

UNIVERSITY OF KENTUCKY
DEPARTMENT OF PHYSICS AND ASTRONOMY
PHYSICS 213 LABORATORY
COURSE SYLLABUS
Spring 2010

1. **PURPOSE:** This document provides detailed information regarding the Physics 213 laboratory course. This laboratory will provide an experimental environment where student research teams will be given the opportunity to explore some of the theory, concepts and physical phenomena covered in Physics 213 lecture and recitation, in a hands on, small group environment. And the majority of experiments students will learn to experimentally determine physical quantities associated with a given phenomena. Using the equipment provided they will use parallel methodologies to determine theoretically comparable results. Then using several analysis techniques, they will formally compare the results and determine if they are significantly different or not. If the primary analysis determines that the values are significantly different than the students will perform a secondary analysis and comparison, looking for omitted systematic error and possible over estimation of the precision in their original measurements. Using these corrections the secondary analysis should then bring the compared values closer to coincidence.

2. **OBJECTIVES:**
 - a. Develop an understanding of selected physical phenomena in a laboratory setting.
 - b. Develop standard techniques for comparative analysis of experimentally derived results.
 - c. Develop an understanding of precision and accuracy in experimental work and how uncertainties in measurement effect the uncertainties in experimental results.(error propagation)
 - d. Enhance students' capabilities in creating and analyzing graphical information.
 - e. Exercise and enhance technical writing skills.
 - f. Exercise and enhance leadership and management skills using a small research team model..

3. **SCOPE:**
 - a. The selected lab exercises, in general, follow a path similar to that used in Physics 213 Lecture.
 - b. Subjects may be introduced in lab that are not covered in Physics 213. Students should always be prepared by carefully reviewing the subject matter before entering the lab.

4. **MISSION:** The PHY 213 Instructional Team will ensure that every student is given the opportunity to master the course objectives and achieve their full potential while seeking

to improve the course pedagogy to better meet the needs of all students, both present and future.

5. EXECUTION:

- a. The Instructional Team is composed of the following members, each with specific duties and responsibilities with respect to the conduct of the laboratory.
 - i. Instructional Lab Specialist/Academic Coordinator
 - (1) Provide long term vision for instructional lab program.
 - (2) Provide and coordinate resources, including budget, space, personnel and equipment.
 - (3) Train and supervise teaching assistants.
 - (4) Supervise and coordinate weekly teaching meetings/seminars.
 - (5) Supervise lab grading practices.
 - (6) Mediate student to TA and student to student disputes.
 - (7) Develop and publish lab manuals and materials.
 - (8) Develop new experiments and test new equipment.
 - ii. Senior Lab Teaching Assistant:
 - (1) Setup and test all lab equipment for each lab.
 - (2) Check and reconfigure lab set ups daily.
 - (3) Coordinate equipment needs for make up labs.
 - (4) Provide weekly summaries of equipment use and trouble shooting.
 - iii. Lab Teaching Assistants:
 - (1) Provide a brief introduction to each lab.
 - (2) Serve as an advisor to the student research teams in each section.
 - (3) Emphasize connectivity with lecture topics.
 - (4) Grade all written work IAW weekly lab seminars/ meetings and this Syllabus.
 - (5) Assist in the development of new labs.
 - (6) Provide input to the lecturers regarding lab questions on exams.
 - (7) Provide feedback on course development issues.
 - (8) Mediate intra team disputes.
 - (9) Maintain a daily journal of lab activities. (experimental note book)
 - iv. Students:
 - (1) Prepare pre labs and quizzes individually.
 - (2) Be familiar with your assigned role and associated duties. (Principle Investigator, Researcher, and Skeptic.) These roles will rotate each week.
 - (3) Fully participate in each lab, draft report and the final report development process.
 - (4) **The responsibility for learning is yours alone.**
 - (5) Use the combined power of your research group efficiently.
- b. Other means of assistance
 - i. TA , lecturer, office hours and appointments

- ii. Email and phone conversations.
- iii. Physics Resource Room
- iv. Private tutors,(ask at the main office (CP 177). Plan ahead; they book early.)

6. ADMINISTRATION AND LOGISTICS:

- a. Lab Manual, "Physics 213 Laboratory Manual for General Physics, Spring 2010", Ellis. Available at Johnny Print. 22 Jan 2010 PM. Each student must have their own copy.
- b. TI , 84, or 83+ Calculator is required , TI 85/86 or 92 will work with TI Sonic Ranger but not all experiments under development. Each team must have at least two of the required series calculators. The **TI 84 + Silver** is the best all around choice, and is **highly recommended**. Each student must have their own calculator.
- c. Lab computers: each lab is equipped with a minimum of 10 computers. computers. (Your TA will issue a user id and password to be used in the lab.)
 - i. All computers are networked and have MS Office Suite 2007, Logger pro, Fundamental Science Skills and TI Connect installed.
 - ii. Programs and data can be transferred to and from your TI graphing calculator, using the TI Connect software and Graph Link cable provided.
 - iii. When not in use by you, these computers are analyzing data collected by several radio telescopes as part of a distributed processing program (SETI @home).
 - iv. Modifying these systems in any way is forbidden and could result in the loss of credit for the current lab and for your entire lab entire group.
 - v. **You are encouraged to begin writing your report, when appropriate, during your lab time and then emailing your work to another location for further action.**
 - vi. Leave the lab computers on and facing the lab entrance when you depart from the lab.
 - vii. Use caution when moving the computer around on the bench top and do not leave them under a water faucet.
 - viii. Your **RF transmitter** is required in lab for your quizzes and other assessments. If you forget your transmitter you will fill out a paper form to answer the quiz. For paper submissions of 10 point quizzes, 2 points will be awarded for a correct answer and 1 point for an incorrect answer. Quizzes are each worth a total 10 points, these points may be given all at one time or divided up into smaller quizzes administered during the experimental session or the draft session.
- d. Lab Schedule. Notes: Five labs will be performed over the semester. The last lab is a lab final and is worth 200 points. The lab final is viewed as the culmination of your learning experience. *Doing substantially better on the final can raise your final grade by one letter grade* The labs will follow the general flow of the