

Physics Laboratory Foothill College

Instructor: Frank Cascarano
Office: 5412 (go in door 5409, then look for 5412)
Office Hours: TBD
Phone & Email: 949-7784 cascaranofrank@foothill.edu
Class Website: www.foothill.edu/~cascarano

Required Materials:

1. Scientific Calculator
2. Laboratory Notebooks - 2 (bound graph paper notebook)

Grading: Generally, you will be doing an experiment or exercise each week. You will be expected to keep a laboratory notebook for each week's experiment. The lab notebooks will be collected and graded every week. One laboratory score may be dropped in determining your overall lab grade.

I will use a 2 – notebook system. I will collect and grade one book while you prepare your second lab notebook for the next weeks lab. You will get the lab notebooks returned to you during your next lab.

Format (0.5 points):

Five sections: title, purpose, procedure, data & results, conclusion
Have the first 3 done when you come to lab. You may cut and paste from the lab handout or summarize the procedure into several sentences.
Make sure your tables, calculations, graphs, etc. have the correct units and labels.

Pertinent Information (1 point):

Open your lab notebook and use it to record all information during lab. Do not use scratch paper, loose paper, the back of old envelopes, lab handouts, etc. to record lab information. All information should be recorded, in ink, in your lab notebook. If you make a mistake, draw a single line through the entry and make a note explaining the mistake. You never know, your original calculation may have been correct. Your data should be recorded in the order taken. You may wish to record run numbers (generated by the computer when collecting data), so you know which data in the computer corresponds with which run conditions from your experiment. Start the lab by recording the date and the names of your lab partners.

Analysis (1 point):

Show sample calculations. One calculation of each type is sufficient. Calculate percent difference from expected values:

$$\% \text{ difference} = \frac{(\text{value}_{\text{experimental}}) - (\text{value}_{\text{accepted}})}{(\text{value}_{\text{accepted}})} \times 100\%$$

Include a summary chart. Arrange your results into a logical order in the summary chart in able to help you to spot trends in the data.

Conclusion (1.5 points):

Look for trends. If you change something, did it affect your results; did your results get better or worst? Think in terms of systematic vs random error.

Physics Laboratory Foothill College

Random errors are statistical fluctuations (in either direction) in the measured data due to the precision limitations of the measurement device. Random errors usually result from the experimenter's inability to take the same measurement in exactly the same way to get exact the same number.

Systematic errors, by contrast, are reproducible inaccuracies that are consistently in the same direction. Systematic errors are often due to a problem which persists throughout the entire experiment. Example: your scale isn't set up properly and reads 0.5 g too high for all of the measurements throughout your experiment.

List sources of errors in your experiment. Think about the experimental design (can some aspect of the experiment be improved to make the data more accurate?), random errors, and systematic errors. Do not use the "shotgun" approach of just listing every possible source of tiny error. Try to think of the one or two main sources of error. Does your data support your reasoning?

Note that systematic and random errors refer to problems associated with making measurements. *Mistakes* made in the calculations or in reading the instrument **are not considered in error analysis**. It is assumed that the experimenters are careful and competent!

Instructor Discretion (1 point):

This is my opportunity to reward (or deduct) points for:

Work habits and effort

General comprehension and understanding of the experiment

Accuracy of results

Make-up Policy: Due to the nature of setting up equipment for the laboratories, there are no make-ups. A missed lab results in a zero for that lab. However, you may drop one lab from the computation of your overall laboratory grade.

Important Notes:

- 1) You must pass the laboratory to pass the class.
- 2) You must be in lab to collect your own data (even if you already had this lab in a previous class).