

## APh 024 Labs Spring 2011

### General Info:

Instructor: Nan Yu, [nyu@caltech.edu](mailto:nyu@caltech.edu)

TA's: TBD, [tbd@caltech.edu](mailto:tbd@caltech.edu), office: tbd

Location: Moore 060a, 060b, and 067

Time: one 4-hour session weekly

Session I: Monday 6:00 pm – 10:00 pm (tentative), two groups

Session II: Thursday 2:00 pm – 6:00 pm (tentative), two groups

Session III: Friday 2:00 pm – 6:00 pm (tentative), two groups

(The session organization and schedule will be discussed and set at the Organization Meeting on Monday, March 28<sup>th</sup>, 5:00 pm)

### Grades:

- 30% for the pre-lab  
(pre-lab questions, so do this carefully)
- 30% for the organization of your lab book and proper documentation of your lab work  
(organization, completeness, neatness)
- 40% for the technical quality of your work  
(participation, procedures, completeness, correctness)

### Lab experiments:

There will be 8 experiments, consist of topics that mostly covered in the demos of APh23.

Week	Experiment #	Title	Room	Grade
1	No lab	Mandatory OM, March 28 <sup>th</sup> , 5:00 pm	Moore70	
2 - 5	1-4	Optical components	67	12.5%
2 - 5	1-4	Fabry-Perot	60b	12.5%
2 - 5	1-4	Interferometers I	60a	12.5%
2 - 5	1-4	Interferometer II	60a	12.5%
5	No lab	Setup switch-over (midterm)		
6 - 10	5-8	Diffraction	67	12.5%
6 - 10	5-8	Optical FT	67	12.5%
6 - 10	5-8	Grating and monochromator	60a	12.5%
6 - 10	5-8	Photomixing	60b	12.5%

### Lab procedures:

- You need to get a Lab book prior to the first lab (we require you get the “*Computational Notebook, 43-648*” from the bookstore). *All of your lab work should be kept in this book (this includes Pre-Labs and any other notes you may have regarding your lab work).*
- You will pair up into groups of 2-3, and do each lab with the same group of students.

There are different labs per section, each group doing one of the labs each week.

3. You will get a handout for each of the 8 labs in the week prior to your lab. These lab handouts contain your pre-labs, and you will need to cut-and-paste parts of the handout into your lab book. Scissors and tape will be made available to you in the lab area.
4. You must come to each lab prepared. While lab works will be collaborative efforts, you should *complete pre-lab portions independently by yourself* only (you can compare answers till you get them right). Your pre-labs must be shown to your TAs at the beginning of the first day of your lab. *Note that you must have your pre-lab graded before you can begin the lab. No pre-lab, no lab. No lab, no grade.*
5. The experiment should be performed within the four-hour period and the results recorded in your notebook as you do the experiment. The TA's and the instructor (sometimes) will be available for questions and assistance. We will also interrupt occasionally to see how you're doing and probe your understanding and approaches.
6. Your lab book should be neat and tidy. You should keep a Table of Contents of all your labs (and associated lab work) in the front of your lab book. Make sure to leave room for this Table of Contents!  
An example lab book will be in Rm. 67 for students who wish to get a feeling for what the layout of a lab book should look like. Please do not take this book...just browse it.
7. Each lab in your lab book should contain a title, a pre-lab section (which you show to your TAs before you begin the lab), and then a main lab section where you describe the experiments you are performing and the results of your measurements. If you have additional notes or calculations you performed for the experiment you can include it in the main lab section, or you can put it at the end of the lab in an appendix section.
8. In the main lab section each question/activity should be cut from the handout and taped into your lab book. Your response/data/answer should then be written below the cutout. Before moving onto the next question/activity (i.e. taping down the next part of the handout), you should complete the current activity or leave enough room to complete it later.
9. I will make available a networked printer so that you may print out results from computer simulations, etc. You are encouraged to have one member of your group bring a laptop computer with Matlab or Mathematica on it so that you may quickly plot or analyze data.
10. Your notebook must be turned in to TAs by the end of each lab period for grading. The notebooks will be graded within a day or two from TA's office or mail box.

### **Additional Notes:**

Record data real-time first as a table, then plot immediately to see if it makes sense. This tells you right away if you are on the right track. DO NOT plan on post-processing messy notes to your lab book at a later time. You will probably not have the time. You will be keeping a technical journal, as is required of nearly all people engaged in industrial research.

Your lab notebook should be a complete, concise narrative account of your work. Assume the reader/grader has never seen the handout and will not know the questions you are answering unless you state them. Make sketches and diagrams. Record your motivation for each step, your observations, your conclusions and your best guesses.