

Phys 3870: Intermediate Lab

Fall 2019 Syllabus

Course Description

Modern experimental techniques, data and error analysis, experimental design, and communication skills are emphasized. Exercises complement upper-level theory courses, and include some experiments of historical importance.

Students are expected to have taken and to be familiar with the content of **General Physics** (PHYS 2210 and 2220), **Introduction to Modern Physics** (PHYS 2710), **Introduction to Computer Methods in Physics** (PHYS 2500). Taking **Intermediate Writing** (ENGL 2010) before PHYS 3870 is highly recommended.

Class will meet in SER 132 at 11:30 Monday and Wednesday for approximately an hour. Lab experiments will be carried out in SER 109, 132, and 138. The instructors will be available in those rooms or their offices until 2:30 on Monday and Wednesday to assist with assignments.

Fees

A \$40 fee per semester is charged for this class to help cover the expenses for expendable supplies and computer usage. Please be aware that the equipment used in this lab was acquired over many years, is very expensive, and can take months or years to repair or replace. Please treat it with appropriate care and respect.

Instructors

Don Rice	SER 218B	Don.Rice@aggiemail.usu.edu
Jonny Price	SER 223	jonathanprice1@aggiemail.usu.edu
Dr. Jan Sojka	SER 250A	jansojka@usu.edu

Office Hours

During lab time, MW 11:30-2:30, or by appointment.

Course Objectives

During this semester, particular emphasis is placed on: (1) experimental and analytical skills including experimental techniques, data acquisition, data analysis, and error analysis; (2) developing collaborative learning skills through work with a lab partner; and (3) improving written and oral communication skills for technical applications.

By the end of this course, you will be able to:

1. Collect experimental data in a careful, professional manner.
2. Perform basic error analysis based on observational uncertainties.
3. Determine whether experimental and theoretical values are consistent, and explain causes of discrepancies.
4. Describe your work in a well-formatted technical document and oral presentation.

Course Resources

1. J. R. Taylor, An Introduction to Error Analysis, 2nd ed. (Univ. Science Books, Mill Valley, CA, 1997). **REQUIRED**
2. R. Jensen, Communicating Science, 2nd ed. ([Rogue Publishing, 2016](#)). **REQUIRED**
3. C. A. Mack, How to Write a Good Scientific Paper ([SPIE Digital Library, 2018](#)). **REQUIRED**

Course materials, assignments, and notifications will be distributed via the Canvas system.

A bound Lab Notebook is required. All manually-recorded data, notes, calculations and scratch work must be kept in the notebook. You may also use a computer notebook program such as Onenote or Evernote to collect and organize computer data. Original notebook data must be submitted with your experiment reports.

Course Requirements

The first part of the semester will focus on simple lab exercises and homework based on lectures and on the textbooks. Students will select lab partners and will choose three experiments to work on for the remainder of the semester. Partners are encouraged to look over the given list of experiments early on to agree upon ones they would both like to do.

Experiments are designed to take about **eight hours each for data collection** by a team of two or three lab partners. The first two experiments will require formal written reports. While collaboration on papers is encouraged, **each student is required to write and turn in their own lab report**. The final experiment will be reported in an oral presentation prepared and presented jointly by the lab partners. Details about the oral presentation will be given later in the semester.

Portions of the written reports may be peer-reviewed and will have editorial requirements similar to those of professional journal submissions.

Evaluation Methods and Criteria

Grades are based on the following:

- Homework during the introductory classes: 35%
- Written lab report for the first experiment: 20%
- Written lab report for the second experiment: 20%
- Presentation for the third experiment: 20%
- Attendance quiz: 5%

Attendance and participation in the class meeting time will be a part of the grade for each activity. Cleaning up work areas will also be counted. Late assignments will be penalized at a rate of **2% per day** up to a maximum determined by the instructor for each assignment. Some assignments will have hard deadlines and late submissions will not be accepted.

Grade Scheme

The following grading standards will be used in this class:

Grade	Range
A	100 % to 93.0%
A-	< 93.0 % to 90.0%
B+	< 90.0 % to 87.0%
B	< 87.0 % to 83.0%

B-	< 83.0 % to 80.0%
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C+	< 80.0 % to 77.0%
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C	< 77.0 % to 73.0%
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C-	< 73.0 % to 70.0%
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D+	< 70.0 % to 67.0%
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D	< 67.0 % to 60.0%
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F	< 59.0 % to 0.0%
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Attendance and Excused Absences Policy

Students are expected to attend the 11:30-12:30 segment of each class. This segment will be used for lectures, problem-solving, and status reports. Attendance and participation is part of the course grade, so avoid scheduling other activities during this time. Be sure to inform the instructors of absences due to illness or other unavoidable circumstances.

University Policies & Procedures

Academic Dishonesty

The instructor of this course will take appropriate actions in response to Academic Dishonesty, as defined the University's Student Code. Acts of academic dishonesty include but are not limited to:

- **Cheating:** using, attempting to use, or providing others with any unauthorized assistance in taking quizzes, tests, examinations, or in any other academic exercise or activity. Unauthorized assistance includes:
 - Working in a group when the instructor has designated that the quiz, test, examination, or any other academic exercise or activity be done "individually;"
 - Depending on the aid of sources beyond those authorized by the instructor in writing papers, preparing reports, solving problems, or carrying out other assignments;

- Substituting for another student, or permitting another student to substitute for oneself, in taking an examination or preparing academic work;
- Acquiring tests or other academic material belonging to a faculty member, staff member, or another student without express permission;
- Continuing to write after time has been called on a quiz, test, examination, or any other academic exercise or activity;
- Submitting substantially the same work for credit in more than one class, except with prior approval of the instructor; or engaging in any form of research fraud.
- **Falsification:** altering or fabricating any information or citation in an academic exercise or activity.
- **Plagiarism:** representing, by paraphrase or direct quotation, the published or unpublished work of another person as one's own in any academic exercise or activity without full and clear acknowledgment. It also includes using materials prepared by another person or by an agency engaged in the sale of term papers or other academic materials.

For additional information go to: [ARTICLE VI. University Regulations Regarding Academic Integrity](#)

Sexual Harassment/Title IX

Utah State University is committed to creating and maintaining an environment free from acts of sexual misconduct and discrimination and to fostering respect and dignity for all members of the USU community. Title IX and USU Policy 339 (<https://www.usu.edu/policies/339/>) address sexual harassment in the workplace and academic setting.

The university responds promptly upon learning of any form of possible discrimination or sexual misconduct. Any individual may contact USU's Affirmative Action/Equal Opportunity (AA/EO) Office for available options and resources or clarification, leading to an informal resolution of the matter. Further information and forms for reporting an incident to USU can be found here: <http://aaeo.usu.edu>

Withdrawal Policy and "I" Grade Policy

Students are required to complete all courses for which they are registered by the end of the semester. In some cases, a student may be unable to complete all of the coursework because of extenuating circumstances, but not due to poor performance or

to retain financial aid. The term 'extenuating' circumstances includes: (1) incapacitating illness which prevents a student from attending classes for a minimum period of two weeks, (2) a death in the immediate family, (3) financial responsibilities requiring a student to alter a work schedule to secure employment, (4) change in work schedule as required by an employer, or (5) other emergencies deemed appropriate by the instructor.

Students with Disabilities

USU welcomes students with disabilities. If you have, or suspect you may have, a physical, mental health, or learning disability that may require accommodations in this course, please contact the [Disability Resource Center \(DRC\)](#) as early in the semester as possible (University Inn # 101, (435) 797-2444, drc@usu.edu). All disability related accommodations must be approved by the DRC. Once approved, the DRC will coordinate with faculty to provide accommodations.

Full details for USU Academic Policies and Procedures can be found at:

- [Student Conduct](#)
- [Student Code](#)
- [Academic Integrity](#)
- [USU Selected Academic Policies and Procedures](#)
- [USU Academic Policies and Procedures](#)
- [Academic Freedom and Professional Responsibility Policy](#)