

Writing Intensive Program: Experimental Methods (PHYS 330)
MW 7:05 pm - 9:50 pm in room BBH 231
College of Arts & Sciences Syllabus

COURSE INFORMATION

Credit Hours: 3.000

Course Description: An introduction to scientific measurement procedures, with special attention paid to scientific writing, the examination of error and uncertainty, and to widely used experimental techniques and their application. Experiments are chosen according to the student's needs and interests. Students will present written results of their investigations in a variety of formats common in the discipline.

Course Prerequisites: MATH 187 minimum grade of C OR consent of the Instructor.

FACULTY INFORMATION

Instructor: Dr. Orin Harris

Office Location: BBH 217B

Office Hours: MTWRF 2:00 pm - 3:00 pm, or by appointment

Phone Extension: 5561

Email: O-Harris1@neiu.edu

COURSE MATERIALS

Required:

- Lab Notebook (this can be any cloth-bound notebook; loose-leaf or spiral-bound are not acceptable).
- *An Introduction to Error Analysis: The Study of Uncertainties in Physical Measurements*, John R. Taylor (University Science Books; 2nd Edition, 1996)
- Additional reading materials, such as a guide to writing lab reports, and the *AIP Style Manual*, will be provided on D2L.

Other Useful Texts and Links:

- *The Three Rs of Experimentation*, from *Introduction to Experimental Physics*, Barry B. Lukkala and David R. Anderson, http://www.cmu.edu/biolphys/smsl/teaching/IntermedOptics/IntOptics_data/3Rs%20of%20Experimentation.pdf

- *Data Reduction and Error Analysis for the Physical Sciences*, Philip R. Bevington and D. Keith Robinson, (McGraw-Hill; 3rd Edition, 2003).
- *Experimentation: An Introduction to Measurement Theory and Experiment Design*, David C. Baird (Addison-Wesley; 3rd Edition, 1995).
- *Introduction to Measurements & Error Analysis*, Duane Deardorff, University of North Carolina Chapel Hill, <http://www.physics.unc.edu/~deardorf/uncertainty/UNCguide.html>.
- *Physics Lab Notebook & Lab Report Information Booklet*, David S. Lee, <http://www.drjbloom.com/Public%20files/Laboratory%20Notebook%20Booklet.pdf>.

COURSE OBJECTIVES / STUDENT LEARNING OUTCOMES

Two principal goals collectively inform the learning outcomes below:

Goal A

Students will design and conduct several experiments that will allow them to gain proficiency in experimental methodology and in the interpretation and analysis of experimental data.

Learning Outcomes - Students should be able to:

- A1. Demonstrate a working knowledge of some common instrumentation used to conduct scientific experiments.
- A2. Demonstrate proficiency in experimental methods, including the collection and analysis of data and the quantification of uncertainty.
- A3. Use data to test scientific hypotheses, and to compare, interpret, and contextualize results.

Goal B

Students will develop communication skills, both written and oral, to effectively convey physics and the scientific method to professional scientists and to a broader audience.

Learning Outcomes - Students should be able to:

- B1. Maintain a laboratory notebook according to standard scientific practices.
- B2. Present and graph data in a clear and scientific manner.
- B3. Author clear and correct technical descriptions and mathematical statements.
- B4. Communicate experimental results and their interpretation to both academic peers and to a broader audience.
- B5. Write in a variety of forms including a lab notebook, lab reports in journal format, standard operating procedures, and formats accompanying oral presentation.

STUDENT TASKS / ASSIGNMENTS / REQUIREMENTS:

Lab Notebook: A lab notebook is an important part of any laboratory experiment; practicing scientists keep track of their work in lab notebooks. Your instructor will give you a list of rules for keeping a laboratory notebook. These rules follow from the basic principle that a lab notebook should allow another person in your field to repeat your work without any other written resources. Your lab notebook will be collected twice during the semester as an ungraded assignment. At that time your instructor will give you formative feedback on how to improve your lab notebook. Your laboratory notebook will be collected for a third time at the end of the semester and you will be graded on the material added to your lab notebook after your last formative review. Typically each experiment will result in 5 to 10 pages of lab notes.

Pre-Lab preparation:

Prior to starting every experiment students will be expected to answer a series of questions posed by the instructor that are designed to help them better understand the underlying concepts behind the experiment. Each question should be answered in complete sentences. Although these pre-lab assignments will not be included in the overall grade, students will only be allowed to perform the experiment upon completion of this activity.

Lab Reports:

You are expected to use the AIP style guide when you write up the results of each experimental investigation assigned. You will also be provided with a condensed writing guide and examples from peer-reviewed scientific journals. Your journal formatted lab reports will include the following sections: abstract; introduction; methods; data analysis; results; acknowledgements and literature cited. Each report should contain between 4 to 5 pages. Students will have the opportunity to revise and resubmit lab reports based on feedback from the instructor. The drafts submitted for feedback will not be graded. Only the final report for each lab will be graded.

Presentation: Students will prepare a 20 minute slide presentation on one of the experiments that has been completed. This presentation will be given during the last week of class.

Grading Policies and Formulae:

Lab reports in AIP format	50% of the total grade
Lab notebook	20% of the total grade
Homework	20% of the total grade
Class presentation	10% of the total grade

Any student who achieves a percentile score of above 90%, 80%, 70%, 60% is guaranteed to receive an A, B, C, or D respectively. These percentile scores may be adjusted downwards based on a class curve and other considerations.

COURSE POLICIES AND STATEMENTS

Course communication: All pertinent class communications between the instructor and students is conducted exclusively through NEIU e-mail and D2L. Thus it is the responsibility of students

to check D2L and their NEIU e-mail account for any course-related updates, assignments, reading materials, as well as updates on class cancellations in the event of threatening weather conditions.

Absence Policy: Regular attendance is mandatory.

Academic Integrity Policy: By enrolling in this course, you are bound by the NEIU Student Code of Conduct: <http://www.neiu.edu/university-life/student-rights-and-responsibilities/student-code-conduct> You will be informed by your instructor of any additional policy specific to your course regarding plagiarism, class disruptions, etc.: Plagiarism is forbidden. No headphones, cell phones being used, or other distractions in class.

ADA Statement: Northeastern Illinois University (NEIU) complies with the Americans with Disabilities Act (ADA) in making reasonable accommodations for qualified students with disabilities. To request accommodations, students with special needs should make arrangements with the Student Disability Services (SDS) office, located on the main campus in room D104. Contact SDS via (773) 442-4595 or <http://www.neiu.edu/university-life/student-disability-services>.

Campus Safety: Emergency Procedures and Safety Information can be found on NEIUport on the MyNEIU tab or as follows: http://homepages.neiu.edu/neiutemp/Emergency_Procedures/MainCampus/.

Incomplete Grade Policy: An Incomplete (“I”) grade is temporary and exceptional, and can be given only to students whose completed coursework has been qualitatively satisfactory but who have been unable to complete all course requirements because of illness or other circumstances beyond their control. An “I” grade is not to be awarded in place of a failing grade or when the student is expected to attend additional class meetings or to re-register to complete the course requirements. Additionally, an “I” grade is not a means for the student to raise his/her grade by doing additional work.

A request for an “I” grade must be made by the student to the faculty member before the last official day of the semester or term. The faculty member retains the right to make the final decision on granting a student’s request for an “I” providing the student meets the provisions above, even though the student may meet the eligibility requirements for this grade. Students have up to one semester, excluding summer, to complete the work.

It is the responsibility of the student to complete and submit the remaining coursework before the assigned deadline. The faculty member will submit a grade change converting the “I” to a letter grade by or before the last day of the semester in which the outstanding coursework is to be completed. If the student does not meet the deadline, the “I” will be converted automatically to a final grade of an “F.” Since the “I” grade is temporary, faculty may not issue a terminal “I” grade.

Upon receipt of the grade change, the Registrar Services Office will post the grade to the student’s record and recalculate the GPA. Although students have up to one semester, excluding summer, to complete the work to change the grade of Incomplete, the student’s academic standing will be reassessed only if the grade change is received by the Friday of the first full week of the semester immediately following the one in which the “I” grade was assigned.

Students will not be allowed to graduate with “I” grades on their records.