Computers in Physics Exps.
Spring Quarter 2019
Physics 116C

UCDAVIS
DEPARTMENT OF PHYSICS

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Physics 317

Lectures:	MWF 1:10-2:00 PM	140 Physics	
Lab:	Section 1:	M 4:10-7:00 PM	152 Roessler
	Section 2:	W 3:10-6:00 PM	152 Roessler
References:	https://www.scipy-lectures.org		
	Online lecture notes on data analysis.		

Office Hours: Monday 2:00-3:30 in Room 317
Lab Instructor: Rahim Ullah
Midterm Exam: May 22, 2019 (during lecture)
Final Exam: June 13, 2019 at 1:00 PM in Physics 140

Course Description: Modern experiments rely heavily on microprocessors to acquire and analyze experimental data. This course uses the Arduino microprocessor as a platform for creating data acquisition systems in different experimental contexts. We will use Scientific Python for analysis of experimental data. Topics include statistical distributions, experimental uncertainties, statistical analysis, Fourier analysis, and noise.

Friday Exercises: As much as possible, Friday lectures will be used for in-class exercises using Scientific Python. Bring a laptop to class on Friday. If this presents a personal financial hardship, please contact the instructor. Completed Scipy notebooks should be exported to PDF and submitted to the course website for grading.

Homework: There will be approximately three homework assignments covering the lecture material.

Labs: You are expected to attend every lab session. The TA will take attendance at the start of each lab. 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 setup. 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.

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

Lab Reports: There will be three long lab reports for the Geiger Lab, Johnson Noise Lab, and the Muon Lifetime lab. The remaining labs include instructions for a report, generally much shorter with fewer requirements.

Course Outline: In addition two the listed topic, most weeks we'll need to cover some additional material in lecture to prepare for the upcoming labs. Labs marked (LW) have a long write-up. The muon lifetime lab is data analysis only.

Week	Dates	Lecture	Lab	Exercise
1	1,3,5 Apr	Distributions	Intro to Arduino	Plotting
2	8,10,12 Apr	Uncertainties	Geiger Counter (LW)	Histograms
3	15,17,19 Apr	Statistical Analysis	Geiger Counter (cont.)	
4	22,24,26 Apr		Arduino Function Generator	
5	29 Apr 1,3 May		Arduino Digital Scope	Fitting
6	6,8,10 May	Fourier Analysis	Arduino Spectrum Analyzer	Muon (LW)
7	13,15,17 May	Noise	Johnson Noise (LW)	
8	20,22,24 May	Microprocessors	Johnson Noise (cont.)	
9	(27),29 31 May		No Lab	
10	3,5 Jun	Review	Arithmetic Logic Unit	