

## About Lab Reports

Your grade will be based on five written lab reports. I will be glad to answer the additional physics questions that you will inevitably discover as you write your lab reports. I am requiring you to write lab reports, *in your own words*, because I know that you will learn more physics that way.

I want to see how well you learned the physics. I do not want you to simply copy information line-by-line, word-by-word from some book, article, or the internet. I want you to learn the established facts---and I know that the best way for you to learn them is for you to write them down in your own words.

### Here is what I want to see in your lab report:

(1) What did you do during the lab?

Please summarize the important canned things, but I also want to hear about the unusual things.

(2) What did you find?

Crystal clear, short and sweet, is best for this one.

(3) What does it mean?

What is the most important physics behind the lab? I really want you to learn the physics---both the experimental physics and the underlying theory. As I see it: Theorists make new theories, sometimes before the experiments, but often after. Experimentalists do new experiments. The sum total of our current understanding of the underlying physics was discovered by both and it belongs equally to both. It is very sad that it is no longer possible to be both.

(4) How well did your measurements turn out?

You do not need to do a formal error analysis, but you should explain how much you trust your results, and why. Also, explain what do not you trust, and why.

(5) What was the most artistic thing about the lab?

What did you find particularly beautiful, elegant and artistic about the experiment? Both about the experimental physics and about the underlying physics.

(6) What did you learn?

What do you know now that you did not know before?

### I want you to learn as much as possible. Show me what you learned!

There is no maximum or minimum limit on the number of pages---the best lab reports typically contain 6-12 pages of text including figures. Summary plots, pictures, and figures are very important. A good picture is worth a thousand words and a good equation is worth a thousand figures. Please turn in a copy of your data.

Again I just want to be able to see how much physics you learned from doing the lab and writing the lab report. I do not want you to simply regurgitate standard textbook material. Translate the physics into your own words and especially into your own understanding.

# Teaching Methodology

We will use the same teaching methodology that medical schools traditionally use:

## Watch One

You will watch the previous group show you how to do the experiment.

## Do One

You will do the experiment with help as needed from the previous group.

## Teach One

You will teach the next group how to do the experiment, and you will be available to help them do it successfully.

If you get stuck, please ask the previous group for help. That will help them learn.

**You will discover that one of the very best ways to really learn something well is to teach it !!!**

## What's with all the reading?

If you have looked through your thick lab binder, you're probably thinking: "He can't possibly expect us to read all this?!" If you are, you are correct! I don't expect anyone to read everything in any of the binders! So, why have I given you "too much" material?

The material that I've given you is a rather complete reference manual that would be a good start if you wanted to work seriously on one of these experiments. I will be happy to give you specific recommendations for the pieces that I think you should read.

Since all of you would not be able to get your hands on the best books or articles from the library, I'm giving you the best things that I have found for my students after teaching the course numerous times.

If you find something better, please let me know!!! In particular, there are lots of good new lab resources on the internet that I have not yet located/identified.

Here is an older version written when I was much younger, much more energetic and extremely enthusiastic---and used way too many exclamation points!!!!!!

You must prepare a written lab report. I will glad to try to answer the additional questions that you will inevitably discover as you write your lab report. The reason that I'm asking you to write a lab report on each lab, is that know you'll learn a lot more if you have to write it down and turn it in!!! I want you to learn as much as you can about physics!!! What I really want to see from your lab reports is that you've learned a lot of physics by doing the lab and by writing it up.

Learning is the most important thing in this class; clarity, simplicity, and quality are the next most important things!!!

You don't need to write a long report; I'm much more interested in quality than quantity! As noted above, I want you to learn as much as possible while doing the write up! I am interested in your ideas, thoughts, and suggestions about these experiments; please do not simply copy descriptions line-by-line, word-by-word from some book or article. However, want you to learn the facts....and I know that one good way for you to learn the facts is for you to write them down in your own words by following and working through one (or several) of the standard discussions!

Here are some suggestions about some of the things that you might want to discuss in your lab report:

- (1) What is the most important physics behind the lab?  
I really want you to learn the physics---that it is the most important thing!!!
- (2) Briefly describe the equipment used in the lab.  
I really want you to learn what the hardware does!
- (3) What did you do during the lab?  
Please tell me the important canned things, but I also want to hear the unusual things!
- (4) What did you find?  
Crystal clear, short, and sweet, is fine for this one!
- (5) Describe your error analysis  
You don't need to do a formal error analysis, but you should explain how well you trust your results, and why! Also, what don't you trust, and why?
- (6) What was the most artistic thing about the lab?  
What did you find particularly beautiful, elegant, and artistic about the physics behind the experiment and/or about the experimental physics?
- (7) What did you learn about the physics behind the lab?  
What didn't you know before the lab that you know now?
- (8) What did you learn about experimental physics?  
What didn't you know before the lab that you know now?

There's no maximum or minimum limit on the number of pages....the best lab reports typically contain 6-12 pages of text. Summary plots, pictures, figures, and equations are extremely important components of a good report! Please turn in a copy of your data!

Again I want to hear your thoughts, impressions, and ideas!!! I do not want you to simply regurgitate standard textbook material!!! Translate the words and ideas in the books and articles into your own understanding expressed in your own words.

**In other terms, in the simplest possible terms, learn the physics and show me that you have learned it. That's all.**