INTERMEDIATE OPTICS LAB II
OPTI 380B, Spring 2015

Lab Schedule: (Room 450, Optical Sciences Center)

Tuesday	Wednesday	Thursday
9:30 am-12:20 pm--sec. A	---	Cancelled
2:00-4:50 pm--sec. B	2:00-4:50 pm--sec. D	Cancelled
5:00-7:50 pm--sec. C	5:00-7:50 pm--sec. E	Cancelled

Lab Lecture (location and time): TBD…

Dr. Mike Nofziger
Phone: 626-8363   E-mail: nofziger@optics.arizona.edu
Office location: Optical Sciences Center, Rm 412A
Office Hours: Wed. and Thurs. 1:00-2:00 pm, and by appointment.

Objectives:
This lab course has been designed to closely follow ECE 207 <u>Elements of Electrical Engineering</u> or ECE 220 <u>Basic Circuits</u>. It provides hands-on experience with most of the concepts taught in these courses. If you are majoring in Optics, then 380B is a required course. It is strongly recommended that these courses be taken concurrently to optimize your learning.

The main objectives for this lab are to learn the basics of electronic measurements, and how to construct and make measurements of basic circuits—basic analytical instruments, linear and non-linear circuit elements, transistors, op-amps, active filters, oscillators, voltage regulators, logic, gates and flip-flops, counters and registers, data converters, and computer interfacing, programming, and data acquisition.

Textbook:
Class Notes are posted on-line at our class website:
www.optics.arizona.edu/nofziger/OPTI 380B

Lab Notebook:
<u>You are required to keep lab notes in some type of bound notebook</u> (<u>no</u> "3-ring" binders).

Grading:

Lab Objectives (done pre-lab)	10 points/lab	130
Schematics	10 points/lab	130
Lab Notebook	25 points/lab	325
Lab Questions (pre- and post-lab)	55 points/lab	715
Final Analysis	100 points	100
"Pop Quizzes" during Lab Lecture	100 points	100
	TOTAL POINTS	**1500**

Final grading will be done on a curve. If your score falls "in-between" 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: Unexcused 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 family emergency. The lab should be made up by noon on the Monday following the lab session that you missed. Makeup work with an excuse will be graded with no penalty.

Lab Objectives: *(DUE at the start of each lab—done in your lab notebook)*   **(10 points)**
This is a written exercise for you to think about and define the **objective(s)** for each experiment that you will perform. Write this in paragraph form, using complete sentences (one paragraph per experiment). This is a "Pre-Lab" activity—it is DUE AT THE START OF EACH LAB (as you walk in the door). This section will not be accepted late—no exceptions.

Schematics: *(DUE at the start of each lab—done in your lab notebook)*   **(10 points)**
        --For the electronics labs: the **schematic diagrams** of the circuits you will build.
This is a "Pre-Lab" activity—it is DUE AT THE START OF EACH LAB (as you walk in the door). This section will not be accepted late—no exceptions.

Lab Notebook:
 A significant portion of your final grade will come from how well you keep a lab notebook. Your notebook will be graded on a regular basis throughout the semester. Your lab notebook must include the following sections for full credit:

        --The **Raw data** that you took (numerical tables) and **Observations** that you made (depending
        on the particular experiment).   **(15 points)**

        --A **Summary** of what actually happened, what you observed in the lab, and any problems
        you encountered.   **(10 points)**

Pre-Lab, Post-Lab, and Notebook Questions: **(55 points)**
<u>Pre-Lab</u> "**(PL#)**" Questions: *Due at the start of your lab—done on a separate sheet of paper.*
<u>Post-Lab</u> "**(L)**" Questions: *Due at the start of the next lab—done on a separate sheet of paper.*
<u>Notebook Questions</u> "**[Q#]**": *Answered in your notebook, clearly labeled [Q#].*
                                    These are to be answered during lab!
<u>These questions will not be accepted late—no exceptions.</u>

Notebooks are to be left with your TA as you leave lab.
Notebooks will be returned by noon on Fridays, in the Academics Office for you to pick up.
_____
Final Analysis: **(100 points)**
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 380B, OPTI 330, OPTI 340, or OPTI 370. 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 <u>length</u> (writing at least half of a page for each item), and <u>content</u> (the extent to which you demonstrate 'critical' thinking about your misunderstandings).

Intermediate Optics Lab II
OPTI 380B, Spring 2015
(Subject to change!)

Week 0:   **12 January 2015**
Lab Lecture on Friday, Jan. 13 to get started.
NO LABS this week—Get a bound notebook, read Lab #1, and answer the Pre-Lab Questions.

Week 1:   **19 January 2015**
Lab 1:   Basic Circuit Construction and Electronic Instrumentation

Week 2:   **26 January 2015**
Lab 2:   Linear and Non-linear Circuit Elements and Networks

Week 3:   **2 February 2015**
Lab 3:   Introduction to LabView and GPIB Interfacing

Week 4:   **9 February 2015**
Lab 4:   Op-Amps I: Introduction

Week 5:   **16 February 2015**
Lab 5:   Op-Amps II: Circuits

Week 6:   **23 February 2015**
Lab 6:   Digital Logic: Introduction to Gates and Encoders…

Week 7:   **2 March 2015**
Lab 7:   Data Acquisition, FFT, and Aliasing

Week 8:   **9 March 2015**
Lab 8:   The Maksutov Telescope: "Performance of the Corrector Plate"

Week 9:   **16 March 2010**
NO LABS--*SPRING BREAK*

Intermediate Optics Lab II
OPTI 380B, Spring 2015
(Subject to change!)

Week 10:   **23 March 2015**
Lab 9:   Micro-controller I
    "Basics of the computer, I2C bus, digital I/O"

Week 11:   **30 March 2015**
Lab 10:   Micro-controller II
    "A/D Converter"

Week 12:   **6 April 2015**
Lab 11:   Micro-controller III
    "Stepper Motors, EEPROM Data Storage"

Week 13:   **13 April 2015**
Lab 12:   MOSFET's, High-Power LED's

Week 14:   **20 April 2015**
Lab 13:   Micro-controller/Data Acquisition Project…

Week 15:   **27 April 2015**
Lab 13:   …Micro-controller/Data Acquisition Project.

Week 16:   **4 May 2015**
NO LABS--*Last Week of Classes*
    Final Analysis due by 5pm, Wed. May 6.

Week 17:   **11 May 2015**
NO LABS--*FINAL EXAM Week*