

PHYS 166 - General Physics Laboratory

Course Instructor: **Sidney Cahn** (sidney.cahn@yale.edu)
Office: SPL25
Tel: 203-432-6239

Physics 166Lb is the second term of the two-semester General Physics Laboratory course taking place in Sloane Physics Laboratory rooms SPL39-43. It is taken in a fall-spring sequence (subsequent to Phys 165La in the fall) by students who elect either the Physics 170/171 or 180/181 sequence. The schedule is coordinated with these two lecture classes (PHYS 171 and PHYS 181) as much as is possible. The primary goal of PHYS 166 is to teach key concepts of physics by carrying out measurements using modern and not-so-modern equipment and simple but powerful systems. Because most students in the course need experience with laboratory science, another important goal of the course is for students to learn to measure and deal with numerical data, and to learn how to communicate the results of those measurements to others. Since you must convey not only the results of measurements, but how sure you are of those results, we place importance on evaluating and communicating your uncertainties. The methods and experiments of this course are modified from year to year to provide you with a hands-on physics experience that is both authentic and relevant to the lecture. We take the comments and suggestions you made in the PHYS165 evaluations very seriously and act on them when practical.

Contacting us:

To get the most rapid response to your questions use the following table to correctly direct any queries:

Contact Person	Question Topic
Your TF	Lab handout, equipment, write-up, make-up labs
Section Instructor	Lab grades, next-week and Reading week make-up labs
Course Instructor	Your overall grade, Dean's Excuses, course related issues

DO NOT contact the course instructor regarding lab-makeups or other classroom level issues. This will slow down your response. ALWAYS INCLUDE PHYS166 IN THE SUBJECT LINE OF EMAILS!

Registration:

We use the central Yale preselection tool and course selection system to determine which sections to open. To begin the process, navigate to

<https://students.yale.edu/ocs-preference/select/select?id=12970>

During preselection, each student must choose his or her top three lab section times. Once preselection closes (NOW AT Jan. 22, 9AM), we will make section assignments based on participating students' preferences and limitations on lab room size, and push those assignments out to your worksheets. Attend the session to which you are assigned the first week even in the unlikely event that you need to request a change of session. We cannot guarantee that you will receive your first choice, but we expect that almost all students will receive either their first or second choice. **NOTE: We may close a section for which there are fewer than 5 students listing it as a preference, or for which a TF is not available.**

Section Registration (January 25th)

Section registration will open on January 25th at 8:00am. At this time, students who did not participate in preference selection will have the opportunity to sign up for sections that still have available slots. You will not be allowed to finalize your schedule without having a confirmed seat in a section!

You should register as soon as you know your schedule. If you are not sure of your final schedule, register for your most likely section. If during the first week of lab you cannot attend your regular section, please alert the section instructor of the section you attend and give him your name so that we can obtain an accurate count of section enrollments.

You must register for a section through your course signup procedure before your course schedule can be finalized. Section assignments will be made on a first-registered-first-assigned basis. Therefore, you should register as soon as you know your schedule. If you are not sure of your final schedule, register for your most likely section. During the first week of lab you may attend any section you wish, but in the following weeks you must attend the section for which you registered unless circumstances intervene. If you cannot attend your scheduled lab section due to legitimate reasons, you must follow the procedure for make-ups described below. **Lab classes will start the week of January 25.**

Sections and Instructors:

Course Instructor		Sidney Cahn	SPL 25	203-432-6239
Monday	1:00-4:00 pm	Sidney Cahn	SPL 25	432-6239
Tuesday	1:30-4:30 pm	Keith Baker	JWG 519	432-3374
Wednesday	1:30-4:30 pm	Keith Baker	JWG 519	432-3374
Thursday	12:30-3:30 pm	Sidney Cahn	SPL 25	432-6239
Thursday	3:30 - 6:30 pm	Sean Barrett	SPL 24	432-6928
Friday	1:00 - 4:00 pm	Sean Barrett	SPL 24	432-6928

TFs

	Mon	Tue	Wed	Th1230	Th330	Fri
SPL39	Jeremy				Savannah	Ryan
SPL42	Michael	Paul	Shilo	Olivier	Daniel	Han
SPL43	Andrew	Stephen	Jae	Arvin	Norman	Lev

First Meeting:

Be sure to read the experiment instructions and the associated reading before coming to class. NOTE: Do not download any handout more than a week in advance. We are frequently working on updates that we hope will improve and simplify them. When posted, they can be found in the Resources section of the classes server. Each week you should download (off the web) and read the next week's hand out in preparation of the next week's lab. **It is important that you become familiar with the material before coming to the lab or you will likely not finish on time.** We may also have a quiz for which you can easily prepare by reading the handout and associated material.

Materials:

1. We strongly recommend that you purchase a single carbon-paper lab notebooks so that you have a copy of your lab work to which you can refer while you are writing up your summary (SEE Lab Notebooks Below). Keep in mind that your carbon copies must be completely legible to be of use- so write carefully. You may also have to print out two copies of any computer generated graphs or data. In either case, choose a notebook with 4x4 or 5x5 quad paper for making graphs on the fly; both types are available at the Yale Bookstore. You may continue to use your P165 Lab Book if a lot of space is left but don't forget to put an additional label on.
2. Bring to the laboratory: writing implements and a ruler. A USB flash drive might be useful for taking your data home, though it is not necessary as the computers are connected to the internet.
3. Your own scientific electronic calculator, though scientific calculators are also available on the computers.

Internet accessible computers are available in the P165/166 lab rooms. These computers have all the programs on them that you will need. There is a short guide for using these computers available on the Classes server. It is also saved onto the computer itself in the documents folder (Click on Documents in the sidebar of any open window). We also encourage you to start using the powerful functionality of Wolfram Alpha (introduced in Physics 170), Mathematica, or whatever other language you feel aids the plotting, fitting, interpretation or analysis of the data you take in the labs.

Times-Dates-Attendance-Grades

You'll probably spend up to 3 hours in the laboratory each week when an experiment is scheduled. In addition, you should expect to devote at least one hour of preparation prior to coming to the laboratory. The time required for laboratory write-ups will vary from one to several hours. It's a good idea to complete the data analysis and the laboratory write-up in class. You can then be assured of sensible data and will be able to seek assistance from the teaching staff. **You must get your lab book signed by your TA before you leave the lab room.**

Due dates: Lab reports will be due at the beginning of class one week after the scheduled experiment, and should be submitted directly to your TA. Late reports will be docked 20% if handed in late but within a week of when due, 20% for each additional week late until the points are all gone. When applicable, Dean's excuses must be obtained as soon as possible and given to the section instructor, course instructor or laboratory manager in order to avert these harsh penalties.

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 the experiment in another session. **The make-up lab report is still due in class one week after your regularly scheduled session.**
- If you know in advance that you will miss your lab section, e-mail your TF to request permission to make up the lab at another section in the same week the experiment is running. Forward the reply to the TF at your make-up session. This TF will grade you for lab performance and send that grade to your regular TF. The same procedure applies in case of illness or emergency.
- Due to the nature of the experiments in Physics 166, it can be logistically difficult to make up a lab when a different experiment is being conducted. If at all possible, make up the lab during the week it is normally run. If you need to make up the experiment in the week after it is normally run, contact your Section Instructor 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. If at all possible, these make-ups should be done during a normally scheduled lab session. Otherwise, you will have to arrange a time with your TF to come in together.
- When extended absence precludes the above, a lab may be made up during the **first two days** 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. These reports 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.
- We will not require Dean's Excuses for labs made up within one week of your normally scheduled session, except from repeat offenders. Labs made up in Reading Week will require a Dean's Excuse.
- ALL Dean's excuses must be handed into the section instructor, course instructor or laboratory manager (not your TA) as soon as possible.
- If a student falls too far behind (whether the reason is legitimate or not) it may be impossible for him/her to make up the work by the end of the semester. It may then be necessary to either withdraw from the course, incur an incomplete (I) or an ABX. Therefore, it is vitally important the affected student alert their section instructor immediately if they begin to fall behind.

Practical Exam: There will be a final lab practical examination during the last week of the regular classes. Making up the practical exam will require a Dean's Excuse, and must be discussed with the Course Instructor, Sidney Cahn, prior to your scheduled Practical Session.

Final grades: Your final grade will be determined as follows: Lab books/reports and unknowns: 55%, Lab Practical exam: 35%, Quizzes: 10%.

Lab Notebooks (During lab session):

During the lab session record in your lab notebook a "narrative" of your work. The idea is to convey, to any interested and knowledgeable reader, the content of what you did during the lab. This includes how you took data, the detailed results you obtained, and explanations of all logical steps you had to make during the lab process. Keep in mind that disconnected words will frequently be meaningless to a reader - sentences (complete with verb, subject, and object) should be used consistently. Your writing can and should refer to written class materials, i.e., do not repeat anything in the handouts, except briefly as needed to orient your reader to what you are doing. Sketches, tabular information, and graphs are highly effective ways of conveying information in your lab notebook, but pay attention to adequate labeling on these. A sentence explaining the meaning and content of all graphs, tables, and sketches is always necessary. You are encouraged to perform sample calculations (and record them in your notebook!), because they allow you to see if you're on the right course. Don't erase, as you may need this information later. Cross out mistakes

with a single line. You may want to follow your own steps and mistakes at a future date. 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 be able to understand what you've done, the data which you have recorded, etc. Remember, you are required to have your data checked off by your T.A. before you leave the lab room - and try to get as much of calculations etc. done during the lab session.

Lab Notebooks (After lab session):

In lieu of a formal lab report, after you leave lab, you will be required to write a short addendum to the material recorded in your lab notebook during class. The purpose of this addendum is to summarize your work, draw and support your conclusions from the data, and comment on anything notable from your experience (i.e., mistakes you now realize you made, observations you found interesting, etc.) This addendum MUST be typewritten, to insure legibility. IT MUST BE NO LONGER THAN ONE PAGE (not including any additional graphs that you find you need to generate after class). Significant points will be deducted for submissions that exceed one page (not including additional graphs). The main goal is to fill any gaps in logic or comprehensibility from the narrative in your lab notebook, and to tell the reader of your notebook the most important facts to take away from reading your work.

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	

Originality: Lab notebooks are to be individual work. You are encouraged to discuss your laboratory work with the teaching staff, your lab partner, and other students. However, the written lab report is expected to be in your own words and based on your own calculations. Likewise, the practical exam will be done on your own.

Data Analysis

Perform calculations in class to insure your data are reasonable, and graphs drawn in you Lab Book are often instructive and useful, as are a few hand calculations of uncertainties. Analyzing the data using LoggerPro will continue.

