GEOMETRICAL AND INSTRUMENTAL OPTICS LAB II
OPTI 202L, Spring 2012

Lab Schedule: (Room 438, Optical Sciences Center)

<table>
<thead>
<tr>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00-10:50 am -- sec. A</td>
<td>---</td>
<td>8:00-10:50 am -- sec. F</td>
</tr>
<tr>
<td>1:00-3:50 pm -- sec. B</td>
<td>1:00-3:50 pm -- sec. D</td>
<td>1:00-3:50 pm -- sec. G</td>
</tr>
<tr>
<td>5:00-7:50 pm -- sec. C</td>
<td>5:00-7:50 pm -- sec. E</td>
<td>CANCELLED</td>
</tr>
</tbody>
</table>

Lab Lecture: Friday, 11:00-11:50 am –in Room 410, College of Optical Sciences

Dr. Mike Nofziger
Phone: 626-8363  E-mail: nofziger@optics.arizona.edu
Office location: Optical Sciences Center, Rm 412A
Office Hours: Tues. and Thurs. 1pm-3pm, and by appointment.

Objectives:
This lab course will attempt to closely follow OPTI 202R, Geometrical and Instrumental Optics. It provides hands-on experience with most of the concepts taught in that course. If you are majoring in Optics, then 202L is a required course. It is strongly recommended that both courses be taken concurrently to optimize your learning. The main objectives for this lab are to review the basics of geometrical optics and image formation, understand aberrations, and the optical design of various instruments. A variety of optical lab techniques will also be used.

Textbook:
Class Notes are available at the EES Copy Center, Harvill Room 137 (621-7502; 8:00am-5:00pm). You are required to keep lab notes in some type of bound lab notebook (no loose sheets of paper).

Grading:

<table>
<thead>
<tr>
<th>Labs (100 points per Post-Lab Report x 11 labs):</th>
<th>POINTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>(including any pre-lab and/or post-lab questions)</td>
<td>1100</td>
</tr>
<tr>
<td>Lecture Session Pop Quizes</td>
<td>100</td>
</tr>
<tr>
<td>Final Analysis</td>
<td>300</td>
</tr>
<tr>
<td>TOTAL</td>
<td>1500</td>
</tr>
</tbody>
</table>

* ALL of the Post-Lab Reports “count.” Unlike last semester in 201L, we are NOT dropping the two lowest scores!

* Final grading for the class will be done on a curve. If your score falls “in-between” letter grades, input from your TA will be used to assess how you performed in lab, to make a final decision on your grade.

* LATE POLICY: All Lab Summaries are due at the start of your lab session, one week after you did that particular lab. Late material will be accepted up to a week after it was due, and will be graded at 75% off. If you miss a lab, it may be made up only because of medical reasons or a family emergency. Sharing of data for lab makeup is NOT allowed. The lab should be made up by noon on the Monday following the lab session that you missed. If you miss a lab for other than an excused medical reason, no Lab Summary will be accepted.

Missing Lab Summaries count as a “0”.

*
Weekly Lab Summary:
Due one week after you have done the lab. The summary is to be turned in at the start of the following week's lab.

“Each lab handout contains specific work tasks that need to be performed, and questions that need to be answered. They generally will be marked and easy to spot, but not always. Read the handout carefully and make sure you do all of the tasks, and answer all of the questions. The weekly “Lab Summary” that you turn in for a grade must include the following:”

- One page of writing, in your own words, that contains the following sections:
  - Objectives (describe the purpose of the lab)
  - Procedures and Equipment (a general description, NO step-by-step details!)
  - Summary (what was learned)
- All of your “raw” data (the actual readings you took in lab).
- All of your “processed” data (the results you calculated based on your raw data).
- Graphs of data (if appropriate—enlarge to fit at least half of a page).
- Results of computer work (if asked for).
- Answers to all of the questions (* or otherwise) in the lab handout.

Lab Summaries MUST be typed (computer-printed), and double-spaced. Hand-written Summaries will NOT be accepted. Lab Summaries MUST be written individually, in your own words. You may use data taken by your lab group, but the Lab Summary must be entirely your own work. If written as a group effort, it will be considered as plagiarism by everybody involved, and will be dealt with accordingly. (This includes a “group-written” summary where only a few words were changed—that does NOT make it your own work.)

Pre- and Post-Lab Questions:
These will be clearly marked in the lab handout:

(Q1) will mark a question.
● will mark something in the lab handout that needs to be included in the post-lab report (questions, observations, findings, etc.).

Pre-lab questions are due at the start of your week’s lab session.
Post-lab reports are due at the start of your following week’s lab session.

Final Analysis:

This will take the place of a traditional final lab report. Identify 3 specific things that you don’t understand about material covered in OPTI 202R, OPTI 202L, or OPTI240. Think critically about what it is that you don’t understand about each item, and why you have had trouble understanding it. Write at least a half page for each item, explaining this.

Full credit will be earned for length (writing at least half of a page for each item), and content (the extent to which you demonstrate ‘critical’ thinking about your misunderstandings, NOT just complaining about something).
GEOMETRICAL AND INSTRUMENTAL OPTICS LAB II
OPTI 202L, Spring 2012

Week 1: 16 January 2012
NO LABS this week—get the Lab Notes and a bound notebook.

Week 2: 23 January 2012
Lab 1: Multiple Lens Systems—The Zoom Lens
Paraxial design of a simple two-lens zoom system. SLR camera zoom lens.

Week 3: 30 January 2012
Lab 2: Aberrations

Week 4: 6 February 2012
Lab 3: The Simple Magnifier, Eyepieces
7 February - LAST DAY TO DROP COURSE WITHOUT A GRADE (course will not appear on transcript)

Week 5: 13 February 2012
Lab 4: Refracting Telescopes
Afocal systems, Galilean and Keplerian designs, angular magnification, FOV, vignetting, field and relay lenses.

Week 6: 20 February 2012
Lab 5: Optical Comparator—The Golfscope
Real-world example of a Keplerian telescope with a reticle.

Week 7: 27 February 2012
…..(Lab 5) Optical Comparator—The Golfscope (continued…..)
…..complete optical prescription entered into ZEMAX.

Week 8: 5 March 2012
6 March - LAST DAY TO DROP COURSE WITH A "W" (if passing), WITHOUT THE DEAN’S SIGNATURE
Lab 6: Reflecting Telescopes
Optical properties of the individual mirrors and of the system.
Angular magnification, FOV.
Week 9: 12 March 2012
NO LABS—SPRING BREAK

Week 10: 19 March 2012
Lab 7: The Reverse Galilean Telescope—Door Peephole Viewer
Real-world example of a Galilean telescope….in reverse.

Week 11: 26 March 2012
Lab 8: The Compound Microscope
Magnification of the objective, the eyepiece, and the overall system.
Telecentricity. Commercial microscopes.

Week 12: 2 April 2012
Lab 9: Optical Materials and Dispersion I
The prism spectrometer, optical layout and alignment.
Dispersion curves, comparison to theoretical data.

Week 13: 9 April 2012
Lab 10: Optical Materials and Dispersion II
The Abbe Refractometer, TIR, unknown samples, optical layout of the instrument.

Week 14: 16 April 2012
Lab 11: Binoculars
Galilean telescope folded using a prism.

Week 15: 23 April 2012
…..(Lab 11) Binoculars (continued.....)
…..complete optical prescription entered into ZEMAX.

Week 16: 30 April 2012
NO LABS—Last Week of Classes
Final Analysis due by 5pm, Wed. May 2.

Week 17: 7 May 2012
NO LABS—FINAL EXAM Week