

Physics 317 Syllabus Fall 2015

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Text: No text is required for this lab, but you need to buy a lab notebook and a glue stick.

Course overview: This junior level lab is designed to prepare you to do independent research and to expose you to a variety of instruments used in physics research. With those goals in mind, each lab will require you to collect data, analyze data, complete error analysis, and communicate the details of that work. You will be exposed to some basic physics equipment that you may see again in your careers. A primary objective is to foster a spirit of independence and inquisitiveness in the lab. Toward that end, many of the labs will be completed on your own.

Course requirements: The requirements for this course will consist of writing lab reports, keeping a detailed lab notebook, and doing a video capture project of your own design which will be presented orally.

Lab Notebook: Your lab notebook is an important part of this course. Each experiment that you conduct should be well documented in your notebook. In order to determine if you have been complete, a good question to ask yourself is "could someone with my background in physics repeat this experiment if they were given my lab notebook?" Your notebook should be detailed. Your lab notebooks will be collected typically one week after your experiment is completed. Each experiment will be graded separately. For more about the lab notebook, please check the Lab Notebook document in the Class Notes folder of Sakai.

Lab reports: You will turn in two formal lab reports. These should follow a formal lab write up procedure similar to the 221 and 222 labs. You will be given two handouts on formal lab reports and there will be a report writing workshop and a report exchange. Each formal lab report you complete will include two drafts. The due dates are on the report schedule (see the link below).

A half a letter grade will be deducted from your report grade for **each day** that the report is late, no exceptions. It is very important that you finish your labs in the allotted time. If you are unable to finish the experiment in class, you must finish it on your own time. The first draft is not graded. However, if it is turned in late, a half letter grade will be deducted from your final report grade.

Experiments: You will be completing four experiments in this class. You will either do the Energy Efficiency Experiment or the Ruby Spectroscopy Experiment. You will design and complete an experiment using a video camera to collect your data. You will do two resonance experiments, an electrical resonance experiment where you will work individually, and a mechanical resonance experiment where you will work in pairs. Ideally enough time is allotted to

collect the data AND complete the analysis in the lab. The experiments are described below. Instructions will be located in the appropriate Sakai folders.

[Ruby Spectroscopy](#)

-In this lab you will learn about the Ruby crystal, its optical and electric properties, and how those properties make it useful as a laser. You will use a spectrometer, function generator and oscilloscope in this experiment.

[Energy Efficiency](#)

-In this lab you will study the efficiency of energy conversion as light energy is converted to electrical energy using a solar cell, then as electrical energy is converted to chemical energy using an electrolyzer, and finally as chemical energy is converted to electrical energy using a fuel cell. You will also need the [electrolyzer/fuel cell instructions](#).

[Video Project](#)

-This is a lab that you will design and conduct on your own. The project must involve an experiment where the data can be collected using a video camera. You will need to write a brief proposal for your project. Projects will be approved on a first come first serve basis, so if you turn in your proposal early, you have a better chance of being able to perform your proposed idea. You will give an oral presentation on your video experiment to the class.

[Download Proposal Form](#)

[Download "How to choose a camera"](#)

[Mechanical Resonance](#)

-In this lab you will investigate the phenomenon of resonance by measuring the resonance frequency and quality factor of a driven damped oscillator. You will determine how the system changes for different driving frequencies and different damping factors. You will work in pairs.

OTHER LAB TO BE ANNOUNCED.

Grading:

Lab notebook	30 %
Lab report 25% each	25 %
Video Project	25 %
Resonance Poster	20 %

Lab due dates and experiment schedule (in progress)

Academic Honesty:

The student handbook states on page 149 that "All students at St. Lawrence University are bound by honor to maintain the highest level of academic integrity. By virtue of membership in the St. Lawrence community, every student accepts the responsibility to know the rules of academic honesty, to abide by them at all times, and to encourage all others to do the same." You are responsible for your own work. In this class you will be expected to use reference materials to complete the introduction of your lab reports. The materials you use should be cited properly. You are expected to cite the lab instructions if you draw from them in your reports. You are also expected to create your own images using a digital camera or a drawing program where appropriate.