Physics 201 Classical Physics I Lab

Gustavus Adolphus College Fall 2008

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Lab Manual: PHY201 Lab Manual - Fall 2008 (kept inside a 3-ring binder)

Course Objectives

1. Exploration of physical laws relating to classical mechanics
2. Exposure to modern laboratory techniques
3. Introduction to data analysis and error propagation
4. Familiarization with the Vernier *LabPro* interface and *Logger Pro* software for computerized data acquisition and analysis
5. Familiarization with *SigmaPlot* software and *Modelfit* plug-in for graphical analysis and least-squares fitting
6. Development of skills for the preparation of laboratory reports

Course Policy and Evaluation

1. **Lab Materials**: Students should bring the lab manual and a calculator to each lab period.

2. **Lab Attendance**: Regular attendance at all labs is required. Students will be held responsible for informing themselves of all announcements and assignments made in the laboratory classroom as well as in the PHY200 daily class meeting. Any last minute communications will be by email. Each student will register for one lab section each week. Students must arrange with the instructor in advance to attend another lab section or to schedule another time to perform the lab; they may do so only for a valid health or school-related reason.

3. **Pre-Lab Quizzes**: Students are expected to be thoroughly familiar with the purpose and general procedures of the experiment **before** coming to lab. Advance preparation is an absolute requirement for the efficient use of the limited lab time. A pre-lab quiz will be given each week via the WebAssign program (https://webassign.physics.gac.edu). The due date/time for the student's quiz responses will be 15 minutes before lab class begins each Wednesday (or Thursday).

4. **Lab Groups**: Students will work in groups of two. It is essential that **ALL** members of the group are completely familiar with the measurements and the data analysis.

5. **Lab Reports**: Each student should prepare a lab report, consisting of pages from the original manual as well as any additional data sheets, graphs, tables, calculations or results, and **arrange and staple all materials in the proper order**. In order to receive credit for the lab, **the report is due in PHY200 class at 11:30 AM on the Tuesday (Wednesday) following the performance of the lab the previous Wednesday (Thursday).** Lab reports will be graded on a 10-point basis, and *there will be a one-point-per-day penalty for late reports*.

6. **Report Format**: The lab report should be prepared with the idea of presenting the comprehensive results of a particular experiment. In addition to answering the including data, graphs and analysis as indicated and answering all questions, the students are expected to write a good conclusion. This conclusion should include a discussion of what was done, why it was done, what was measured, what was calculated, comparison to known or accepted values, and any conclusions that could be drawn.

   For those labs which require the students to prepare the entire lab report, the following format should be followed:

   1. Title, Names, Date
   2. Introduction - Purpose
   3. Theory (Brief)
   4. Procedure
   5. Data (Tables, Graphs, etc.)
   6. Analysis
   7. Results
   8. Conclusions

7. **Pinewood Derby:** The objective of this project is to pull together some aspects of what was discussed during this semester, including (non)conservation of mechanical energy, friction, air resistance, etc. The group will work together during the last three weeks of the semester to design and build the fastest pinewood derby car. The race rules and procedures will be provided when the design phase begins. Each group will be expected to provide a report explaining the rationale for their design.

8. **Incompletes**: A grade of incomplete will be given only for work not completed due to circumstances beyond the control of the student.

9. **Evaluation**:

Lab Reports	70%	A	94 - 100	C+	74 - 78
Lab Final	20%	A-	90 - 94	C	70 - 74
Pre-Lab Quizzes	10%	B+	86 - 90	C-	66 - 70
		B	82 - 86	D+	62 - 66
		B-	78 - 82	D	58 - 62

Laboratory Schedule

Experiment	**Dates**	**Lab Manual**
Modeling Reality	September 3-4	pp. 1-12
One-Dimensional Kinematics	September 10-11	pp. 13-22
Rotational Kinematics	September 17-18	pp. 23-30
Newton's Second Law	September 24-25	pp. 31-38
One-Dimensional Collisions	October 1-2	pp. 39-48
NO LAB – Nobel Conference	October 8-9	
Two-Dimensional Kinematics	October 15-16	pp. 49-52
Ballistic Pendulum	October 22-23	pp. 53-58
Air Resistance & Friction	Oct. 29-30	pp. 59-62
Energy Conservation	November 5-6	pp. 63-66
Two-Dimensional Collisions	November 12-13	pp. 67-68
Rotational Dynamics	November 19-20	pp. 69-78
NO LAB – Thanksgiving	November 26-27	
Pinewood Derby Preparation	December 3-4	p.79
Laboratory Final	December 10-11	