jan		Passive Filters and Resonance
5	4 Feb	Distributions	Catch Up
	6 Feb		Distributions
6	11 Feb	Uncertainties	Geiger Counter
	13 Feb		Central Limit Theorem and Uncertainties
7	20 Feb	The Diode	The Diode
8	25 Feb	Analysis	Curve Fitting
	27 Feb		Planck's Constant
9	4 Mar		Speed of Light
	6 Mar		TBA
10	11 Mar		Muon Lifetime
	13 Mar		TBA