Syllabus

Course: P209A_001 Thursday 4 – 6:40 pm Darwin Hall 308
Instructor: Dr. So Young Han, hanso@sonoma.edu, www.sonoma.edu/users/h/hanso/
Office Hours: Monday 11:40-12:40, Thursday 1:40-2:40 Darwin 300B, Tel.:664-3242

Course Description: The laboratory component of the algebra based physics P210A. It covers Kinematics, Linear and Rotational Motion, Newton’s Laws of Motion, Impulse and Momentum, Conservation of Momentum and Energy, and Low Temperature Measurements. An electronic Data acquisition program and a method of Statistical Data Analysis will be introduced. GE: Category B1 or B3 and GE laboratory requirements.

Prerequisite: P210A, Trigonometry and algebra

University Policies
It is your responsibility to be aware of University policies, such as the add/drop policy; cheating and plagiarism policy, grade appeal procedures; accommodations for students with disabilities and the diversity vision statement. http://www.sonoma.edu/uaffairs/policies/studentinfo.shtml

Accommodations for Students with Disabilities
If you need disability related accommodations for this class, such as a note taker, test taking services, special furniture, use of service animal, etc., please contact the office of Disabled Student Services (DSS) located in Salazar Hall, Room 1049, Tel: 664-2677

Objective:

• Learn to identify and correctly represent appropriate data, observations, variables and equations necessary to solve a problem.
• Be able to analyze the data to answer relevant scientific questions.
• Develop a conceptual grasp of basic principles and apply their knowledge to new scientific problems in the hopes that you will be able to interpret experimental results in the context of the discipline as a whole.

1. Your goal is not to blindly follow lab procedures, generate preliminary results, and leave.
2. You are the main operator in this lab. You need to know what you are doing in each step of your action.
3. Always try to obtain the best. Don’t be satisfied with a proper/expected result. Think about how you can make it better.
4. The group with the best results (fast) will be rewarded bonus points.
5. When you obtain data from your measurement (sometimes with large errors), think about what this result means and why you have these errors in your measurements. If you can obtain logical scientific reasoning for your errors/and results, you will be also rewarded bonus points.
6. Your laboratory manual and instructor are only for your guidance. The given procedure on the manual is only an outline and you are encouraged to upgrade/ modify with proper reasons.
**Materials to bring:**

- Lab Manual for guidance ($10. Available in class during the 2nd week.)
- Lab Notebook with permanent binding
- Method of keeping all returned work
- Calculator and a memory stick

**Attendance:**

Attendance is mandatory. To pass you cannot miss 3 labs or more.
3 point will be deducted from the lab worksheet score for students showing up late (15 minute or more). It is your responsibility to check for late attendance. You can make up only one lab at the end of the semester.

**Grade:**

- 3 Individual Lab Report 40%
- Homework and Prelab 10%
- Lab worksheet (one per group) 40%
- Lab Note 10%

A [93 above, A- [92-89], B+ [88-86], B [85-83], B- [82-79], C+ [78-76], C [75-73], C- [72-69], D [68-60], F [Below 60]

*Grades* are based on an absolute scale, not a curve. To pass you cannot miss 3 labs or more.

*Lab Note*

Record all information obtained during the lab. Use it for lecture notes, diagrams, and relevant information. Traditional format for lab books follows but think of them as keeping tract of all you need to know about the experiment to write a good lab report.

**Format for Lab Note**

- Title of the experiment, Data, and all partners’ names.
- Outline the purpose of the experiment and the steps taken to conduct it.
- Simple Sketch labeled with important information.
- Enter data and statistics into lab book
- Brief summary, conclusions, sources of error and answers to any questions posed at the end are all helpful.

*Lab worksheet*

You may get the lab worksheet from the instructor at the beginning of each lab. Complete the worksheet at least 15 minute before the lab ends.
Turn in one lab worksheet per group before you take a quiz. (Don’t forget to write your name.)

*Individual lab report*

You need to complete 3 formal individual lab reports this semester. You may submit a late report no later than 1 week after the due. You will have 10% grade deduction for late works. Your lab report should be more than 2 pages.
[Individual Lab Report Format]

Name, course name, date and names of laboratory partner(s) appear on the first page. No title page is necessary. Label each section with the section title. Single spaced, first person viewpoint, and well-written paragraphs with complete sentences. Avoid list form for all parts. Typed.

Abstract
The Abstract lists the purpose of the experiment and brief conclusions. Note the overall perspective and dominant conceptual idea.

Theory and Procedure
Start with a small paragraph of the overall conceptual idea.

[Example]: The acceleration of an object close to the earth, in the absence of air resistance or free-fall is found to be approximately 9.8 m/s² with small variations across the Earth. We attempted to measure this in the lab.

Expand on the procedure hinted in the Abstract. In words give a good picture of the setup and steps of the experiment to achieve results. How did the theory result in the procedure used? If formulae are used they should be started here, and any derivations of measured quantities done. The parts of the equation you are trying to verify should be clearly stated.

Equipment and Setup
Use a simple sketch with Labels.

Data
Either retype the tables and significant data or enter them into the Excel Sheet and state “see Excel sheet”.

Statistical Reductions and Calculations (no discussion)
Re-type from the Excel Sheet statistics the relevant values rounded to the correct number of significant figures. Can include the mean, standard error, slope, y-intercept and % difference.

Graphs
Attach graphs with labels, axes and units.

Summary, conclusions, answers to questions integrated in
Restate main results i.e. statistics and other reductions like average ± SE, % different. Do the results fit the theory within errors? The summary should be based on your results and not what you wish would have resulted. Integrate any questions posed in the experiment guidelines or answer them at the end of the write up.

Sources of experimental errors
No experiment is free from random errors, and it is possible systematic errors might have skewed your results. There are specific tests to conclude that systematic errors are present. Mistakes should not be discussed. If all data are larger than expected or smaller than expected comment on this.

* There is no length requirement. Write the report in your words although it is often useful to talk over the results with your partner.

[Tentative Schedule]

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<th>Lab Objective</th>
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<td>Feb 3</td>
<td>Lab 1. Intro, EXCEL and Data Studio</td>
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<tr>
<td>W2</td>
<td>Feb 10</td>
<td>Lab 2. Free-Fall Acceleration &quot;g&quot; (Individual Report1)</td>
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<td>W3</td>
<td>Feb 17</td>
<td>Lab 3. Air Resistance and Terminal Velocity</td>
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<td>Lab 4. Newton’s 1st law of Motion – Zero Net Force</td>
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<td>Lab 5. Atwood’s Machine (Individual Report2)</td>
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<td>Lab 6. Time of Flight</td>
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<td>No Lab: Cesar Chavez Birthday</td>
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