DEPARTMENT OF PHYSICS, UCSD
PHYS 2CL - Electricity & Magnetism, Waves and Optics Lab
Fall 2009

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Lectures:	Mon. 7:00 PM – 7:50 PM, York Hall 2722

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Web: http://physics.ucsd.edu/students/courses/fall2009/managed/physics2cl/

TA:

FA09 PHYS 2CL ***Mayer Hall Addition 2544***

	Monday	Tuesday	Wednesday	Thursday	Friday
8:00 AM		A01 Conger Kim 662911	A05 Conger Graf 662915	A09 Conger Winbow 662919	
9:30 AM					
11:00 AM		A02 Graf Kim 662912	A06 Progovac Marsh 662916	A10 Conger Winbow 662920	A13 Progovac Marsh 662923
12:30 PM					
2:00 PM		A03 Marsh Briggs 662913	A07 Smith Huang 662917	A11 Smith Progovac 662921	
3:30 PM					
5:00 PM		A04 Marsh Briggs 662914	A08 Smith Huang 662918	A12 Smith Progovac 662922	
6:30 PM					

Lab TA Coordinators

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Lab TAs

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week (starts)	lecture	exp	report due at lab section	hw due at lab section
1 (28 Sep)	Measurements and Variability. Error propagation.	0		
2 (5 Oct)	Statistical Analysis. RC circuits (Exp. 1).	1	0	3.10 & 3.28
3 (12 Oct)	Histograms and Distributions. The Gaussian Distribution.	2	1	4.18 & 4.26
4 (19 Oct)	LRC circuits (Exp. 2, 3).	3	2	
5 (26 Oct)	Refraction and Interference with Microwaves (Exp. 4). Measurements Magnetic Fields (Exp. 5).	3		5.20 & 5.36
6 (2 Nov)	Diffraction and Interference with Coherent Light (Exp. 6).	4-7 (I)	3	
7 (9 Nov)	Lenses and the Human Eye (Exp. 7).	4-7 (II)	4-7 (I)	
8 (16 Nov)	Rejection of Data, Weighted Averages, and Least Squares Fitting.	4-7 (II)	4-7 (II)	7.2 & 8.10
9 (23 Nov)	Covariance and Correlation, χ^2 Test for a Distribution.			
10 (30 Nov)	final	make-up		9.14 & 12.3

Experiments:
0. Exploring the Instruments and ORIGIN
1. RC Circuits
2. Oscillation and Damping in the LRC Circuit
3. Resonance in LRC Circuits Driven by Alternating Current
4. Refraction and Interference with Microwaves
5. Measurements Magnetic Fields
6. Diffraction and Interference with Coherent Light
7. Lenses and the Human Eye

Students will do experiments 0, 1, 2, and 3 during weeks 1, 2, 3, 4 and 5. In week 5, students will enlist for the remaining two experiments choosing them among experiments 4, 5, 6 and 7. Students will do these two experiments during weeks 6, 7 and 8. Each experiment is performed by two students. The reports should be done individually by each student. Lab reports will be due at the lab session one week after the experiment is performed.

Laboratory Manual will be provided online.

Homework from Taylor, 2nd Edition

Probs 3.10 & 3.28 (optional: 3.36 & 3.41)	due at W2 lab section
Probs 4.18 & 4.26 (optional: 4.6 & 4.14)	due at W3 lab section
Probs 5.20 & 5.36 (optional: 5.2 & 5.6)	due at W5 lab section
Probs 7.2 & 8.10 (optional: 6.4, 8.6 & 8.24)	due at W8 lab section
Probs 9.14 & 12.3 (optional: 12.14)	due at W10 lab section

Final Exam (Nov 30, 7 pm, York Hall 2722) will cover the material in the lectures and textbook.

Textbook (required): John R. Taylor, *An Introduction to Error Analysis*, 2nd Ed., 1997.
Lab notebooks (required): 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).

Grading Policy:	Lab Work	6x12=72%
	Homework	10x1=10%
	Exam	18%

Students should prepare for the experiment in advance by reading the lab manual. Students will be quizzed on the background by TAs in the early stage of the lab.

Quiz questions (can use notes, cannot use lab manual) Credit 2 points

Guide to the Lab Report

	Credit (10 points total)
Diagram(s) showing the overall experimental set-up and relevant electrical circuits	2
Key Equations	1
Data recording, analysis, and presentation in graphs	4
Error analysis, dominant sources of error	2
Experimental conclusions	1

How to ACE Your Lab Reports

1. All reports must include 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. Give the graph a title.
   b. Label your axes with the variable and units [e.g. t (msec) or d (10^{-8} cm)].
   c. Put error bars on the experimental points.
   d. 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 .