

P165La General Physics Laboratory

Course Instructor: **Sean Barrett** (sean.barrett@yale.edu); Office: SPL 24

Sections and Instructors:

Day	Time	Instructor	Teaching Fellow 1	Teaching Fellow 2	Teaching Fellow 3
Wednesday	1:30-4:30 pm	Dr. Sid Cahn	Stephen Eltinge	Jeremy Gaison	Sangjae Lee

Who to talk to about Phys 165:

The **Lab Manager** is Dr. **Rona Ramos**. Email: rona.ramos@yale.edu. Tel: 23655. Offices: SPL 36 and the room in between the two lab rooms SPL 39 and 42. Dr. Ramos can help with anything to do with the equipment, computers and printers if the TA cannot solve the problem.

Dr. **Sidney Cahn** (Email: Sidney.cahn@yale.edu) created and stars in the Video Vignettes and is responsible for most of the Demonstrations we will show you.

Contacting us:

Important Note: All emails about the course MUST contain PHY 165 in the subject line.

To get the most rapid response to your questions use the following table:

Contact Person	Question Topic
Your TF	Lab handout, equipment, write-up, make-up labs, grades
Section Instructor	Lab grade problems if unresolved with your TF, next-week and Reading week make-up labs
Lab Manager	Make-ups the week after a scheduled experiment or during Reading week
Course Instructor	Your overall grade, Dean's Excuses, course related issues, unresolved problems

DO NOT contact the course instructor regarding lab-makeups or other classroom level issues. This will slow down our response.

First Meeting:

Labs will always meet in SPL (39, 42, and 43). **DO NOT GO TO YOUR SECTION INSTRUCTOR'S OFFICE.** During your first laboratory period, you will meet the course instructors and TFs and we'll go over the details of laboratory organization. You will then be split into up to three subsections and assigned to one of our three lab rooms (SPL 39, 42, 43) at which point you'll begin **Experiment A: Galileo's pendulum**, which will introduce you to basic experimental methods and procedures. **Be sure to download, print out and read the experiment instructions and the associated reading before coming to class. These can be found on the classes server. The lab write-ups are in the resources section.**

Materials (what you need to bring to the lab):

- Quad rule notebook with perforated pages. Laboratory notes will be handed in with lab reports. Carbon copies are not necessary, but you may want them for your own records.
- **Scientific calculator** and writing implements.
- Handouts for the lab experiments will be posted in Resources folder of the Classes*v2 server. You should have the handout for the current week available throughout the lab.
- Internet accessible computers are available in the P165/166 lab rooms. These computers have all the data acquisition and analysis programs on them. A USB might be useful.

Preparation (what you need to do before the lab):

- Allow at least an hour to prepare for each lab before you come in.
- Download and read the lab handout (from the classesv2 web site) well before your lab session. Look up any unfamiliar concepts in a physics textbook or Wikipedia. Review the references listed in the lab handout. There are many additional sources of information on the classesv2 server including Resource Sheets on some of the equipment, computer programs, data analysis, etc., as well as Video Vignettes showing how some of the equipment is used. **It is important that you become familiar with the material in the lab handout before coming to the lab or you may not be able to finish on time.**
- **On most weeks there will be a short quiz** on the material in that week's lab handout.

Laboratory work (what will happen during the lab sessions):

- Lab sessions are three hours long. Most labs can be completed in less time. Use this extra time to take good notes and to think things through, explore your own questions and make sure you understand not only what you are doing, but why you are doing it. This is the best way to "study" for the practical exam.
- Both partners should actively use the apparatus and computers.
- Complete all your data collection AND data analysis in class before you leave.
- Try to keep your station neat and organized. The most important reason for this is safety, although there are many other benefits: demonstrating good lab technique, clearly seeing what you are doing, catching mistakes, allowing your TFs and instructors diagnose problems more easily, and consideration for those that have to clean up after you.

Quiz:

Most weeks there will be a short quiz (5 min.) If you are prepared for class and have read the required material, the quizzes will be easy.

Lab notebook (during the lab session):

During the lab session, you will record a "narrative" of your work that can be read by the TF. This includes how you took data, the detailed results you obtained, and explanations of all logical steps made during the lab. Disconnected words are often meaningless to a TF - sentences (complete with verb, subject, and object) should be used consistently. You can and should refer to written class materials: there is not need to repeat anything in the handouts, except briefly as needed to orient your TF to what you are doing. Sketches, tables, and graphs are highly effective

ways of conveying information in your lab notebook, but be sure to use adequate labeling and a sentence explaining their meaning and content. NEVER ERASE from your notebook. Rather, cross out mistakes with a single line. Make sure you put enough information in your lab book so that ANYONE WITH ACCESS TO CLASS MATERIALS, BUT NO OTHER KNOWLEDGE OF WHAT YOU'VE DONE will understand your procedure, thought process, data, etc.

- Record your name, your partner's name, your TF's name, and the date.
- Record the apparatus used and/or make a drawing if necessary.
- Write a general description of your plan, even if only "We followed the procedure in section 2.1 of the lab handout."
- Record possible sources of error, problems encountered, and decisions made.
- Cross out erroneous data, do not destroy or throw them away. Mistakes happen! Leave them legible and write a short note about why you discarded them.
- Don't use scrap paper. *Everything* goes in your notebook.
- Copy and paste graphs and images into a Word file. After collecting all your graphs for the session, print them on 1-2 pages and submit with your notebook pages.
- Have your TF check your data and graphs for egregious problems or omissions, and then sign your lab notebook before you leave to verify that it was checked.

Lab report (after the lab session):

After each week's lab, you will write a 1-page Lab Report that must be turned in with the lab notebook the following week. The purpose of the lab report is to very briefly summarize your work, comment on anything notable from your experience (i.e., mistakes you now realize you made, observations you found interesting, etc.), and generally to draw and support your conclusions from the data. You can also use the lab report to fill any gaps in logic or comprehensibility from the narrative in your lab notebook, to tell the TF the most important facts to take away from reading your work, and to answer any specific questions asked in the lab write-ups that you missed in the lab notebook.

- **Lab reports are to be written individually.** Plagiarism will not be tolerated and no credit will be given for the lab report.
- **Reports must be typewritten.**
- **Reports are limited to one page absolute maximum.** Scientific writing is succinct. A goal of this course is for you to practice writing concisely, while still making an effective argument. You will have to judge what things are important and communicate them efficiently. Do not use tiny fonts or narrow margins in an attempt to fit it all in.
- **Insight is an important part of your report** (worth 4/60 pts.). We want to encourage our students to think more deeply about the topics we are investigating. Do you understand what you were doing, and more importantly why? Explain what you learned, not just what you did. Demonstrate your understanding by offering plausible sources of error based on physical principles (vague phrases like "human error" are not acceptable), make connections to phenomena outside the course (i.e. everyday life, other courses, articles or papers you've read, videos you've seen, etc.), or make connections with

previous lab experiments. Propose improvements to your methods and techniques that would help the problems you encountered. The more deeply you understand the concepts involved, and better able to apply those concepts in a different context, the better you will perform on the practical exam.

Grading of Lab Notebooks and Lab Reports:

Item	Points	Notes
Notebook	14	Can it be followed by someone who has not done the experiment, but has all the necessary documentation?
Data	16	Was the required data taken? Is it presented in an organized and readable way?
Analysis	16	Discussion of results and answers to specific questions posed in the lab handout.
Summary	10	Was the lab report cohesive and concise? Were all the important topics covered and well communicated?
Insight	4	Does the student present a deeper understanding and synthesis of the physical concepts?
Total	60	

Due dates and Late submissions of weekly assignments:

Lab notebooks and reports are due at the beginning of class one week after the scheduled experiment. Submit them directly to your TA.

Late reports will be penalized 35%, and will be accepted only within a week of the due date. No credit will be given thereafter.

When applicable, Dean's excuses must be obtained as soon as possible and given to the session instructor or laboratory manager.

Final Exam:

There will be a lab practical examination during the last week of the regular classes that serves as the final exam for the class. The exam will consist of three experiments and/or measurements similar to things you will have done during the semester. We will give further details of the practical exam later in the course.

Making up the practical exam will require a Dean's Excuse, and must be discussed with the Course Instructor, [Sean Barrett](#), prior to your scheduled Practical Session.

Course Grades:

Your final grade will be weighted as follows:

Lab books/reports: 60%, Lab practical exam: 30%, Quizzes: 10%.

Attendance and Missed Labs: *Full credit in this course entails completing all experiments.* We expect that you will attend the section that you have signed up for. If legitimate reasons (see below) cause your absence, arrange a make-up session via the procedures below.

- If you miss your scheduled lab session, you have one week after the missed lab to make up in another session. **The make-up lab report is still due in class one week after your regularly scheduled session.** (This excludes break weeks, Oct 19-23 and Nov 23-27.)
- If you know in advance that you will miss your lab section, inform your TF that you will be making up the lab at another section in the same week the experiment is running. Inform the TF at your make-up session that you are a "visitor" and give him or her the name of your usual TF to help ensure that your grade for the lab gets recorded properly.
- If at all possible, make-ups should be done during a normally scheduled lab session during the same week as the session you miss. However, if you need to make up the experiment in the week after it is normally run, contact your Section Instructor and the Lab Manager, [Rona Ramos](#), to schedule a time and request an equipment setup for your make-up. Note that the rule above that missed labs must be made up within a week of your normally scheduled lab still applies.
- When extended absence precludes the above, a lab may be made up during the **first two days (only)** of Reading Week. This may put you at a significant disadvantage during the practical exam (which occurs during the last week of regular classes) so avoid this if at all possible. Reports from experiments made up during Reading Week are due the day after performing the experiment and should be turned into your regular TF. A Dean's Excuse will be required for these make-ups.
- Legitimate reasons for missing a lab include: participation in a performance, interview, illness, family/personal emergency, or other important, non-regularly scheduled commitment. Non-legitimate reasons include: oversleeping, forgetting, or another commitment that regularly interferes with lab.

Lab topics (subject to modification):

- Galileo's pendulum: a study in laboratory methods
- Uncertainties, Estimates, and Sonograms
- Accelerated Motion: Measuring the strength of a fundamental force
- Terminal Velocity
- Collisions
- Simple Harmonic Motion
- Rotation
- The Gyroscope
- Radioactivity
- Properties of Fluids
- Gas Laws: Testing Boyle's Law