PHYS 122L **Introductory Physics Laboratory** **Fall 2015**

SYLLABUS

Place and Time:

Lecture: Sherman Hall 150, Tu 2:30-3:20 pm
Lab: Physics 110, 3:20-6:20 pm, Tu **or** Th (depending on registration)

Instructor: Dr. Lili Cui
Email: lili@umbc.edu
Office Hours: MonWed 10-11, Tue 11-12, Thu 2-3, in Physics 321

Teaching Assistants: Shawna Chisholm
Email: chis3@umbc.edu
Office Hours: Tue 12-1, Thu 2:30-3:30, in Physics 110 (lab room)

Course Description (from the registrar)
Four hours of laboratory work a week.
This is the laboratory course associated with the PHYS 121-122 sequence.
Prerequisite: PHYS 121
Corequisite: PHYS 122

I will assume that you have the Physics background provided by PHYS 121 and PHYS 122. We will use concepts from these classes on a daily basis. I will assume that you have a working knowledge of Calculus that includes derivatives, and formulas for algebraic and trigonometric functions.

Course Objectives
This is the first physics lab during your studies at UMBC. Therefore, there will be much emphasis on how to carry out and report a measurement, data evaluation, etc. Nevertheless, keep in mind that clear understanding of the principles involved is essential. Busy-work without understanding is worthless.

Here is a formal list of objectives:

- Observe physical phenomena familiar from your lecture courses. Become familiar with the intricacies of working in a lab, such as how to plan a measurement, how to set up and use equipment, and how to take and record data.
- Learn how to analyze your data and compare theory with experiment.
- Learn the proper methods of estimating and reporting errors. It is an integral part of every laboratory measurement. It is not the main purpose of the lab, but no lab report is complete without an estimation of the experimental error for every directly measured and derived quantity. Learn how to use error propagation and how to fit theoretical curves (usually straight lines) to measured data.
- Learn to present your results in a complete, concise, and clearly written report. (In the real world your work is usually judged by what you write about it: you prepare a report for your manager in industry, a dissertation as a graduate student, a research paper in academia. Fair or not, a badly written reports is dismissed, no matter how great the work itself would be otherwise.)

Required Course Materials:

1. ***Lab Pack***, sold by the bookstore. Make sure to obtain the "Fall 2015" version, not an earlier one. They are different. If you do not find one at the shelf, go to the desk and ask them to print one for you. It will be ready in 5 minutes.
2. ***Lab Notebook***, also available at the bookstore. You must buy the specified lab-research notebook; the top page is permanently bound to the notebook, while the duplicate page is perforated, making it easy to tear out and submit it to the lab TA at the end of each lab section while still keeping an official copy. The lab TA will staple your duplicate pages to your lab report before returning the graded report to you. Please make sure that you have tuned in you duplicate data pages at the end of each section to your lab TA. Lab reports without the data pages will be subject to a 30% grade reduction. (Ask a clerk, if you are not sure what to buy.)
3. An ***Introductory Physics textbook*** you can consult whenever you feel uncertain about the principles. Reports with incorrect physics will be harshly downgraded. You must understand what you are doing in the lab and why.
4. Access to ***Microsoft Word and Excel*** with option to print. These programs are available on practically every computer, most probably including your laptop. The necessary features are available in any version. Make sure that you are familiar with the version available to you. Both Word and Excel have extensive Help systems. If your data evaluation required the use of a spreadsheet, attach a printout to your lab report. Incorporate only the main results and plots in the main text of the report. Make sure to back up your files properly and to have a plan B for printing. Difficulties with your computer are not an acceptable reason for a late report.

Course Management

I will use ***Blackboard*** to manage the course. ***It is your responsibility to keep up to date with the course materials and announcements posted on Blackboard.***

Course Grade

9 lab reports, 80 points each	720
2 homeworks, 80 points each	160
Final presentation (in pairs)	80

I will drop the lowest score, either a homework or a lab report. With that, the achievable total is 880.

Grades will be assigned according to the following scale (with possible minor corrections):
A = 780 or above
B = 660-779
C = 540-659
D = 440-529
F = 439 or below

In principle, everyone can get an A. I will not grade the class on a curve. This is the absolute grading scale I will use.

"Incomplete" is given only in exceptional cases. In order to be considered for an "I", you must have completed at least 8 of the 12 assignments and have C or better standing at the time of incapacitation.

Course Policies

Reading assignments

Come well prepared to the lab. Read the relevant chapter from the lab manual and polish up on your basic physics knowledge, if necessary. Summaries of the principles will be given in class and also posted on Blackboard, but it is too little too late, unless you did your share already. Have a plan – you can record it in your notebook, if you wish – of what you will do.

Homework

Homework assignments for the first two weeks will be posted in Blackboard. It is your responsibility to obtain a copy. For any solution that requires calculation in Excel, you must include a printout of the results with the main answer circled or highlighted. The correct answer without the work will receive NO credit, but partial credit is given for partially correct attempts. For other questions, homework solutions can be handwritten, but please, write clearly. You can work together, but eventually each student must have her/his own unique solution.
You do not have to submit electronic or typed versions of your homework.
Notice that the homework grades account for a substantial portion of your final grade. They are hard and long, comparable to a lab report. Take them very seriously, leaving sufficient time (at least 4 hours) to complete them.

Working in the lab

Arrive to the lab on time. Two or three students work together, thus being late from the lab hurts your partner(s) and potentially gives you credit for work you were not involved in. Therefore, the following late policy will be strictly enforced:
Up to 15 min: your lab grade is reduced by 10%.
15-30 min: your lab grade is reduced by 25%.
If you are late by more than 30 min, you cannot join in.
If you have a proven legitimate reason, you are eligible to make up the measurement; otherwise you will get no credit for that lab.

Work in the lab in an orderly manner. You will not do any particularly dangerous experiment, but accidents can happen if you are careless. Use common sense and be careful with shooting balls and pouring hot water.

Lab reports

To receive full credit for a lab report, you must attend the lab, take data, submit the yellow copy of your record, and hand in a hard copy of your written report within one week after you do the experiment (normally at the beginning of the next lab.) Additionally, you must upload an electronic copy of your lab report to the course blackboard site prior to submitting the written report. ***You must do both: upload an electronic version via Blackboard and submit a hardcopy for grading.*** If one of the two is missing you will get a zero score for the lab. You should allow enough time to complete these tasks before coming to the lab. You cannot email me or the TA lab reports, we will delete these emails upon receipt.

Reports must be typed using a word processor and should conform to the format supplied at the beginning of the semester and in the sample report in the Lab Pack. It must be spell-checked and written in clear English. (Publishers return manuscript without review, if language is full of errors.)

You may talk to your classmates regarding the lab reports, but each of you ***must submit your own original text, graphs, analysis, and report***. Of course, it is understood that the raw data of your partner equal yours. But the evaluation, graphs and the text must be clearly different. ***Copying someone else's work is cheating***.

Late submissions (both homework and lab report) must be turned in to the physics office, room 220 in the Physics Building, and marked with the date and time by the person receiving them. The score will be reduced according to the formula:

$$\text{Final Score}(t) = \text{Original Score} * \exp(-0.1t),$$

where t equals the number of full or partial calendar days by which the assignment is late. (According to this formula, being late by one day means approximately 10% reduction and a one-week-late assignment receives approximately 50% credit. It is much less than full credit, but still much more than zero! You can hurt your grade the most by not turning in an assignment. The saying "better late then never" is valid.) The grade of the assignment is rounded up to the nearest integer.

Make-up lab policy: Make-ups will be allowed only for a documented medical or legal problem, athletic event, religious observance, or a death in the immediate family. The instructor must be notified as soon as possible, preferably well before the lab is missed. Going out of town on a recreational trip or a family event do not constitute valid reasons for requesting make-up.

Oral presentations: You will give a 15-minute talk based on one of the labs at the end of the semester. You and your partner will propose an addition, correction, or refinement to one of the measurements. You don't have to do the measurement you propose (though it may be beneficial if logistically possible). We'll discuss how to make such presentations during lectures. The goal is to give you experience in presenting scientific results and answering questions in front of your peers. No matter what job you do in the future, you can benefit from learning how to present a topic in a clear and concise form.

Blackboard

Assignments, lecture slides, lab notes, and announcements will be posted on Blackboard. Take a look at the course Blackboard page a day or two before the next lab, or if you suspect that guidance should be available in a given situation, such as inclement weather. We will also enter your grades into Bb so that you will be aware of your standing in the course at any time.

Disabilities

If you have any condition such as a physical or learning disability, which will make it difficult for you to carry out the work as described or which will require academic accommodations, please notify me ASAP, but definitely during the first two weeks of classes.

Academic Integrity

"By enrolling in this course, each student assumes the responsibilities of an active participant in UMBC's scholarly community in which everyone's academic work and behavior are held to the highest standards of honesty. Cheating could result in disciplinary action that may include, but is not limited to, suspension or dismissal." More on the requirements of academic integrity can be found at http://www.umbc.edu/gradschool/procedures/integrity.html

SCHEDULE

Week	Dates	Activity	Assignment
1	Aug 26-28	No lecture/lab (half week)	
2	Aug 31-Sept 4	Lecture: course policies, data collection and analysis, errors, Continued in lab.	HW#1
3	Sept 7-11	Lecture: More on data analysis, Excel, making plots Continued in lab.	HW#2
4	Sept 14-18	Group A: 1. Atwood's machine Group B: 2. The Ballistic Pendulum	LR#1
5	Sept 21-25	Group A: 2. The Ballistic Pendulum Group B: 1. Atwood's machine	LR#2
6	Sept 28-Oct 2	Group A: 4. Angular Momentum Group B: 3. Simple Harmonic Motion	LR#3
7	Oct 5-9	Group A: 3. Simple Harmonic Motion Group B: 4. Angular Momentum	LR#4
8	Oct 12-16	Group A: 5. Velocity of Sound Group B: 6. Heat Capacity and Latent Heat	LR#5
9	Oct 19-23	Group A: 6. Heat Capacity and Latent Heat Group B: 5. Velocity of Sound	LR#6
10	Oct 26-30	Group A: 8. The Current Balance Group B: 7. DC Circuits and Ohm's law	LR#7
11	Nov 2-6	Group A: 7. DC Circuits and Ohm's law Group B: 8. The Current Balance	LR#8
12	Nov 9-13	Both Groups: 9. The Ratio of e/m for the Electron	LR#9
13	Nov 16-20	Preparation for presentations, lab make-up	None
14	Nov 24	Lecture only – review of student presentations	None
15	Nov 30-Dec 4	Student presentations	None
16	Dec 8	Reserve/last chance to make-up	None