

# Phys 13BH / Phys CS 15B Course Information

Winter 2020 Professor Everett Lipman

## 1 About the Course

Note: when I write “Physics 13,” it should be taken to mean “Physics 13 / Physics CS 15.”

This is the second quarter of a year-long class designed to help you learn to do experimental physics research. The second quarter will focus mostly on how computers are used to control experiments and take data.

Experiment control and data acquisition will be done using a Raspberry Pi single-board computer. After some initial exercises, you will write your own Python programs, which will produce specified voltages and read time-dependent signals via digital-to-analog and analog-to-digital converters. You will then write a feedback control program that measures the temperature of a metal block and changes the voltage applied to a heater so as to keep the temperature constant.

Extensive prior programming experience is not required. Please note, however, that the real purpose of the course is not to teach you programming! Instead, **you will be expected to learn what you need by yourself**, with an occasional bit of help. This is much closer to what will happen when you are working in a lab. Everyone in the lab who knows what they are doing will be too busy to teach you!

Another thing you will learn this quarter is metal fabrication. This will enable you to build the kinds of precisely specified instruments you will need in the future to make new measurements.

## 2 Contacting Your Instructor

The best way to reach me is in person at my lab hours:

- Wednesdays and Fridays 3:30–4:30 P.M. in Broida 3314 or 2409.
- Other times by appointment or drop-in.

Please don't hesitate to drop by my office any time. If I'm here and I'm not working on something with a deadline, I'll be happy to talk with you. You may also send me email, but please avoid non-trivial questions about physics, your code, or your experiment. It's much more efficient to talk about those things in person. If you need help or have an administrative question that needs to be answered, you can also talk with your

## 3 Graduate Student Instructors

The physics graduate students here at UCSB are some of the best in the world. Not only are your TAs brilliant, but they are also eager to help you learn. TA contact information is

listed on the

## 4 Course Web Page

The course web page is located at

<http://www.physics.ucsb.edu/~phys13/lipman>

All announcements, handouts, and other course information will be posted there. **I will assume that everyone has read announcements on the web page two days after I post them, so please be sure to keep yourself well-informed.**

## 5 Textbook and Course Materials

The textbook and required materials for Physics 13BH are described on the course web page. You are required to buy a Raspberry Pi computer, but the textbook is free.

## 6 Attendance and grading

Each lab section will meet together as a whole from 3:30 P.M. to 4:30 P.M. on its scheduled day. Attendance is required. You will be allowed one unexcused absence, after which you will lose one letter grade increment (or the equivalent units) per additional unexcused absence. As we meet only ten times during this quarter, the policy is intended to ensure that you do not fall behind in your work. If you have a difficult situation, talk with me in person beforehand. If you convince me that you are up to date with your work, it is likely something can be worked out. Repeated unexcused arrival in class more than 10 minutes late will be counted as absence.

Several of your lab sessions will begin with machine shop training. On those days, you are required to be in the shop from 3:30-5:00 P.M.

Each week, there will be an assignment sheet posted on the course web page. It may include programming, doing calculations, data acquisition, or some combination of these. Once you have completed the assignment, you will email your work to the TA for your section. **Any code you turn in must run on the TA's Raspberry Pi 4 under the standard configuration for the course. It is your responsibility to ensure that all necessary code has been sent to the TA.** Calculations must be written out in a text file or a PDF file that you include with your assignment. Assignments are due by 11:55 P.M. on Thursday for students in the Wednesday lab sections and 11:55 P.M. Friday for students in the Friday lab sections. Due dates may be altered by the instructor to account for unforeseen circumstances.

You will get two grades for each week's assignment. One grade will reflect whether your code and calculations are correct (that is, whether they produce the correct result), and the other will reflect the quality of your code. This second grade will take into account the readability, efficiency, robustness, and elegance of the programs you have written and the measurements you have made.

As part of the course, you must complete a project in the machine shop. This will be graded pass/fail, and you must pass to pass the course.

If you are enrolled in Phys 13BH, you will get a letter grade. If you are enrolled in Phys CS 15B, you will get 0, 1, 2, or 3 units of credit depending on the quality and quantity of work you have completed at the level of “B” or better. Work done at any level below “B” does not earn any units of credit in the College of Creative Studies (For example, “B-” translates to zero units). The mapping from grades to units will be:

<b>grade</b>	<b>units</b>
A	3
A-	3
B+	2
B	1
B-	0
C+	-1
C	-2
C-	-3
D+	-4
D	-5
D-	-6
F	-7

Work that is not turned in will receive an F. You must complete all assigned work, including the machine shop project, to receive credit for this class. Assignments turned in late will be penalized one grade increment plus one increment per additional 24 hours of lateness. No work of any kind will be accepted after 11:55 P.M. on the Monday following the last assignment due date.

## 7 Getting Help with Equipment

If any equipment should malfunction and you cannot find the instructor or the TA, you can get help from Zak Espley (room 3310, phone 805-893-4072). If his office is empty, then you should also look for one of the lab staff in the senior labs on the 3<sup>rd</sup> floor, ocean side, or the lower division labs on the 2<sup>nd</sup> floor, mountain side, of Broida.

## 8 Course Policy

- You must do your own programming and experimental work in this class. You are, however, encouraged to discuss your work with other students.
- Academic dishonesty will be dealt with severely. Among the prohibited activities are:
  - Any form of plagiarism. You must have written or created 100% of the work you turn in.
  - Attempting to misuse any course-related computer system.

- Tampering with another student’s coursework.
- If not prearranged with the instructor, absence and late work will be excused only in the case of serious illness, death in the family, or unavoidable circumstances of similar severity. All requests must be supported by documentation, and claims of illness **must** include an original signed note from your doctor. The authenticity of the note will be verified.
- Repeated unexcused arrival in class more than 10 minutes late will be counted as absence.
- Equipment may not be removed from the lab.