Advanced Undergraduate Lab (PHYS 3719)

Requirements for a research-based waiver

Original document by Jordan Gerton on April 6, 2006
Edited by Miguel Mostafá on May 9, 2006

The waiver procedure and requirements described in this document are applicable only when endorsed by the current instructor of PHYS 3719.

Introduction

The pedagogical goals for students in the Advanced Undergraduate Laboratory course include developing skill and deep familiarity with the following:

1. A selection of seminal experiments from the 20th century physics: Franck-Hertz, Millikan oil drop, photoelectric effect, etc.

2. Common laboratory apparatus and measurement techniques: oscilloscopes, power supplies, voltage probes, electronic circuits, ionization detectors, light detectors, etc.

3. Lab notebook recording habits and procedures: detailed experimental notes, neat and organized tables, units, comments, etc.

4. Data and error analysis procedures: linearization of data, $\chi^2$ fitting, error estimation and propagation, precision vs. accuracy, etc.

5. Experiment planning: context/history of experiment, estimates of experimental quantities and uncertainties, theoretical underpinning, proposed procedure, etc.

6. Formal reporting of experimental procedure, results, and analysis in both an oral presentation and a written, journal-style format.

Some of these goals can be met through faculty supervised undergraduate research, while others do not fit into the typical context of a research environment. To ensure that the course objectives are met uniformly by all Physics majors, a list of requirements must be established for those students who wish to obtain a waiver for the Advanced Laboratory based on substantial undergraduate research experience.
Requirements

The following items are required to obtain a research-based waiver for the Advanced Undergraduate Laboratory (PHYS 3719):

1. Evidence of at least two semesters of undergraduate research in an experimental laboratory within the Physics Department at the U. Research experience of a purely theoretical nature is not sufficient to obtain a waiver. (An REU may be accepted as an equivalent to the two semesters.) This requirement must be directly addressed in the letter of support (item 7).

2. Satisfactory completion of a written exam covering error estimation and propagation and experiment planning.

3. A (two- to five-page) report on each of three different modern physics experiments available for the class. Reports should provide historical and scientific context, review the relevant scientific theory, provide estimates for quantities to be measured, and discuss a preliminary experimental and analysis procedure.

4. A formal report on the undergraduate research project in the style of a Physical Review Letters manuscript. A published journal article with the student as co-author will satisfy this requirement only if the student significantly contributed to its writing. If this is the case, the faculty research supervisor must explicitly address this issue in the support letter (item 7).

5. A 15-minute oral presentation on the undergraduate research project. A presentation at a conference will satisfy this requirement only if it was given in the presence of the research supervisor.

6. Registration for four credits of Special Laboratory Topics in Physics (PHYS 3949).

7. A signed letter from the faculty research supervisor(s) in support of the student’s request for waiver. The letter(s) should explicitly address the quality of the student’s research, the amount of effort and time spent by the student working on the research project(s) in the supervisor’s lab, and any other endorsements or hesitations regarding the waiver.
petition. The waiver petition will be summarily dismissed if the research supervisor does not explicitly endorse the request.

The student will be responsible for completing all requirements listed above. The current instructor for PHYS 3719 will be responsible for administering and grading all exams and reports. In particular, the petitioning student must contact the instructor to set up times for the written and oral report, both of which must be completed in the presence of the instructor. The instructor will determine whether all requirements are met satisfactorily. **All the requirements must be met within the particular semester that the student files the petition.** If the requirements are met satisfactorily, a note from the instructor will be inserted into the student’s academic file along with the letter from the faculty supervisor(s).

Salt Lake City, Utah
May 10, 2006

To Whom It May Concern,

I endorse the present proposal. The waiver procedure and requirements described above will be applied for PHYS 3719 during the Fall, 2006.

Miguel A. Mostafá
Assitant Professor