PHY 5341 (LAB) – Fall 2009
Fri: 4:00-7:00 p.m.

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Lab Methodology:
a) This lab is broken up into a “fiber optics” section and an “optics” section. At any one
time, some students will be doing optics experiments, and some will be doing fiber
optics experiments. You are expected to have the lab printed out and brought with you
each and every week. If you don’t have the lab, you will get a “0” for the week. No
excuses.

b) You will be assigned randomly to groups. While working in groups, all students
should make an effort to perform all functions during the course of a lab session
(making measurements, taking notes, etc.). All students will be required to make notes
and document the experiment in a lab book.

c) Lab runs for three hours. If all experiments are done before the three hours are
complete, the students are free to go. If all experiments are not done after the three
hours, the students should write-up only what was accomplished during the allotted time
(allowances will be made if students prefer to stay somewhat beyond three hours).

d) Each student individually will write-up the experimental details, results, and analysis
independently in a lab report to be turned in by the next Friday’s class session.

e) Each student's lab report will be graded individually.

f) Due to numbers and practicality, missing lab is strongly discouraged and labs
cannot be “made-up”!

g) No late arrivals. This class is scheduled from 4-7. To give you some leeway, class
will start at 4:05. At this time, the door will be closed and no further admission will be
allowed. Participation is critical to the success of these labs and missing the
introduction is unacceptable. You will get a “0” for the week.

h) There are no extensions for late lab reports. Lab reports are due after one week and
that is it.

i) We only meet for 12 total class periods over the course of the semester, so
attendance is important. The first day of class, September 4th, will count just like all the
other class periods and will be part of your grade.
Grading:
Grading will be based on three things: keeping a lab book, the lab write-up, and demonstrating competency in computer proficiency (when applicable).

- 2 points: lab book
- 6 points: lab report
- 2 points: computer proficiency (when applicable)
- 10 points/week

Grading Scale:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>A</td>
<td>89 – 100%</td>
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<tr>
<td>B</td>
<td>77 – 88.9%</td>
</tr>
<tr>
<td>C</td>
<td>63 – 76.9%</td>
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<tr>
<td>D</td>
<td>50 – 62.9%</td>
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<tr>
<td>F</td>
<td>below 50%</td>
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1) Keeping a lab book
Each student will be required to keep a lab notebook devoted to the lab class. During the course of the lab, you should carefully sketch out your experiment, noting important dimensions (distances, volumes, etc.), record the procedure you are following (including mistakes you made in setting something up, and when you moved certain optics) and lastly accurately recording the data taken.

At the end of the lab class, before you leave, you will show the lab book to your instructor, who will grade it. You will receive a “√”, or “0” based on neatness, accuracy and thoroughness. This will correspond to 2 or 0 points. This grade is 20% of your score. I honestly expect an accurate depiction of what you were doing in the lab. Details, details, details.

2) Lab report or “write-up”
All experimenters, both scientists and engineers, must be able to communicate effectively. You MUST be able to accurately, concisely, and clearly describe “what you did” and “what result did you see”. This is the essence of a lab report. No set, definitive criteria is provided for a lab report. However, examples of two “A” reports will be provided. A complete report should include (but not be limited to):

- an introduction (one paragraph describing what your impression of the goal of the lab was)
- a section describing the theory involved, any important relevant equations, etc.
- a longish section detailing the actual experiment you did (NOT what was described in the lab manual, but what you actually performed). This should include careful drawings of the apparatus. Be careful, draw accurately, label everything with proper units, etc. Be clear and be concise about what you did.
- a section reporting all the numerical measurements made. This may be “mixed” in with the description of the apparatus if multiple mini-experiments were preformed in one lab. It is probably best to keep the experimental details and the
resulting measurements together. I will include sheets for summarizing data with each lab manual. Please turn these in with your lab report.

- **error analysis.** Try to handle the errors and uncertainties in your measurements as completely as possible. You cannot ignore uncertainty! See the handout on error analysis.
- **a conclusion/discussion.** Many, if not most, labs will have some discussion questions at the end which should be addressed in your report.
- **Hand-sketches and drawings of experimental setups are more than acceptable.** I do not expect you to computer draw anything.

Reports should be typed, although some leeway will be granted for equations, figures, etc.

### 3) Computer proficiency

We will frequently be generating data in the class that will need to be analyzed with a computer, whether that means utilizing a spreadsheet program to do statistical analysis, plotting experimental results, or fitting functional shapes to that data. Graphing of numerical results is BEST when done on a computer, and this class is one of the Department’s classes that satisfies the WSU General Education Program Computer Proficiency Level II requirement. As such, you are required to demonstrate your proficiency performing these standard tasks. The Department has computers with the Origin Graphing Software installed for your use. Other programs of your choice are acceptable. You will receive 2, 1, or 0 points specifically related to how you have handled this computerized analysis. This grade is 20% of your score.

### Plagiarism

In each of the last two years I have taught this course, I have had incidents of students taking information – images, descriptions, whole paragraphs – right off the web, cutting and pasting into their lab report. I have caught this every time, as it is usually quite obvious.

If you have never been told, this is plagiarism, a form of academic dishonesty, and is taken very seriously by myself and the University. Most importantly, it is not necessary! I do not want to know what the Web or anyone on it knows. I am trying to figure out what YOU know. You must right these lab reports in your own words, and with your own understanding of the ideas and motivations behind the experiment. This includes copying diagrams from my lab manual and putting them into your write-up. I want to see your diagram of the experiment.

At the first incidence of plagiarism, I will give the write-up an automatic zero. This will be your warning. On a second incidence of plagiarism, I will assign a score of zero for the course. This is a very serious action which is easily avoided: **DO YOUR OWN WORK.** ALL your words should be your own.
Optics Labs

LAB 1: DETECTION OF LIGHT
LAB 2: ATTENUATION OF LIGHT
LAB 3: POLARIZATION, POLARIZERS, AND WAVE PLATES
LAB 4: BREWSTER'S LAW
LAB 5: DIFFRACTION THROUGH A SINGLE SLIT AND, DOUBLE SLITS
LAB 6: MICHELSON INTERFEROMETER

Fiber Optic Labs

LAB 1: Semiconductor Laser
LAB 2: Fiber Losses
LAB 3: Proximity and Microbend Displacement Sensors
LAB 4: Single-Mode Fiber
LAB 5: Waveguide Grating Coupler