

SUNY Geneseo, Department of Physics and Astronomy

Physics 362: Intermediate Lab

Syllabus, fall 2021

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Course Websites: <http://www.geneseo.edu/~mclean/IntLab/> and in Canvas

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.

Three overarching themes of this course: Working with equipment in a less structured environment and with greater autonomy than in earlier lab courses, analyzing data in a less prescriptive environment, and writing about the results more extensively.

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: ISC 225A, Thu 12:30–3:50PM

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

Laboratory rooms: ISC 225, 225A, 225A1, 225A2, and 228B will be used for specific labs.

Office hours: Tue 1:30–3:30PM, Thu 9:00–11:00AM, Fri 2:00–4:00PM

During these times, available for office walk-ins, office phone, or Zoom link (available on the schedule page of my web site).

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

Required coursework and grading (with fraction of final grade)

4% Each of four electronics labs (Lab 0, Ea–Ec scored for individual students)

For each of three physics experiments (Labs 1–3):

4% Satisfactory progress one week after assignment (scored on a team basis)

8% Written report, merits of the scientific work (scored on a team basis)

8% Written report, quality of the writing (scored individually, except that within a team, report grades may differ by one letter grade at most. Every student is responsible for assisting their partners in the writing process, partly (but not solely) by providing comments on their work by the required due date. Failure to provide comments will reduce your report grade.

For a Final Independent Project (Lab F):

2% Satisfactory progress at each of three mileposts (scored on a team basis)

13% Quality and scientific merit of final results and analysis (scored on a team basis)

5% Oral report (scored individually, but partly based on joint visual presentation)

Most work is graded on a letter scale, rather than a point scale. Interpretations of those letters might be:

A+ : Wow! (equivalent to getting 100%)

A : meets or exceeds expectations

A- : not much to complain about

B+ : good, several things could be improved

B : OK

B- : adequate

C+ : some clear problems or errors interfere with success meeting the goal

C : significant problems or errors interfere with success meeting the goal

C- : disappointing overall, but some good elements

D : major problems, but sufficient to be not unacceptable

Required materials

None. A single permanent location (bound notebook or electronic equivalent) for recording notes, observations, data, and analysis is recommended.

All required equipment and books will be loaned from the physics department. Except for a few expendables, these must be left in the same condition (or better) as you found them.

Resources for each lab are available in an online site. A link is on the course Canvas page.

Pandemic Backup Plan

If the entire course cannot meet in person, it will shift to a remote mode. Details will depend on the timing, since each lab spans several weeks. Generally, all students will work on the same physical experiment. Data will be obtained from video of work by the Instructor. Focus will shift more towards data analysis, including modelling. Writing will continue to pass through an editorial process, but each student will write their own article, rather than working collaboratively.

Lab E can most easily be done remotely, with equipment taken home. In early October, we will re-evaluate whether Lab E should be held in reserve for later in the semester.

Details

Lab 0 concerns the use of electrical measurement equipment. Performed individually.

Lab E concentrates on building basic analog electronic circuits. Performed individually.

Labs 1–3 are classic & modern physics experiments, performed by teams of two people. The milestones in the calendar are:

Preparatory Research: Initial review of a topic and the equipment, sometimes from supplied material, and sometimes from internet researching. You obtain a basic understanding of the experiment.

Launch: Each team meets with the instructor and must demonstrate readiness to proceed without direct supervision. Targets will be set for work to be completed over the coming week.

Site Visit: Teams demonstrate that their setup works, present preliminary data and analysis, and generally show evidence of good progress.

Draft Article Due: Submission must be **one** MS Word document. Each team member is responsible for authoring certain sections. Work together to merge them.

Editorial Comments Due: Each team member provides comments on the other's writing, using the MS Word review feature. Submission is **one** Word document.

Final Article Due: Each author revises their sections, in response to the comments provided by team member(s). All comments and review marks must be removed.

Lab F is a physics experiment designed by the team and approved by the instructor. The Proposal is a short, written assignment, justifying feasibility of the project and outlining needs in order to be successful. Three brief oral Presentations are made to the class to demonstrate good progress. Final presentations are made in a physics seminar style.

Planned schedule

Due times are **Wed. 5:00PM OR Thurs. 12:30PM OR Sat. 11:00PM**

Θ	Sep	2	Lab 0: Advanced Oscilloscope	
M		6		Lab 1 Assigned
W		8	Lab 0 DUE	
Θ		9		Lab 1 Launch, Radiation Safety
Θ		16		Lab 1 Site Visit
T	~	21	Lab 2 Launch	
W		22		Lab 1 Draft Report DUE
Θ		23		
S		25		Lab 1 Comments DUE
W		29		Lab 1 Final Report DUE
Θ		30	Lab 2 Site Visit	
T	Oct	~5		Lab 1 Returned
W		6	Lab 2 End of Lab Work	
Θ		7		
M,T	11, 12		FALL BREAK	
W		13		Lab 1 Rewrite DUE
Θ		14		Lab Ea in class
F		29		Lab Eb Start
W		20	Lab 2 Draft Report DUE	
Θ		21		Lab Eb DUE, Lab Ec Start
S		23	Lab 2 Comments DUE	
W		27	Lab 2 Final Report DUE	Lab Ec Results DUE
Θ		28	Lab 3 Launch	Lab Ec Circuit DUE
F		29		Lab F Ideas DUE
Θ	Nov	4	Lab 3 Site Visit	
W	Nov	10	Lab 3 Draft Report DUE	Lab F Proposal DUE
Θ		11		Lab F Launch
S		13	Lab 3 Comments DUE	
W		17	Lab 3 Final Report DUE	
Θ		18		Lab F Present Equipment
W-F	24-26		THANKSGIVING BREAK	
Θ		25		Lab F Present Data
Θ	Dec	9		Lab F Present Analysis
T		14	(10:00AM) Lab Clean-up	Lab F Draft PowerPoint DUE
F		17	(12:00-2:30PM)	Lab F Presentations

Alternate possible times for Lab F Presentations are Dec. 16, 12:00-2:30PM or Dec. 21, 8:00-10:30AM.

Dates with diagonal dashed lines are when Dr. McLean will be unavailable.

General Comments

Bonus Material: At the beginning of some lab periods, there will be a short presentation on such topics as journal article format and advanced error analysis.

Maintaining the work 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. Random inspections of the research area will occur by the instructor during the week to ensure that such an environment is maintained.

Article Format: The goal is to produce a paper similar in format to articles that appear in published journals. More details will be provided.

Submission Format: Electronic submission of files. All assignment stages (draft, comments, and final versions) are uploaded *to the same Canvas Assignment*.

- The submitted filename must consist of the team name and **one word** describing the lab subject. As an example, “Pions_Refraction.docx”.

Unreliable Partners: What if a due time is approaching, and you cannot get your partner to do their part? (This can happen for a variety of reasons, including simply not being able to contact them.) In that case:

- Submit your portion of the Assignment.
- The submitted filename must consist of **your last name** and **one word** describing the lab subject. As an example, “Smith_Refraction.docx”.
- Contact the instructor as soon as possible, describing the situation in detail.

Academic honesty: All written lab reports must be entirely original; any plagiarism will result in a failing grade in the course. Plagiarism is occurring when recognizable word patterns (e.g., sentences) are identical or nearly identical to those found in previous work of others.

Departmental Writing Requirement: This course serves to satisfy part of the departmental writing requirement for the physics major (which the college requires). Papers written for this course are also used for departmental assessment (evaluation of the department’s, rather than students’, performance). You do not actually have to do anything about this—just thought you’d like to know.

Accessibility

The Provost has prepared a reference webpage for [Student Success Resources](#).

SUNY Geneseo is dedicated to providing an equitable and inclusive educational experience for all students. The Office of Accessibility will coordinate reasonable accommodations for persons with physical, emotional, or cognitive disabilities to ensure equal access to academic programs, activities, and services at Geneseo. Students with letters of accommodation should submit a letter to each faculty member and discuss their needs at the beginning of each semester. Please contact the [Office of Accessibility Services](#) for questions related to access and accommodations: (585) 245-5112, access@geneseo.edu.

If you have difficulties accessing any online materials (including needs for alternative formats), please let me know as soon as possible. A solution will promptly be determined and implemented.