COURSE SYLLABUS Fall 2015

PHYSICS 201L: PHYSICS I LABORATORY

Description:
Laboratory to accompany PHYS 201. Corequisite: PHYS 201.

Text: Lab Manual for Introductory Physics I (available on-line)

Instructor: Dr. Ted Clarke
Office: CW 115 E-mail: *tclarke2@cbu.edu*
Phone: 3462 Home Page: *http://www.cbu.edu/~tclarke2*

Office Hours:
I will announce office hours in class. Feel free to check to see if I am in at other times as well.

Goals:
This laboratory course supplements the lecture course, so it is designed to assist you in reaching the goals of Physics 201. The additional goals of this course are:
1. To investigate in more detail the topics discussed in Physics 201 lecture by direct, hands-on observation.
2. To test the models developed in Physics 201 in the real-world environment of the laboratory. To see how well the models work and to find their limitations.
3. To increase the qualitative understanding of physical phenomena by directly seeing how physical quantities affect each other, particularly how forces and torques affect the motions of objects.
4. To see how the process of measurement affects experimental results through measurement uncertainty.

Topic Prerequisites:
- basic algebra, trigonometry

Outline:
There are eleven experiments to perform in the course. The lab and quiz schedule is shown in the table below.

Date	**Exp.**	**Title**	**Exp. Quizzed On**
Sep 3	1	Composition of Concurrent Forces	
Sep 10	2	Acceleration due to Gravity	1
Sep 17	3	Acceleration Down a Ramp	2
Sep 24	4	Newton's Second Law	3
Oct 1		Newton's Second Law (continued)	
Oct 8	5	Centripetal Force	4
Oct 15	6	Torque	5
Oct 22		*No Lab (Fall Break)*	
Oct 29	7	Atwood's Machine	6
Nov 5	8	Hooke's Law	7
Nov 12	9	Fluids	8
Nov 19	10	Oscillations	9
Nov 26		*No Lab (Thanksgiving)*	
Dec 3	11	Vibrating String	10

Grading:
The underlined experiments require written lab reports from each student. The written reports are worth 100 points each. The ten quizzes are worth 5 points each. There is a possible total of 350 points in the course.

Your final letter grade is determined by adding all points earned on the reports and quizzes and then by using the following scale:

A (320-350) B (290-319) C (260-289) D (230-259) F (<230)

This grading scale is based on the following criteria. An average of 90 for the written lab report grades and a perfect 50 on the quizzes yield the minimum of 320 for an "A". (See more information below about the quizzes.) An average of 80 for the written lab report grades and a perfect 50 on the quizzes yield the minimum of 290 for a "B". Similarly, a perfect quiz score and an average of 70 on the reports yield the minimum of 260 for a "C".

Absences:
If you cannot make it to a lab meeting, make arrangements with me before the meeting to do the experiment and take the relevant quiz at another time. If you miss a meeting with no warning, you can make it up but your score for that quiz will be reduced by 25%. Your final letter grade will be reduced by one letter for each experiment that is not performed by the end of the semester.

Quizzes:
You will take a quiz at the beginning of the lab session on material covered in the most recent experiment that you performed. Each quiz is worth 5 points. You have 5 minutes to take each quiz. If you arrive after the quiz has started, you must remain outside of the room until the quiz is over. You may then take the quiz at the end of the lab period with a 25% penalty. The quizzes should be straightforward if you paid attention while doing the experiment and kept a good lab notebook. I suggest reviewing your lab notebook and the lab manual before you take a quiz.

A Good Lab Notebook:
A good lab notebook is a bound notebook. Recorded information is always dated. Entries are written in ink. Recorded data is organized, such as in tabular form. The units of physical quantities are always displayed. An incorrectly recorded value is not erased or scratched out. Rather, a single line is drawn through the value and the correct value is written next to the incorrect value. Graphs are included in the lab notebook. If the graph is done on a separate sheet, the sheet is stapled or taped into the lab notebook. Graphs are titled and the axes have labels with appropriate units. Results and conclusions are written in a comprehensible form. The general rule to follow is this: A person with a lab manual should be able to read your lab notebook and understand the entire experiment.

Written Reports:
A report is usually due one week after the experiment is performed at the beginning of the lab session. Late reports will be accepted at a penalty of 4 points per day. After five days, the penalty will not increase from 20 points and late reports will be accepted up until the last class day of the semester. (However, this is a severe penalty and I advise against turning in reports this late. For that matter, I advise to turn all of your reports in on time.) Reports that are turned in on the due date and receive below 80 points may be resubmitted once up until the last class day of the semester for a maximum of 80 points. If a report is turned in on the due date and has a major error or is missing a vital component and is deemed unacceptable, it will be returned with "Resubmit" written on it. The report may be resubmitted once up until the last class day of the semester for a maximum of 80 points. Such a report that is not resubmitted is worth 40 points. I strongly encourage you to visit me to discuss your report before you resubmit it.

The written reports must have the following elements:

1. Title Page (title of experiment, date, your name, name(s) of partner(s))
2. Experimental Objective (few sentences in your own words)
3. Raw Data (measured values with units)
4. Calculated Data and Sample Calculations (for each equation used, state equation & show a sample calculation with units)
5. Plots, if any (label axes with units, display equation of best fit if relevant)
6. Other Results (include your answers to the questions raised in the manual or raised by me in the lab session, be sure to discuss each plot, calculate percentage differences when comparing quantities, include any other relevant results that you may have found)
7. Discussion of uncertainties and accuracy of results (be as quantitative as possible, estimate effect of experimental errors on results, identify the largest source of error)

The reports must be typed (e.g. Word) and the graphs must be done using plotting software (e.g. Excel). Complete sentences should be used to express your thoughts in an organized fashion. You will be penalized for incorrect spelling and grammar.