Syllabus
Experimental Physics I
PHYS 3250/3251

Course Description: Introduction to experimental modern physics, measurement of fundamental constants, repetition of crucial experiments of modern physics (Stern Gerlach, Zeeman effect, photoelectric effect, etc.)

Course Objectives: The objective of this course is introduce you to the proper methods for conducting controlled physics experiments, including the acquisition, analysis and physical interpretation of data. The course involves experiments which illustrate the principles of modern physics, e.g. the quantum nature of charge and energy, etc. Succinct, journal-style reports will be the primary output for each experiment, with at least one additional presentation (oral and/or poster) required.

Text: An Introduction to Error Analysis, 2nd Edition, J.R. Taylor, ISBN 0-935702-75-X. Additional documentation for any assigned experiments will be supplied as needed.

Learning Outcomes: At the conclusion of this course, students will be able to: 1) Assemble and document a relevant bibliography for a physics experiment. 2) Prepare a journal-style manuscript using scientific typesetting software. 3) Plan and conduct experimental measurements in physics while employing proper note-taking methods. 4) Calculate uncertainties for physical quantities derived from experimental measurements.

Clemson Thinks^2: What is Critical Thinking?
This course is designed to be part of the Clemson Thinks^2 (CT^2) program. "Critical thinking is reasoned and reflective judgment applied to solving problems or making decisions about what to believe or what to do. Critical thinking gives reasoned consideration to defining and analyzing problems, identifying and evaluating options, inferring likely outcomes and probable consequences, and explaining the reasons, evidence, methods and standards used in making those analyses, inferences and evaluations. Critical thinking is skeptical without being cynical, evaluative without being judgmental, and purposefully focused on following reasons and evidence wherever they may lead."
http://www.insightassessment.com/FAQ/FAQs-General-Critical-Thinking/What-is-Critical-Thinking

CT^2 Learning Outcomes: 1) Identify the assumptions underlying any experimental measurement made in the physics laboratory. 2) Identify and explain the limitations of the hypothesis behind your planned (and completed) experimental measurements. 3) Interpret relationships in graphed data and develop an intuition for alternative plotting methods. 4) Explain how new data could change your interpretation of your results. 5) Reflect on the methodology employed in your experiment and assess prior and future measurements in the context of your results. 6) Assess the language used to describe physics experiments (both your own and others) and how it can alter perceptions of the method and results.

Critical Thinking Methods of Teaching: All critical thinking methods of course instruction require class participation and interaction of the students. In these discussions you can expect to have your claims challenged and questioned. This is to get you to think deeper about the origins of those your thinking and beliefs on the topic(s) at hand and to question their accuracy. This can be uncomfortable at times and is not meant to be a critique of anyone's intellect or personal belief system.

Meeting Times
Lecture: M 1:25-2:15pm in Kinard 317
Lab: M/W 2:30-4:30pm in Kinard 317

Course Staff
Instructor:
Dr. Chad E. Sosolik Kinard 206, 656-0310 Email: sosolik@clemson.edu
Teaching Assistant:
Daniel Field Email: dafield@g.clemson.edu
Dhruva Kulkarni Email: dkulkar@g.clemson.edu

Office Hours: This is a lab course where will have direct interaction every M/W by design. If there is a need to meet outside of these times to discuss course materials or other course issues, please email to arrange a mutually agreeable time with the instructor or teaching assistant(s).

Attendance: Attendance is mandatory for all lecture and lab sessions. In-class quizzes and discussion periods will serve as a check of lecture attendance, and teaching assistants will record lab attendance at the beginning of each M/W session. Two or more unexcused absences will result in a final letter grade reduction (one letter grade for each additional unexcused absence). All excused absences require notification in advance and legitimate documentation. Tardiness, defined as attending a lecture or laboratory session more than ten minutes late, will be recorded, with every two instances being counted as an unexcused absence.
Laboratory time outside of regular meeting times will is allowed, and a sign-up sheet will be posted where you must record your entry and exit times. Lab keys are available to facilitate after-hours access. It is expected and understood that you must work after-hours (outside of the lab/lecture time period) to complete the required setups. Assignment of final grades as opposed to incompletes will be contingent on the return of lab keys at the end of the semester.

Required Materials:
Lab Notebook – this notebook will serve as your sole record of the work you do in the laboratory on your specific experiments. It should show the time and date you start any setup or experiment, include any drawings, sketches, or data you find necessary, and should be legible. A few requirements:
1. Write in ink.
2. Each page should be numbered.
3. Use the pages sequentially. It is suggested that you leave the first few pages blank so that you can formulate a table of contents.

4. Errors or mistakes (or flawed designs!) should not be scribbled over or eliminated via white-out. A single line through items to be omitted that still leaves the underlying text legible will suffice.

CT^2 Assessment:
You will be assessed by the CT^2 program through the application of a set of mandatory pre- and post-course surveys or tests. As mandatory assessments these will carry course credit as discussed below under Course Grading. In addition to the pre and post-course evaluations, the CT^2 initiative's success is also gauged through the submission of individual student-created artifacts for review. The artifacts that will be submitted for this course is a sampling the experimental critiques that will appear in your laboratory reports – described above under CT^2 Learning Outcomes. Artifacts that are submitted are a random sampling to show evidence of students' critical thinking ability and are not assessed outside of this class for grading purposes.

Course Grading:
- Pre- and post-course CT^2 assessments – both must be taken to get credit – an incomplete attempt will receive no credit. Following each assessment a report is generated indicating how long each student was actively logged into the test and how many questions they answered (5%)
- Homework and quizzes related to reading and/or course material (20%)
- Experimental Reports (50%)
- Presentations of Research (10%)
- Laboratory Notebooks (10%)
- Class Participation (positive influence in discussion) (5%)

Honors Requirements:
Those enrolled in PHYS 3250 Honors are required to include, as part of each Report, specific and detailed recommendations for improvements, such as interfacing, A/D conversion procedures, etc.

Academic Integrity
As members of the Clemson University community, we have inherited Thomas Green Clemson's vision of this institution as a "high seminary of learning." Fundamental to this vision is a mutual commitment to truthfulness, honor, and responsibility, without which we cannot earn the trust and respect of others. Furthermore, we recognize that academic dishonesty detracts from the value of a Clemson degree. Therefore, we shall not tolerate lying, cheating, or stealing in any form.

Title IX Statement
Clemson University is committed to a policy of equal opportunity for all persons and does not discriminate on the basis of race, color, religion, sex, sexual orientation, gender, pregnancy, national origin, age, disability, veteran's status, genetic information or protected activity (e.g., opposition to prohibited discrimination or participation in any complaint process, etc.) in employment, educational programs and activities, admissions and financial aid. This includes a prohibition against sexual harassment and sexual violence as mandated by Title IX of the Education Amendments of 1972. This policy is located at http://www.clemson.edu/campus-

life/campus-services/access/title-ix/. Mr. Jerry Knighton is the Clemson University Title IX Coordinator. He also is the Director of Access and Equity. His office is located at 111 Holtzendorff Hall, 864.656.3181 (voice) or 864.565.0899 (TDD).

Disability Statement
Students with disabilities requesting accommodations should make an appointment with Dr. Arlene Stewart (656-6848), Director of Disability Services, to discuss specific needs within the first month of classes. Students should present a Faculty Accommodation Letter from Student Disability Services when they meet with instructors. Accommodations are not retroactive and new Faculty Accommodation Letters must be presented each semester.