

# Physics 362: Intermediate Lab

Syllabus, spring 2009

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Course Websites: <http://www.geneseo.edu/~mclean/IntLab/> and in [myCourses.geneseo](http://myCourses.geneseo.edu)

## Learning Outcomes

This course will further your education in experimental physics. You will become familiar with more advanced equipment, use it to perform several classic physics experiments in a variety of fields, use more sophisticated mathematical tools to analyze the data, and report your results in a professional format. Work will generally be done in as collaborative teams, with greater autonomy than in previous lab courses.

Students completing this course will be able to:

1. set up advanced equipment, using the necessary resources (manuals, etc.),
2. trouble-shoot and solve equipment setup problems,
3. acquire and analyze data in the manner best addressing an experimental question,
4. manage their time and work constructively with others,
5. write standard format physics journal articles, with appropriate display of data, and analysis leading to conclusions.

## Times and places:

Lab meeting: Bailey 128; Wed. 2:45–5:15pm

Lab work is expected during this time. Significant time outside of this period will be required in order to complete labs satisfactorily.

Laboratory: Bailey 22 complex

Office hours: Mon. & Tue. 1:00–2:30pm, Thu. 1:00–2:00pm

I am also available at other times. See the schedule on my web site. Just stop by my office, or if you want to ensure that I'll be there, contact me by phone or email.

## Required materials:

A bound notebook is required for recording notes, observations, data, and analysis.

All other required equipment and books will be loaned from the physics department. With the exception of a few expendables, these materials must be left in the same condition (or better) as at the beginning of the semester.

## Required coursework and grading (with fraction of final grade):

14% Three electronics labs, performed individually (3%, 4%, and 7%)

2% Quizzes, all announced at least one week in advance.

For each of four classic physics experiments:

4% A) Timely progress on labs, as evidenced in lab notebooks

4% B) Quality of results, as evidenced at presentation of results

3% C) Quality of comments on others writing, as evidenced in a report draft

10% D) Final draft of report

Items A and B will be scored on a team basis, C will be scored on an individual basis, and D will be scored on an individual basis with a maximum 1% variation within a team.

Late work will be penalized by 10% for each day late.

## Schedule

|                     |         |                                   |                                 |
|---------------------|---------|-----------------------------------|---------------------------------|
| W                   | Jan. 21 | Lab 1a: Blinker circuit           | Lab 1b: Non-inverting amplifier |
| W                   | 28      | Lab 1b Circuit Check              | Lab 1c: Inverting amplifier     |
| W                   | Feb. 4  | Lab 1c Circuit Check & Report due | Lab 2 Assigned                  |
| W                   | 11      |                                   | Lab 2 Progress check            |
| W                   | 18      |                                   | Lab 2 Results presentation      |
| M                   | 23      |                                   | Lab 2 Draft report due          |
| W                   | 25      | Lab 3 Assigned                    | Lab 2 Final report due          |
| W                   | Mar. 4  | Lab 3 Progress check              |                                 |
| W                   | 11      | Lab 3 Results presentation        |                                 |
| (SPRING BREAK WEEK) |         |                                   |                                 |
| M                   | 23      | Lab 3 Draft report due            |                                 |
| W                   | 25      | Lab 3 Final report due            | Lab 4 Assigned                  |
| W                   | Apr. 1  |                                   | Lab 4 Progress check            |
| W                   | 8       |                                   | Lab 4 Results presentation      |
| M                   | 13      |                                   | Lab 4 Draft report due          |
| W                   | 15      | Lab 5 Assigned                    | Lab 4 Final report due          |
| W                   | 22      | Lab 5 Progress check              |                                 |
| W                   | 29      | Lab 5 Results presentation        |                                 |
| M                   | May 4   | Lab 5 Draft report due            |                                 |
| W                   | 6       | Lab 5 Final report due            |                                 |

### Details:

Lab 1 concentrates on basic electronics skills. Each person will work independently. Lab 1a will be completed in class. Labs 1b & 1c may be completed outside of class if necessary, with results presented the following week.

Labs 2–5 will be classic physics experiments, performed in teams of two or three people. Teams will remain the same throughout the semester. These labs all follow the same pattern:

Lab assigned: Lab period will be spent researching the theory and equipment necessary for the experiment. Teams must demonstrate readiness to proceed without direct supervision. Targets will be set for work to be completed over the coming week.

Progress check: While work on labs progresses, the instructor will visit teams to verify that targets have been reached and will evaluate lab notebooks.

Results presentation: Experimental results should be complete by the end of this lab period. Teams will describe their results to the instructor. This is not a formal presentation, but drafts of graphs, tables of data, etc., should be available.

Draft report due: Report must be a *single* MS Word document, comprising six sections. Each team member is responsible for authoring certain sections. Each team member will then provide comments on the other's writing, using the MS Word commenting feature. Drafts, including comments, are due in the myCourses drop box by **Monday at noon**.

Final report due: Each author revises their sections, in response to the comments provided. Final reports are due in the myCourses drop box by **Wednesday at 2:30**.

## **General Comments:**

### Bonus Material

At the beginning of each lab period, there may be a short presentation on such topics as journal article format or advanced error analysis.

### Maintaining a clean & safe working area

All students must maintain a clean and safe working environment. Failure to do so will result in a substantial loss of credit on your experiment. Regular inspections of the research area will occur by the instructor during the week to ensure that such an environment is maintained.

### Report Format

The goal is to produce a report similar in format to articles that appear in published journals. More details will be provided at the appropriate point.

### Academic honesty

All written lab reports must be entirely original; any plagiarism will result in a failing grade in the course.

### Departmental Writing Requirement

If you are a physics major, this course serves to satisfy part of the departmental writing requirement (which the college requires). Papers written for this course are also used for departmental assessment (evaluation of the department's, rather than students', performance). In particular, the second and third lab you write will fulfill these purposes. You do not have to actually do anything about this. I will copy the appropriate final drafts and add them into your folder.