

Physics E-1axl: Mechanics, Elasticity, Fluids, and Diffusion (Lab)

Harvard University, Fall 2016

Instructor

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Office Location: Science Center B08A

Lab Location Science Center Room 115

Teaching Assistants To be announced on course website.

Overview

This is a hands-on lab course intended to complement the Physics E-1ax lecture course.

You will complete six laboratory experiments, which meet roughly every other week (detailed schedule is on the last page). These experiments include aspects of measurement and uncertainty, force and momentum, fluid mechanics, and diffusion. Working in groups, you will develop experimental and collaborative skills.

Prerequisites

Concurrent enrollment in PHYS E-1ax, or prior completion of a comparable course in physics (mechanics) is assumed.

Calculus is not needed, but we do expect you to have familiarity with algebra, trigonometry, and exponential functions; MATH E-10 or equivalent is highly recommended.

Course Policies and Expectations

We expect every student to attend each of their assigned lab sections. If you miss a lab without an excused absence you will receive a zero for the experiment. Students must arrive on time for their lab—you will not be allowed to participate in your group if you are late.

Students work together in groups of three when possible (two students at a minimum). All data, graphs, answers to questions, and conclusions are a collaborative effort within the group. Actively working together is an important requirement for succeeding in the course. Each group member is assigned the same grade for the submitted work (see lab grading procedure below).

Lab Handouts and Materials

Handouts for each experiment will be available on the course website prior to each section meeting. Students are expected to read over all lab handouts for the experiment prior to their lab section meeting. (We recommend that you print the handout and bring it to your lab section meeting with your notes and questions.)

All materials and equipment for your experiment will be supplied in your lab section.

Lab Report Submission

Before the end of the lab session, each member of a lab group submits a copy of the **lab report** (data, graphs, answers to questions, and conclusions). Specifically, each student logs into the course website and uploads a digital copy of the report to a drop box. It is strongly recommended that—time permitting—you have your TA look over the work to offer suggestions for improvement before it is uploaded.

Lab Grading Procedure

Each lab experiment is graded as a group on a scale of 0-5. The grading is based on the following rubric.

5	The group clearly understands the major lab concepts. Minor mistakes and careless errors can appear insofar as they do not indicate a conceptual misunderstanding. The lab is very neat and well organized.
4	The group understands the main concepts and problem-solving techniques, but has some minor yet non-trivial gaps in their reasoning. The lab lacks a little in neatness and organization.
3	The group has partially understood the problem. The group may have started out correctly, but gone on a tangent or not finished some aspect of the lab. The lab is disorganized or hard to read/follow.
2	The group has a poor understanding of the lab. They may have gone in a not-entirely-wrong but unproductive direction, or attempted to solve the problem using pattern matching or by rote.
1	The group did not understand the problem. They may have written some appropriate formulas or diagrams, but nothing further. Or, they may have done something entirely wrong.
0	The group wrote nothing or almost nothing. Note: Individual students will receive a zero for a lab experiment if they do not actively participate in their group or they miss the lab without an excused absence.

Course Letter Grade

Each student starts out the semester with 12 points. Labs that achieve a 4 or 5 grade will not reduce this number. Labs that receive a 3 will reduce the grade by 1 point. Labs that receive a 2 reduce the grade by 2 points. Labs that receive a 0 or 1 reduce the grade by 3 points. At the end of the term the course letter grade is determined by the following scheme: A = 12 points, A- = 11 points, B+ = 10 points, B = 9 points, B- = 8 points, C+ = 7 points, C = 6 points, C- = 5 points, D+ = 4 points, D = 3 points, D- = 2 points, and F = 0 or 1 points.

Missed Labs, and Cancellations

If you cannot attend your regular section due to illness or other emergency then you will need to contact the course instructor—Allen Crockett—as soon as the conflict arises. You must have written (email) approval from the course instructor with a specific time and date for a make-up before attending a lab other than your assigned section. *All appeals to make-up a lab are at the discretion of the course instructor.*

If possible, your make-up will be scheduled during the same week as the missed lab at one of the two Thursday sections: Lab Section 4, Thursday 2-5 pm or Lab Section 5, Thursday 6-9 pm. If a Thursday section is not feasible, then your make-up lab may need to be scheduled during the final week of class, December 5-8.

Inclement weather (i.e. large amounts of snow) may cause the Extension School to cancel your lab section, and we have reserved an additional lab date for each section just in case. See the lab schedules below.

Academic Integrity

In this course, lab partners are expected to work together on experiments. Submitted data, calculations, answers to questions, and conclusions are a collaborative effort by lab partners. Each member of the group will sign off on the submitted work.

You are responsible for understanding Harvard Extension School policies on academic integrity (www.extension.harvard.edu/resources-policies/student-conduct/academic-integrity) and how to use sources responsibly. Not knowing the rules, misunderstanding the rules, running out of time, submitting "the wrong draft", or being overwhelmed with multiple demands are not acceptable excuses. There are no excuses for failure to uphold academic integrity. To support your learning about academic citation rules, please visit the Harvard Extension School Tips to Avoid Plagiarism (www.extension.harvard.edu/resources-policies/resources/tips-avoid-plagiarism), where you'll find links to the Harvard Guide to Using Sources and two, free, online 15-minute tutorials to test your knowledge of academic citation policy. The tutorials are anonymous open-learning tools.

Accommodations for students with disabilities

Students needing academic adjustments or accommodations because of a documented disability must present their Faculty Letter from the [Accessible Education Office](#) (AEO) and speak with the professor by the end of the second week of the term, September 11, 2015. Failure to do so may result in the Course Head's inability to respond in a timely manner. All discussions will remain confidential, although Faculty are invited to contact AEO to discuss appropriate implementation.

Lab Room/Schedule All lab sections meet in Science Center Room 115*Lab Section 1 (14589) Monday 6-9 pm*

September 12, 26

October 3, 24

November 7, 28

December 5 (*if necessary due to cancellation*)

Lab section 2 (14590) Tuesday 2-5 pm

September 13, 27

October 4, 25

November 8, 29

December 6 (*if necessary due to cancellation*)

Lab Section 3 (14591) Wednesday 6-9 pm

September 14, 28

October 5, 26

November 9, 30

December 7 (*if necessary due to cancellation*)

Lab Section 4 (14592) Thursday 2-5 pm

September 15, 29

October 6, 27

November 10

December 1 (*and December 8 if necessary due to cancellation*)

Lab Section 5 (14593) Thursday 6-9 pm

September 15, 29

October 6, 27

November 10

December 1 (*and December 8 if necessary due to cancellation*)

Lab Section 6 (14594) Saturday 9 am-noon

September 10, 24

October 1, 22

November 5

December 3