WINTHROP UNIVERSITY course Syllabus
Department of Chemistry, Physics, & Geology

Semester: Spring 2014 **Course:** PHYS 212L (001) - Physics with Calculus II Laboratory
Credit hours: 0 **Co-requisite:** PHYS 212

Laboratory Meeting Time and Place: Mondays 2-4:50, Sims 205.

Professor: Dr. Ponn Maheswaranathan (Mahes).
Office: 213-B, Sims, Office Hours: MW 12-1 & F 1-2 or by appointment.
Phone: 323 4940, E-mail: mahesp@winthrop.edu

Textbook: Fundamentals of Physics; Halliday, Resnick, & Walker, 9th Edition, John Wiley.

Lab Score: The lab score (25% of PHYS 212) will come from lab reports and activities, which will be collected using WileyPlus and Blackboard. Students need to register for one of the lab sections, PHYS 212L.

Course Description:
PHYS 212L is the laboratory component to accompany PHYS 212 which deals with thermodynamics, electricity, magnetism, and optics. Experiments in thermodynamics, electricity, magnetism, and optics will be conducted. This course will be used to incorporate the General Education Writing Component, where students will write lab reports with conclusions, a minimum of 20 pages of writing.

Course Objectives:

- Develop an understanding of physics' role as the most basic of the sciences.
- Demonstrate an understanding of the history of scientific discovery.
- Learn the introductory physics concepts associated with heat, thermodynamics, electricity, magnetism, and optics.
- Gain an understanding of physics' role in technology and in everyday life and to discuss the strengths and limitations of science.
- Develop conceptual and analytical problem solving skills.
- Learn how to design and carry out introductory physics experiments.
- Learn how to use computers for data collection & analysis and graphing.
- Draw conclusions for the experiments and write laboratory reports.

University-Level Competencies:

This will be met in the co-requisite course, PHYS 212: Physics with calculus II introduces students to the role of scientific reasoning in solving introductory physics problems using calculus (e.g. calculating entropy changes in thermodynamics, calculating magnetic field due to electric currents, and analyzing circuits). They will apply the scientific methodologies of inquiry during the laboratory, PHYS 212L, and write well-reasoned conclusions. They will also be introduced to the history of scientific discovery

(e.g., topics and devices are introduced with historical perspectives) and learn that the theories in physics evolve into laws after continuous re-evaluations and arguments. In addition they will see how scientific advances made in a laboratory transform into useful technological devices (e.g., the development of the transistor from vacuum tube to silicon chip).

Touchstone Goals: PHYS 212L and the co-requisite PHYS 212 together fulfill four hours of general education requirement for natural sciences. Listed below are the seven fundamental student learning outcomes for natural science courses as well as examples of how they will be fulfilled in PHYS 212 and 212L.

Students should be:
1. Conversant with a few fundamental concepts from among the three main areas of natural science, including earth, life, and physical sciences. (*e.g., heat, thermodynamics, electricity, magnetism, and optics*)
2. Able to apply the scientific methodologies of inquiry. (*e.g., experiments and investigations in the PHYS 212L laboratory)*
3. Able to discuss the strengths and limitations of science. (*e.g., experimental error and analysis in the PHYS 212L laboratory*)
4. Able to demonstrate an understanding of the history of scientific discovery. (e.g., *topics and devices are introduced with historical perspectives)*
5. Able to discuss the social and ethical contexts within which science operates. (e.g., *environmental and health hazards of new devices and materials and sharing of knowledge)*
6. Able to communicate about scientific subjects including (lab courses only) the defense of conclusions based on one's own observations. (e.g., *PHYS 212L laboratory reports*)
7. Able to discuss the application of scientific knowledge to the social sciences and to non-scientific disciplines. (*e.g., application of technology in everyday life)*

Writing Component: The General Education Writing Component will be incorporated into this course via PHYS 212L, which is the laboratory component, where students will write lab reports with conclusion.

Attendance and Participation:
The attendance policy described in the Winthrop University undergraduate catalog will be followed. Students are encouraged to attend all the lectures and to actively take part in classroom activities. Regular attendance and good participation efforts will help in the final letter grade assignment for borderline cases.

Students with Disabilities:
Winthrop University is dedicated to providing access to education. If you have a disability and need classroom accommodations, please contact Gena Smith, Coordinator, Services for Students with Disabilities, at 323-3290, as soon as possible. Once you have your professor notification, please tell me so that I am aware of your accommodations well before the first {*test/paper/assignment*}.

Student Conduct Code: The policy on student academic misconduct is outlined in the "Student Conduct Code Academic Misconduct Policy" in the online *Student Handbook* (http://www2.winthrop.edu/studentaffairs/handbook/StudentHandbook.pdf).

Syllabus change policy: The instructor will make changes to this syllabus as deemed necessary for the progression of the course.

Rules for the laboratory:

1. You must read the web-link and the relevant materials from the textbook before the lab period and be prepared for the laboratory.
2. You will work in a group of two. Both partners should actively take part in collecting the data and in the experimental process.
3. At the end of your lab work you need to return all the laboratory equipment to the appropriate places where you took them.
4. You need to handle the equipment carefully, giving special attention when warranted.
5. When you leave the laboratory, you need to make sure the laboratory table is clean and free of any materials.
6. Do not miss any laboratory. You will receive "0" for all missed laboratories.
7. Lab reports are due at the end of the lab period, unless advised otherwise by the instructor.

LAB SCHEDULE Conclusion Grading Rubrics

Lab #	Week	Experiment	Post-Lab Hwk
1	Jan. 13 & Jan 21-23	Heat	Prob. 40 & 39, Chap. 18
2	Jan. 27-30	Gas Laws	
3	Feb. 3-6	Joule's Law and Heat Transfer	
4	Feb. 10-13	Charge and Field: Instructions	Pre-lab on Fields
5	Feb. 17-20	Resistance	Pre lab for Resistance
6	Feb. 24-27	Ohm's Law	
7	Mar. 3-6	Capacitor	

8	Mar. 10-13	Meters	
9	Mar. 24-27	Induction and Permeability Constant	
10	Mar. 31-Apr. 3	Oscilloscope	
11	Apr. 7-10	Spherical Mirrors and Lenses	
12	Apr. 14-17	Interference and Diffraction Instructions Data	
13	Apr. 21-24	Spectra	

Lab Reports:

At the completion of each lab every student is required to turn in a lab write-up. Students may work with their partner(s) to complete most of the write-up. This means sharing ideas not paragraphs. However, the conclusion section must be completed independently! Students are encouraged to be creative with their conclusions and explain whether or not their results are accurate. If the results are not close to the accepted values student are expected to give reasons for any discrepancies. The conclusion section is the part of the lab which is most important to check for student comprehension of the topic.

How to write a conclusion?

* Conclusion is the most important part of your report. It is a brief summary-paragraph, about half a page. You must write your own conclusion, after completing the data collection and analysis. It must be written as the last piece and attached after data tables and graphs.
* Conclusion should state things that are unique for your investigation which can be accomplished by including values of the experimentally determined physical quantities. Just remember that you cannot write your conclusion without completing your experiments or investigations. General statements like "I have determined the densities of given solids" is not acceptable.
* You may start your conclusion by re-stating the purpose with appropriate changes. Then you need to briefly state (don't repeat procedure) how you conducted the experiment and collected the data. Continue this with summarizing your results, referring to the data tables and graphs when appropriate, and answer the purpose. Then you may discuss about some of the difficulties you had, errors and their possible causes, and suggestions for improvement. Describe your reasoning using physics terminology and principles. You should explain as completely as possible what goes through your mind that leads you to your conclusion. While we encourage you to discuss the investigations with your partners, your conclusion must be your own thought.