

Lab Syllabus

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Goals:

"It is very necessary that those who are trying to learn from books the facts of physical science should be enabled by the help of a few illustrative experiments to recognize these facts when they meet with them out of doors." James Clerk Maxwell, "Introductory lecture on experimental physics" in "The Scientific Papers of James Clerk Maxwell", W.D. Niven editor, Volume II, pp 242 to 243, Cambridge University Press (1890).

To apply what you learn in the lecture, you will need some skills and concepts that are best learned in the laboratory. These skills include model building, data collection and analysis, laboratory record keeping, and formal reporting of results. You will also need enough statistics to perform elementary hypothesis testing. These skills apply to quantitative work in many fields, including the health- and life-sciences, math, and engineering. Although these activities should improve your understanding of the lecture material, our principle goal is to turn theory into practice.

Most students in introductory physics courses have had lab experience in chemistry and other disciplines. We build on that experience. Your teaching assistants will not be as specific about their requirements as your chemistry teaching assistants may have been. You will often be expected to figure things out on your own in consultation with your lab partner, but you will be graded by the rubrics – which can help to provide some guidance. Since you will be working more independently, you will be required to document your work more carefully, with less input from your teaching assistant.

To accomplish these goals, you will be expected to:

- Apply physics in a variety of physical settings.
- Build simple mathematical models.
- Design experiments.
- Document your experimental work, results, and data analysis in lab notes and notebooks.
- Evaluate and compare results using uncertainties.
- Employ representative software packages for data collection and analysis.
- Document your experimental methods, results, and data analysis in a lab notebook.

- Evaluate and compare results using uncertainties.
- Communicate your work in writing (short and long formal assignments).

Student responsibilities

- **Read the syllabus.** The regulations/guidelines in this syllabus take precedence over any oral commitments that may be made. The lab director is responsible for the final interpretation of these policies.
- **Arrive at your lab on time.** In rare cases, room assignments may be adjusted to accommodate special requirements of a particular lab. Notice will be posted when this happens.
- **Perform all three graded labs at the end of the semester.** If you miss or expect to miss a graded lab due to sickness or another valid reason, a make-up laboratory is available on Closed Week.
- **Make sure that all submitted work is your own.** Academic dishonesty is not tolerated and is grounds for failing the course. Should a student have access to legacy lab notes, sufficient changes have occurred in recent semesters that this will be immediately apparent.
- Before each lab, **read the lab manual** and related course material, particularly if the material has not already been covered in lecture. Chapters in the freely available OpenStax textbook are referenced for further investigation, YouTube MOOC offerings can also help get you up to speed.
 - The Lab Manual will be updating through the course of the semester. The copy available through your Blackboard portal will be the version used in each weekly lab. Changes will be for clarity, and not fundamentally alter the nature or evaluation of each lab.
- Bring your calculator, pen and pencil, lab notebook, and scratch paper to lab each week.
- Come prepared to perform mathematical calculations based on the level of math appropriate for the course. This includes algebra, geometry, and trigonometry. For Physics 201 and 202, calculus is also required. All labs also conduct statistical work, which is not covered in any prerequisite courses for these labs. Students may wish to utilize Khan Academy or other resources for help with statistics.
- Do not bring food, tobacco, or beverages into a lab room.

Final lab grades

Lab and Lecture components of this four credit course are only loosely linked. Due to the open ended nature of scientific investigation, the Lab component is evaluated on a Pass/Fail basis. Final grade for the course will be determined completely by performance in Lecture activities. However, a failure of either the Lab or the Lecture will count as a failure of both, and each component will need to be re-taken if the student desires a passing grade.

A student fails the lab if they score under “Expectation” in 5 or more Rubric categories across the final 3 labs. Every evaluated rubric category used in the final 3 labs is used at least 3 times during the previous labs in the semester, with no new categories being added during the last 6 lab sessions (so you have at least 1 month of practice in every evaluation metric before being

evaluated).

In addition to this failure condition, each week you must complete an “Exit Ticket” before leaving lab for the day. This primarily consists of “put everything how you found it” level of cleaning up your own lab station. If you have **failed to complete 4 or more exit tickets**, that is a failure.

Attendance requirement in the lab is that **you will fail if you miss 3 or more labs** (4 or more if at least one is excused). A make up session is available for the final 3 (evaluated) labs only, and that session is during Closed Week at your normal lab time. Ensure that your schedule is set to avoid missing any of the final 3 labs. Save your one make up opportunity for unplanned emergency/medical use.

Although each lab partner in a group will report the same data, your data analysis, discussion of results, and conclusions must be your own. The Rubrics should be your guide for ensuring that your work is adequate prior to submitting it. All work must be submitted within one week to obtain feedback from the TA.

Questions regarding feedback on lab assignments need to be discussed with your teaching assistant within two weeks of receiving the evaluated material (earlier at the end of the semester). Final lab assessments (pass/fail) will be posted on Blackboard during Finals Week. The lab evaluation is submitted to your instructor Monday morning of Final Exam week. Errors that affect your physics course grade will be corrected after final grades are submitted to the Registrar, if necessary.

Attendance Policy

Except for the final three weeks of lab, all meetings serve as an opportunity to learn and practice the skills which will be evaluated at the end of the semester. **Failure to attend 3 or more labs results in failure of the course**, and since every evaluation metric is used 3 or more times, a student with 2 absences will still have an opportunity to practice each graded metric at least once in the semester.

There are no make up opportunities offered for standard labs. The final three graded labs are provided with one opportunity for make up, which is during Closed Week at the normal time and location for your lab sessions.

Do not attend lab if you are ill with something contagious. Review your Lab Manual and discuss via email with your TA or peers to learn what you can of any new concepts from that missed week. If illness results in missing one of the graded lab sessions, notify your TA as soon as possible to ensure you have material available during the make up session on Closed Week. *An illness only counts as an excused absence if accompanied by a doctor's note which explicitly states you are not to attend class on the day of the missed lab.* Such a note must be delivered to your TA as soon as possible (no later than 1 week after the absence).

If you expect to miss your regularly scheduled lab to attend a university-approved activity, that absence counts as an excused absence. University-approved activities include music and athletic events in which you perform. The official list of Common Morning/Evening Exams is posted at <http://registrar.schedule.wsu.edu/common-exams/>. Your TA must be provided with documentation for the absence to count as excused.

Exam Conflicts - If one of your other classes schedules an exam outside of normal hours and it conflicts with your lab session, the instructor of that other class is required to arrange an alternative time for the exam with you. This is set forth in WSU Academic Regulation 80 as of Spring 2016. Do not surrender any of your limited absences in lab just to take an exam, inform your professors of the regulation if they are unaware of it, and they will arrange an opportunity for you to take the exam without missing lab. But informing your professor of the conflict and arranging an alternate exam is your responsibility.

Students are not permitted to attend any lab section other than the one for which they are registered.

Student conduct

“Washington State University, a community dedicated to the advancement of knowledge, expects all students to behave in a manner consistent with its high standards of scholarship and conduct. Students are expected to uphold these standards both on and off campus and acknowledge the University’s authority to take disciplinary action. The purpose of these standards and processes is to educate students and protect the welfare of the community.”—Quoted from the Preamble to the Washington State University Standards of Conduct for Students (<http://cacd.wsu.edu/media/211772/2014-15 Student Handbook.pdf>).

A partial list of prohibited conduct appears in Washington Administrative Code (WAC) Section 504-26 (<http://apps.leg.wa.gov/wac/default.aspx?cite=504-26>). Of special importance to the laboratories is the false reporting of data, experiment results, information, or procedures. Reporting data acquired by others (including your lab partner if you did not contribute) or in previous semesters is academically dishonest. Fabrication of results, information, or procedures, and sabotaging other students’ work is also prohibited. Violations of this policy will affect your lab grade and may be reported to the Student Conduct Committee as instances of academic dishonesty.

Students are expected to avoid behavior that unnecessarily interferes with the learning of other students. We expect students to be on time to labs and to mute their cell phones for the duration. The concepts of physics are subtle, and even the most intelligent students make mistakes. In this environment, it is important that students be willing to ask questions if they don’t understand what their lab partners say or do. To this end, we require that students and teaching assistants alike avoid behavior that discourages communication. This includes threats and insults. Students who repeatedly disrupt lab may be directed to leave the room and may receive a zero grade for that week’s lab.

Disability accommodations

Reasonable accommodations are available for students with documented disabilities. If you have a disability and need accommodations to fully participate in the lecture or lab, call or visit the Access Center in the Washington Building, Room 217 (Phone: 335-3417, e-mail: Access.Center@wsu.edu, URL: <http://accesscenter.wsu.edu/>). All accommodations must be approved through the Access Center. Notify both your lecture instructor and the lab director during the first week of lecture

concerning any approved accommodations. Late notification may cause the requested accommodations to be unavailable.

As laboratory work is quite different from standard classwork, and we have no examinations, few accommodations apply to labs. Be sure to mention to your TA if you feel one of your accommodations should apply and is not being met.

Safety resources

General information on campus safety is posted at <http://safetyplan.wsu.edu/>—the Campus Safety Plan. Information on how to prepare for potential emergencies is posted on the Office of Emergency Management web site (<http://oem.wsu.edu/>). Safety alerts and weather warnings are posted promptly at the WSU Alerts site (<http://alert.wsu.edu/>). Urgent warnings that apply to the entire University community will also be broadcast using the Campus Outdoor Warning System (speakers mounted on Holland Library and other buildings) and the Crisis Communication System (e-mail, phone, cell phone). For this purpose, it is important to keep your emergency contact information up to date on the MyWSU system. To enter or update this information, click the “Update Now!” link in the “Pullman Emergency Information” box on your MyWSU home page (<http://my.wsu.edu/>).

Safety information that applies to the laboratories appears in the Lab Manual. Your teaching assistant will also present any safety information that applies to the current laboratory at the beginning of the laboratory. Students are expected to conduct themselves responsibly and take no unnecessary risks in the course of their work. Students who disobey the safety instructions of the teaching assistant will be directed to leave the room. All accidents and injuries must be reported promptly to your teaching assistant.

An Emergency Guide is posted by one door of each lab room. If faced with an emergency, follow the “Alert, Assess, Act,” protocol: Remain ALERT (through direct observation or emergency notification), ASSESS your specific situation, and ACT to ensure your own safety and the safety of those around you. In case the fire alarm sounds, leave the building promptly in an orderly fashion. If you are not on a ground floor, use the stairs. Do not use the elevators. After exiting the building, gather across from the basketball court behind Waller Hall (down the hill, south of Webster Hall, see Figure 1) with the other members of your lab. A representative of the Department of Physics and Astronomy will tell you when it is safe to re-enter the building. If this does not happen before the end of the lab period, you are free to leave for your next class. If the emergency involves an active shooter, your options are to RUN, HIDE, or FIGHT (<https://www.youtube.com/watch?v=5VcSwejU2D0>). Each lab room door can be locked from inside in case of a lock down.

Possible changes

The lab director reserves the right to correct errors in the syllabus and to modify lab schedules and room assignments. The lab director has delegated some authority to modify assignments and due dates to your teaching assistant. This helps ensure that you are graded according to the criteria stated

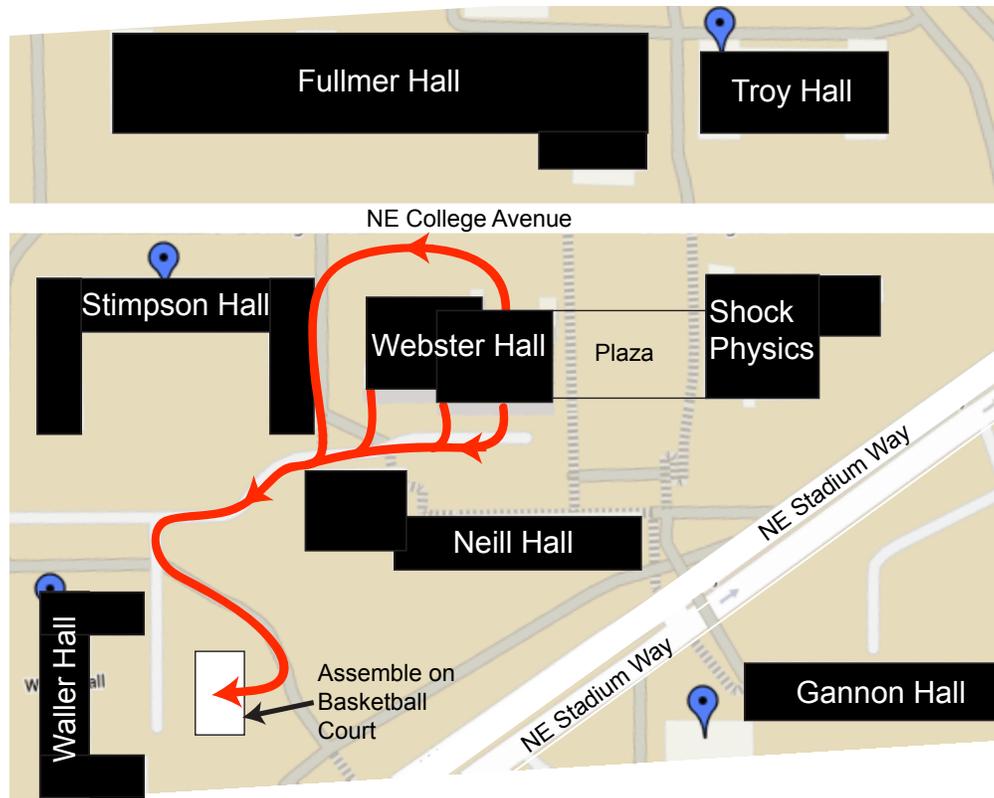


Figure 1. Physics and Astronomy assembly point. In case of a fire alarm, exit the building and gather at the basketball court behind Waller Hall. Use the stairs. Do not use the elevators in case of fire. A department representative will tell us when it is safe to re-enter the building.

during your lab meeting.