DEPARTMENT OF PHYSICS, UCSD
Modern Physics Laboratory
Physics 2DL, Spring 2010

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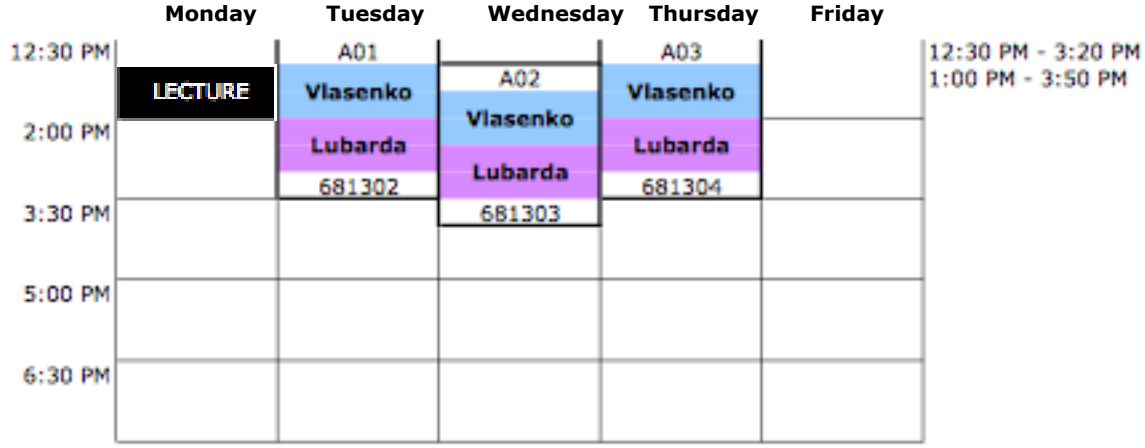
Office Hour: Mondays 3 – 4 pm



Lectures: **Mondays 1:00—1:50, Peterson Hall 102**

The first lectures will discuss the experiments. Later lectures will discuss the analysis of experimental data and the treatment of errors, following Taylor.

Lab Periods: **Tue & Thursday12:30—3:20, Wed 1:00—3:50, Mayer Hall 2nd Fl. 2574**

Your lab session in weeks 1 and 2 will be as used discussion sessions for the six experiments. Each student will then do six (6) experiments, with a lab partner, in Weeks 3—9. ***DO NOT MISS ANY OF YOUR LAB SESSIONS.*** If you MUST miss a lab session you need a note from a doctor or similar for us to authorize a make up session. It is very inconvenient for us to set up the labs for two students. Lab reports will be due at the lab session *one week after* the experiment is performed.

Experiments, Textbook Sections to Review:

1.	Optical Spectra	Serway §3.3, 3.4	Tipler 4-1, 4-3
2.	Coherence of Light	Serway §1.3	Tipler §5-3
3.	PhotoElectric Effect	Serway §2.4	Tipler §3-3
4.	Electron e/m	Serway §3.2	Tipler §3-1
5.	e^-—Atom Collisions	Serway §3.5	Tipler §4-5
6.	Electron Diffraction	Serway §4.2	Tipler §5-1, 5-2

Note: these are listed in no particular order. You and your lab partner will choose which experiments are done. There are two experimental setups for each experiment. All experiments must be done by each lab group.

Homework from Taylor, 2nd Edition

Probs 3.6, 8, 10, 12, 22, 24, 46	due at W4 lab	(week of 19 April)
Probs 4.4, 5, 6, 12, 16, 18, 20	due at W5 lab	(week of 26 April)
Probs 5.6, 12, 20, 22, 34, 36	due at W6 lab	(week of 3 May)
Probs 6.2, 4, 6; 7.2, 4, 6	due at W7 lab	(week of 10 May)
Probs 8.2, 4, 5, 10, 18, 23, 24	due at W8 lab	(week of 17 May)
Probs 10.2, 6, 10, 16; 11.2, 4, 20	due at W9 lab	(week of 24 May)

Probs 12.2, 4, 10, 12, 14 due at W10 lab (week of 31 May)

Final Exam: The Final Exam will cover the material in the lectures and the labs. Some of the questions will be taken directly from the homework problems. Lab questions will include derivation of background theory, sketching of apparatus and circuits, and description of results.

Grading Policy:		
	Lab Work	65%
	Final Exam	25%
	Homework	10%

Required:
John R. Taylor, *An Introduction to Error Analysis*, 2nd Ed., 1997.
Laboratory Manual, Physics 2DL, provided online at the 2DL website

Notebooks (lab) must be purchased by the student:
- Two 7 7/8 x 10 1/8 quadrille ruled notebooks
- You will work with one notebook while the other one is being reviewed by the TA.

Calculator: A scientific calculator with a statistical analysis package (mean, standard deviation, and linear regression). The lab stations have computers with Origin plotting and analysis software.

How to ACE Your Lab Reports!

1. All reports must include physical and electronic diagrams.
   a. Make a clear diagram showing the overall experimental set-up.
   b. Make clear diagrams of all relevant electrical circuits.

2. Record your data carefully.
   a. Don't just write numbers. Say what the numbers represent, and include units (e.g. ohms) and the associated uncertainty (e.g. ±5%).

3. Make your graphs understandable.
   a. Justify the choice of plot. A sentence like "We expect the voltage V to decay exponentially with time so we plot log (V) vs. time to obtain a straight line" is all you need.
   b. Give the graph a title.
   c. Label your axes with the variable and units [e.g. t (msec) or d (10^{-8} cm)].
   d. Put error bars on the experimental points.
   e. If you are fitting (comparing) experimental points to some mathematical expression (the fitting function), then include the fitting function on the graph. Include also any fitting parameters with their uncertainties (errors).

4. When you use measured values to calculate a result, e.g. $q = x/y$, use the errors (uncertainties) associated with x and y to find the uncertainty in the calculated value q .