# Syllabus for PHYS 102L Introductory Physics II Lab (Section 5) – Spring 2015

Class Times: Wednesday, 12:20-3:20 PM, HWWE 104

Instructor Information: Dr. Mike Larsen

**Office Phone:** 843-953-2128

**Office Hours:** Mondays, 12-1 PM; Wednesdays 10-11 AM; Thursdays 5-6 PM, or by appointment. (I am here *a lot.* 95% of the time, I'll drop whatever I'm doing to help you if you need some help. Just ask. If you want to make sure I'm available, make an appointment with me.)

Office Locations: JC Long 217 (I also am sometimes in a research lab during office hours – JC Long 220, JC Long 221, or Lightsey 336. Check the door of my office for my current location.) Email address: LarsenML@cofc.edu (please use sparingly; I'd rather talk to you in person if you have a question or a concern.)

Prerequisites: PHYS 101 or HONS 157

Course Webpage: http://larsenml.people.cofc.edu/phys102L\_spr15.html

(Please see course page for full description of course, rationale, and supplementary information). Course Description: A laboratory program to accompany PHYS 102.

## **Attendance Policy**

Attendance is required for all lab sessions. If you must miss a lab, you will score a "0" for that week's pre-lab, lab quiz, and other graded lab work. Because I am aware that sometimes "life happens" and you have to miss class for an unplanned reason, the lowest score in each grading category is dropped at the end of the semester. (If all labs are attended, the lowest earned grade will be dropped; see grading section for more detail). If you have a known conflict with a lab (due to a sporting event, religious observance, interview, or other important personal event) it is *your* responsibility to use office hours to discuss options with the instructor *well in advance of the date in question* to work out a mutually acceptable solution.

Note that most of the PHYS 102 labs take the entire scheduled 3 hours; please plan to be here for the full assigned three hours. A few weeks we may finish a little early, but it would be a mistake to plan on that – it is hard to predict, and not likely to happen very often.

Lab Groups: You will have assigned lab groups that likely will change periodically. It is your responsibility, if necessary, to exchange contact information with your lab partners. Some lab reports may take the form of "group" lab reports, where an entire group submits a single report and all grades are shared. (Not all labs will be graded this way). Absence hurts not only yourself, but your lab group members. Please be considerate to your classmates and come to class.

## **Necessary Materials**

- Closed-Toe Shoes
- College of Charleston 102 Spring 2015 Lab Manual
- Lab Notebook
- Pen
- Physics 102 Text
- Scientific Calculator (*not* on your cell-phone!). (Will be needed for quizzes; although spare calculators may be provided as available, no promises regarding their availability are made. You might be out of luck if you forget yours).

Coming to class prepared is expected; if you are missing any of these required materials, Dr. Larsen will penalize your weekly lab quiz score up to 20%.

### **Classroom Policies**

This class is a science lab; a general good rule for life is to not have food or beverage in a science lab if you plan on staying healthy. ("Don't lick anything in a science lab.") Please do not bring food or drink to lab.

Open toed shoes are also forbidden in lab. If you are wearing open-toed shoes (sandals, flip-flops, etc.) the instructor may be required to remove you from class. At the very least, you may be offered (non-optional) alternative footwear for safety purposes. You also will lose the points on your weekly quiz for coming to class unprepared.

There are also a number of safety concerns in a lab. Your safety is always your instructor's top priority. It is expected that you will follow the instructor's verbal announcements regarding all classroom behavior, and follow the safety guidelines as set out at the beginning of the semester at all times. If necessary, your instructor may – at his discretion – require you to leave lab for the day (and forfeit all points associated with the lab activities) in the interest of the safety of everyone in the room. No safety risks of any kind will be tolerated by the instructor.

### Honor Code / Code of Conduct

It is expected that you will adhere to the university's honor code and student code of conduct, as can be found in your student handbook.

### Students with Disabilities

The College will make reasonable accommodations for persons with documented disabilities. Students should apply at the Center for Disability Services/SNAP located on the first floor of the Lightsey Center, Suite 104. Students approved for accommodations are responsible for notifying your professor as soon as possible and subsequently contacting your professor again at least one week before any specific accommodation is needed.

#### Grading

Grades will be based on six components.

- Prelab Work (10%). Each week you will be given a handout with a set of (typically fairly straightforward) questions on the lab that will be completed the following week. The questions are specifically designed to help prepare you for the next lab. These prelabs will be available for pickup at the end of one week's lab and are due at the immediate beginning of the following week's lab. Your instructor will likely grade these during the weekly quiz; if you have not turned in your weekly pre-lab by the beginning of the quiz, your pre-lab score will be docked 50%. Each pre-lab counts for 1% of your semester grade (the lowest 2 pre-labs will be dropped).
- Quiz Average (30%). Each week a quiz will be given based on the previous week's lab. You will have approximately 20-30 minutes to complete this quiz. If you arrive late, you will not be given extra time to complete the quiz. Each quiz counts for 3% of your semester grade (the lowest 2 quizzes will be dropped).
- Formal Lab Reports (30%). 3-5 times throughout the semester, your instructor will inform you that you are expected to complete a formal lab report on one of the labs you have completed. Expectations for these formal lab reports will be distributed separately, and the formal lab reports will be due at least one week after the lab is conducted.
- Shoot-for-your-grade labs (10%). Some of the labs during the semester are "shoot for your grade' labs, wehere your grade is determined by your performance on a specified task.
- Semi-Formal Quantitative Labs (10%). Some of the labs during the semester involve a bunch of activity that will ultimately lead to a specific numerical result. For the semi-formal quantitative labs, each lab group is expected to turn in a sheet with calculations and error analysis revolving around the specific quantity of interest. For these labs, the detailed expectations will be made verbally by the instructor during the lab. Semi-Formal quantitative labs will be turned in at or before the end of the lab period.
- Semi-Formal Qualitative Labs (10%). Some of the labs during the semester involve activities that rely on learning by observing a particular phenomena. Often, these labs are not well

suited to the other forms of lab writeup. In these cases, the lab instructor will give you an explanation of what will be expected. Semi-formal qualitative labs will be turned in at or before the end of the lab period.

Your lowest score (including absences as 0s) will be dropped from each of the above six categories, except I will drop your two (2) lowest quiz and prelab scores. This does mean that if you miss two labs (a shoot for your grade and a formal lab, for example), you will be fortunate to be able to drop the absence for both the missing formal lab report and the shoot for your grade, and you'll be able to drop the zero for both quizzes you missed. (However, this does mean that you are at a severe disadvantage for the quizzes you take upon returning to class, since you will not have attended the lab the quiz is based on the previous week). Because I am ultimately dropping 8 scores from your grade, NO MAKEUP QUIZZES OR LABS WILL BE GIVEN FOR ANY REASON. This follows general Physics department policy, based on the availability of rooms and equipment.

If you do not miss any classes, you get to drop your lowest scores as well, but you won't have the "0" from an absence to deal with. Showing up will benefit your grade positively.

Grading Scale: The final grading scale will be no more stringent than:

Α	>90	C+	79
A-	90	$\mathbf{C}$	71-78
B+	89	C-	70
В	81-88	D	60-69
B-	80	F	<60

**TENTATIVE Schedule**: I believe the schedule of labs is made somewhere in Harbor Walk. This is the TENTATIVE schedule planned by your lecture instructor (Dr. Wood):

Date	Lab	
1/14	Coulomb's Law	
1/21	Electric Fields	
1/28	Simple DC Circuits	
2/4	Circuit Reduction	
2/11	Electric Motor	
2/18	Magnetism	
2/25	Magnetic Induction	
3/4	NO LAB – SPRING BREAK	
3/11	Reflection and Refraction	
3/18	Simple Optical Instruments: Lenses	
3/25	Interference	
4/1	Spectroscopy	
4/8	Photoelectric Effect	
4/15	Radioactivity	
4/22	No Lab (But last formal lab report due)	

Learning Objectives This course endeavors to aid the motivated student in the following tasks:

- Learn experimental and data analysis methods to test and verify certain fundamental laws of physics involving electricity, electric circuits, magnetism, optics and spectroscopy, photoelectric effect, and radioactive decay through hands-on activities.
- Enhance the observation and analytical skills.
- Improve the ability of students to articulate their thoughts and ideas.
- Broaden an appreciation for logical qualitative and quantitative reasoning.
- Enhance scientific writing skills.
- Enhance teamwork and communication skills.
- Learn lab safety.

#### **General Education Student Learning Outcomes**

These outcomes will be assessed via use of a signature problem/project at some point during the semester.

- Students apply physical/natural principles to analyze and solve problems.
- Students explain how science impacts society.

Learning Outcomes At the end of this course, successful students will be able to:

- Use basic instruments (charge sensors, dc power supplies, digital multimeters, magnetic field sensors, spectrometers, Geiger counters, etc.) to make measurements.
- Design and carry out measurements based on the directions given by the lab instructor and in the experimental manual.
- Collect data (manually and/or using computers) and tabulate it with appropriate units.
- Draw sketches, graphs, etc. and analyze the data manually and/or using professional software.
- Estimate uncertainties associated with the measurements.
- Discuss the results and compare it with available accepted values.
- Draw conclusions from the observations and measurements from an experiment and prepare a lab report following specific guidelines.
- Use computer software (Microsoft Word, Microsoft Excel, DataStudio, etc.) to collect data and creat graphs, report observations, and tabulate results.
- Investigate the interactions of different kinds of electrical charge qualitatively and quantitatively.
- Map out the electric field lines and equipotential surfaces for different electrode configurations.
- Investigate the relationships between resistance, potential difference, and current in simple DC circuits and compare the results to Ohm's law.
- Apply Ohm's law and Kirchhoff's rules to analyze series-parallel combination DC circuits.
- Investigate the response of a capacitor in parallel RC circuits.
- Investigate the relationship between magnetism and electricity.
- Build a working DC motor and demonstrate its performance.
- Verify the law of reflection and gain practical experience with simple optical instruments.
- Investigate interference patterns in a replication of Young's double-slit experiment and investigate diffraction with a human hair and/or CD.
- Identify a gas by its emission spectrum as shown with a spectrometer.
- Determine the value of Planck's constant using the photoelectric effect.
- Investigate alpha, beta, and gamma radioactive emissions and the effect of various shielding materials, and learn the proper operation of a Geiger tube.