



ADVANCED PLACEMENT PHYSICS

LA9901A : Semester-Long Lab Project (Overview)

rev. 2007 1107

OVERVIEW

During the second semester, you will be responsible for the planning, execution, and reporting of a large lab project. This will constitute the majority of your lab grade for the remaining two quarters. Working in groups of two or three, you will design and refine a lab experiment to answer a question of your own choosing.

TIMING

The lab project must be designed so as to fit within the semester. Final presentations will be scheduled a week or so after the administration of the AP exam. This project will for 25% of your third quarter and 50% of your fourth quarter grades.

SCOPE

The scope of your project must be chosen carefully. It must not be so trivial as to be completed significantly earlier than the end of the semester; at the same time, it should be reasonably likely to be completed before the year is out. It is far better to err on a project too ambitious – wherein you can report only preliminary results – than to waste your time and mine on a project of little import or interest.

Construction projects (“We want to build a tornado generator”) are no longer allowed. All projects must have a definite and quantifiable question to be answered.

EQUIPMENT

You are encouraged to design experiments that take advantage of the equipment already possessed by The Hun School. Note that this need not be limited to equipment in the Physics lab, but you will need to negotiate use of other equipment. All work must be performed within the New Physics Lab, **so the use of chemicals or organics is discouraged.**

In the event that your lab absolutely requires equipment not in our possession, there is a chance that it could be purchased. The odds of success are inversely proportional to cost and proportional to the ambition and interest of your topic. The Science Department Chair, Mr. Brown, has committed \$100 per student. Although all expenditures must be approved beforehand by Mr. Gilroy, you will not have to give a lengthy justification for this initial amount. If you require more money than your original budget, you must prepare a requisition and business case, to be presented to the Science Department Chair for approval.

In all events, do not purchase anything without checking with me first. If you purchase an item without prior approval, you will not be reimbursed. Be sure to retain receipts for anything your purchase.

STAGES

Completion of the project will occur through a set of distinct stages, summarized below.

- ∞ Proposal and Interview
- ∞ Literature Search and Background Research
- ∞ Lab Design
- ∞ Lab Execution
- ∞ Final Report
- ∞ Poster Session

In addition, throughout the XLP, I will be checking a journal you maintain.

NB: All submissions must be typed, with the exception of your lab journal

Proposal and Interview

Since this project involves considerable investment of time and resources, a doable choice of topic is essential. To ensure that you have thought carefully and chosen a reasonable project, I will review your topic with you. You must submit electronically a short proposal, around one page in length, that specifies the members of the group and outlines your topic and initial lines of inquiry. We will spend ten to fifteen minutes discussing the topic and your ideas, after which I will do one of the following: approve the project; approve the project with suggestions for a modified focus; or disallow the project. In the event of the last, you will need to find a different topic and submit a new proposal.

The proposal **must** include a title for your lab project. (Past projects have included “The Effects of Temperature on Common Lead-Acid Galvanic Cells” and “Frequency Dependence of Acoustical Absorption”.) Your title must also appear on the final lab report. It is acceptable to change titles if the thrust of the work changes as you work on the project.

Literature Search and Background Research

It is almost inconceivable that you can choose, design, and execute a project on a topic unrelated to any previous research done by humankind. As such, your first step must be to ascertain the current understanding on your topic. At the very least, your textbook can serve as an initial resource, although you will be expected to go out into “the real world” to find other information. All major engineering and scientific professional societies have presences on the Web; several have areas in which you can submit questions or ask for input. The library of Princeton University – as well as departments of the University – can also serve as a useful resource.

Projects which present no or few outside references are suspect and, unless a compelling case can be made that no such information exists, will be graded harshly. Be prepared to document your project thoroughly, or, if your search fails to uncover anything, to document your search thoroughly.

Important: No group will be allowed to begin working in the lab until I am satisfied that a reasonable literature search has been performed, or is at least in progress. This will be satisfied by submission of an initial Works Referenced list.

Lab Design

You must prepare a lab design, much like for your earlier lab projects. While it would be counterproductive to specify all steps in minute detail – the project is supposed to be an investigation – you should have at least a rough idea of the process you will use and equipment you will need. This must be submitted in writing and must be as explicit as you can make it. The lab design should include a clear statement of your goals, the quantities that you will measure, and how you will go about it. Generalities are not acceptable and your terminology should be reasonably accurate.

Lab Execution

Once you have submitted a design and it has been reviewed by me, you will begin to work on executing the lab. There is no explicit grading of this, but it will obviously be reflected in your grades for the lab journal and final report. You will be given at least one lab period per week to work on the project, but you should expect to commit some time outside of class as well. Keep the schedule in mind, so that due dates don't sneak up on you.

Lab Journal

You will be required to maintain a journal of all your work on the project. See Handout L9903A for more details.

Group Meeting

Every Friday, after the quiz, the class will take 5-10 minutes to hear a status update of one group (on a rotating basis). While no formal work be done for this presentation, it is a vital tool of feedback and correction; the smart groups will learn to use it to aid their progress.

Final Report

Your work will be summarized and completed by a final report. This should cover the progress from conception to completion, and should be written for a reader completely unfamiliar with your work. It must address the question you investigated, the techniques you used, the data you obtained, and the interpretation you gave them. Your conclusions and considerations of future extension round out the report.

You will submit your lab journal with the report.

Although the report should be "as long as needed and no longer", you should expect a seven-to-ten page document, including figures. Anything less would indicate either a timid project or a slipshod execution.

Poster

Toward the end of the semester, we will have two "poster sessions". The first will be an in-house session, wherein members of different groups will meet and discuss. This is intended as an opportunity to hear the feedback of your peers before you make your public presentation. The second poster session will be open to the Hun school community. I will provide refreshments, and the class will have the opportunity to circulate among the posters and ask questions of each other. I will be inviting other faculty and administrators, in addition to your parents, to survey your work as well.

In the context of scientific research, a "poster" has a slightly altered connotation from other high school projects. Posters are not expected to be artistic or visually challenging. At scientific conferences, posters are sheets of poster board with 8½x11 sheets attached. They give a very brief overview and summary of the research, as well as presenting particularly relevant or snazzy graphs or tables. Although an eye-catching visual is common, the emphasis is on efficient transmission of information, not aesthetic appeal. It is becoming more common to arrange a poster in parallel to a PowerPoint presentation.

FOXTROT

by Bill Amend

