

PHYS 1110: Intro to Experimental Physics

Fall 2025

Class meetings

Lectures: Fridays in Schwartz Auditorium

L01: 1:25-2:15pm

L02: 2:30-3:20pm

Labs: Mon-Thurs in Rockefeller basement

See enrollment info for your section's meeting time and location.

Note: You must attend the lecture and lab section for which you are registered.

Lead Instructor

Natasha Holmes

Office Hours (PSB 406):

R 3-4:30pm

F 3:30-4:30pm

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Support Instructors

Mary Lory-Moran

RCK B27

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Teaching Assistants

Alesya Dewland ad2445

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Julian Jimenez Paz jj836

Xinyi Lin xl978

Nate MacFadden njm222

Rachel Merrill rm854

Benjamin Vaughan bjb37

All instructors are available for office hours by appointment. Email to inquire.

- 15% Lecture participation (drop 5)
- 20% Lab participation (drop 2)
- 30% Lab check out (drop lowest 2)
- 20% Tutorials and reflections
- 12% Final Presentation
- 3% Surveys

Course Description and Learning Goals

An introduction to experimental physics aims to introduce you to how scientists learn about the universe, accounting for all the messiness and subjectivity inherent in experimentation. The objectives for this course fall under five big themes.

By the end of this course, you should be able to:

- Collect data and revise an experimental procedure iteratively,
- Evaluate the process and outcomes of an experiment quantitatively and qualitatively,
- Extend the scope of an investigation,
- Communicate the process and outcomes of an experiment,
- Conduct an experiment collaboratively and ethically.

The purpose of this lab course is NOT to demonstrate or reinforce introductory physics concepts. Although lab activities may draw upon examples from parts of the introductory physics course sequence, you should not expect to perform experiments that verify what you already know.

**The goal is to understand *how* we know,
not what we know.**

The course is broken down into several experiment units, tutorials, and supporting lectures. Each experiment unit focuses on developing and applying tools of experimental physics to extend our understanding of physical behavior and how we model it. You will be expected to develop a rich evidence base in support of a claim. The focus is on the evidence, not the claim!

Course Components

- *Lecture participation:* We will use iClicker in lectures to record attendance and participation. You are allowed **5 lecture absences** across the semester, no questions asked.
- *Lab participation:* You are expected not only to show up physically for lab each week, but to arrive on time, participate fully, and collaborate with your group members. This is a lab-based course, so participation is non-negotiable. There are no opportunities to make up missed labs, but you are allowed 2 lab absences.
- *Lab check outs:* You will keep a running set of notes that document your procedures, data, analysis, and claims. You will check out from lab with your TA each week by presenting your final claim and evidence for your claim and scrolling through your lab notes to summarize your process. If you run out of time for your checkout, your TA will look over your lab notes for your claim and evidence. All students will be expected to submit lab notes. Lab check outs will be graded according to the 0-4 scale discussed below.
- *Tutorials and reflections:* As homework, you will be assigned a series of “tutorials” that will take the form of CoLab notebooks (like your lab notes) and “reflections” that will be text submissions. Completion of these assignments will provide individual practice with and reflection on the skills and concepts introduced during the course. These assignments will be released on Mondays and are due by midnight on Friday. They will be graded according to the 0-4 scale discussed below.
- *Final presentation:* The final experiment you conduct will be of your own choosing and design. Your group will deliver a “poster” presentation on your experiment to be presented to your lab section at the end of the semester.
- *Surveys:* Completion of Physics Department surveys gets you 3 points on your final grade. Yippee!

Labs

In this course, there are two parallel sets of lab activities, named PEPPER and SALT, and indicated with (P) or (S), respectively. The differences between these sets of labs will be described during the first lecture but know that both sets of labs are designed to achieve the same learning goals and require the same amount of work. You have been randomly assigned to a (P) section or (S) section, but you can swap during the add/drop period if you like.

Deadlines on Canvas and Gradescope will be assigned by section for clarity.

(P) lab sections: Lab 401, 404, 405, 407, 408, 411, 414, 417, 418, 420 (located in RCK B30)

(S) lab section: All other sections (located in RCK B22 or B26)

Grading Scale

Lab checkouts, tutorials, and reflections will be graded on a coarse scale: 0, 1, 2, 3, or 4. The reason for this is that each assignment will look different. You may take a slightly different approach than someone else and that's ok. It can be very difficult to assign a detailed point system for documents with varied approaches and we want you to focus on learning and doing.

Here's the system:

- 4: Equivalent to an 'A'. No flaws or missing pieces.
- 3: Equivalent to a 'B'. It is good but has one or more significant flaws and room for improvement (e.g., in data collection, evaluation, interpretation, and/or communication).
- 2: Equivalent to a 'C'. There are some major flaws (e.g., data is presented in a clearly incorrect way, figures are missing or unreadable, one or more major sections of the assignment do not appear).
- 1: Multiple major flaws, very little work shown, egregiously low effort submission.
- 0: You didn't hand anything in.

If you are assigned a 1, it will be reviewed by Prof. Holmes personally. It is also possible to earn a 5 on lab check outs. A “5” reflects work that really goes above and beyond—particularly in the areas of investigative depth, data analysis, interpretation, or figure presentation. This will be rare (<5% of all labs) and will be reviewed by another instructor.

Note: Your tutorials and reflections will oftentimes not be graded by your lab instructor.

For the check-outs, we will be using the following rubric:

- Is your claim aligned with your evidence?
- Is the evidence for the claim sufficient?
- Is it clear that you collected those data?

Materials

There is no required textbook for this course. All materials will be delivered electronically through Canvas. Assignments will be submitted on Gradescope.

For lecture, you will need an iClicker and materials to take notes with. You are strongly encouraged to take notes by hand on paper or a tablet. **No cell phones or laptops or other types of electronic devices may be used during lecture**, unless extenuating circumstances require it (e.g., SDS accommodations). You are not permitted to use the iClicker app.

For lab, you may bring a laptop and there are desktop computers available for your use in all the lab rooms.

Policies

Attendance

You are expected to attend your registered lab and lecture section each week as per the course schedule. If you are sick, traveling, or have an emergency that precludes you from attending class you can make use of the available drops (5 for lecture, 2 for lab). **There is no need to contact us regarding missed lectures.** As a courtesy to your lab TA, if you know you will miss an upcoming lab, you can let them know, but this is not required.

Accommodations can be made for extreme extenuating circumstances. Please come to office hours or schedule a meeting to discuss such situations. In the case of such circumstances, please communicate your situation with your lab instructor or Prof. Holmes as soon as possible.

There are no drops for the tutorials and reflection assignments. If you are not able to meet a deadline for submitting these assignments – **for whatever reason** – contact your lab instructor to propose an alternate deadline. We will accommodate most requests within reason.

Academic integrity

Each student in this course is expected to abide by the Cornell University Code of Academic Integrity. Any work submitted by a student in this course for academic credit will be the student’s own work. Copying text from other sources – including generative AI – is a form of plagiarism. All writing submitted in lab notes and homework must be authored by the student(s) submitting the work. Collaborative work (very common in this class!) must include acknowledgement of all who participated in the work.

Lecture activities should be your own work – submitting iClicker responses for peers is a violation of academic integrity.

Generative AI use is permitted in this class, such as to create first drafts of text or generate draft code for data analysis or making figures. In fact, it's encouraged and common practice in scientific research now. **BUT** having genAI do your work for you is still a violation of academic integrity. You must engage intellectually with the genAI output, such as by critically evaluating, editing, and adapting the output. Any genAI use should be reported in your submitted assignments. Responsible use of AI requires that you understand what the system is doing and what the output means.

Getting In Contact with Us

For general questions, please use the Discussions platform on Canvas rather than email. That way, anyone on the teaching team can reply, giving you a response more quickly than through email.

For specific concerns, reach out to your lab instructor first before emailing senior staff. You can also attend office hours for questions that are best handled through conversation. Emails to Prof. Holmes should be reserved for serious, personal, or urgent matters.

Inclusion

The full teaching team of PHYS 1110 is committed to fostering an inclusive and enriching educational experience in which all members of our community are treated with dignity and respect. Creating this learning environment is a responsibility and privilege we all share. To that end, if there are any obstructions to your participation in the class, please let Prof. Holmes know so we can work together to address them.

The following resources and accommodations are available to students. We are also happy to help you identify other resources if needed.

- Office of Student Disability Services
- Cornell Health Counseling and Psychological Services
- DACA Student Support
- Learning Strategies Center

Course Schedule

Week	Lab	Lecture	Tutorials and reflections
8/25	Lab 0 (all sections)	Lecture 1: Introduction	Pre-survey
9/1*	(S) Lab 1.1: Pendulum (P) Lab 1: Intro to Muons	Lecture 2: Mean, Standard Deviation, Distinguishability	Tutorial 1: Uncertainty
9/8	(S) Lab 1.2: Pendulum (P) Lab 2.1: Scintillators	Lecture 3: Distinguishability and Uncertainties	Tutorial 2: Distinguishability
9/15	(S) Lab 2.1: Dropping magnets (P) Lab 2.2: Scintillators	Lecture 4: Instrumental Uncertainties, Uncertainty Propagation	Reflection 1
9/22	(S) Lab 2.2: Dropping magnets (P) Lab 3.1 Configuration	Lecture 5: Guest lectures	Tutorial 3: Uncertainty Propagation
9/29	(S) Lab 3: Objects in flight (P) Lab 3.2: Configuration	Lecture 6: Least Squares Fitting, Linearization	
10/6	(S) Lab 4.1: Circuits (P) Lab 4: Project Design	NO LECTURE	Tutorial 4: Curve Fitting
10/13	Fall Break - no labs	Lecture 7: Philosophy of Science	Reflection 2
10/20	(S) Lab 4.2: Circuits (P) Lab 5.1: Project Lab	Lecture 8: Scientific Ethics, Collaborations	
10/27	(S) Lab 5.1: Stretchy things (P) Lab 5.2: Project Lab	Lecture 9: Asking a Research Question	Tutorial 5: Writing and Reading Science
11/3	(S) Lab 5.2: Stretchy things (P) Lab 5.3: Project Lab	Lecture 10: Review	
11/10	(S) Lab 6.1: Project Lab (P) Lab 5.4: Project Lab	Lecture 11: Writing, Communicating, Making Figures	Reflection 3
11/17	(S) Lab 6.2: Project Lab (P) Lab 5.5: Project Lab	Lecture 12: Guest Lectures	
11/24	Thanksgiving break - Monday labs only	NO LECTURE	
12/1	Student Presentations	Lecture 12: Wrap-up	Memo to Future Researchers and Post-survey

*Note: This week has a Monday holiday so all Monday sections (408, 418, and 419) will be off-set by one week until the week of November 24th.