

**PS315- Weekly Checklist-** This will help you achieve a higher score. – The Ghost of Arthur Barriault

- Before Lab
  - Prepare your prelab
    - ◆ Dr. Smith's write ups are guidelines, they outline the lab and your goals, but there is still much you have to research on your own.
    - ◆ Understand the physics you will be using.
    - ◆ Formulate each step of the procedure.
    - ◆ Highlight the important steps you may miss (i.e. plots)
    - ◆ Have all necessary lab materials (blue/black pen, hardcover lab book (no composition books), etc)
- In Lab
  - Plan ahead
    - ◆ What do you hope to accomplish today.
    - ◆ Will you have time to finish all data collection for that day split with your other lab days?
  - Lab Write Up
    - ◆ Include:
      - Proper Heading
      - Objective in own words: What do you wish to prove?
      - Equipment list and **Labeled** Diagram(s)
      - Theory
        - What is the purpose/ background of the lab?
        - What physics will be involved in this lab?
        - What equations will you be using to interpret your data? (Important)
      - Procedure and Data
        - Write Procedure as you do complete each step
        - Tell it like a story, no bullet points or numbering steps!
        - Include datum when it is taken. Be thorough, don't leave out anything, we do check.
        - Include Uncertainties in EVERY value measured.
        - Explain how your steps relate to your goal and WHY you are doing these steps. It is a good idea to do some theory as you do each step to help make a solid argument that what you are doing is appropriate for what you are doing, i.e. relate back to the physics!
      - Analysis
        - What equations are you using and WHY? (Relate back to the physics!)
          - For all calculations, include units and define all variables.
          - All results of calculations also have uncertainties!
          - Discuss the results of calculations. (Is it what you expected? Why or why not?)
        - What are you solving for and WHY? (Relate back to the physics!)
        - Include all plots. (MatLab , Mathematica, & Python ONLY)
          - Each plot should be titled, with labeled axis, and have a FIT line when appropriate.
          - Every plot should have a discussion underneath, or shortly after.
            - ◆ What does this plot display?

- ◆ What do the results (usually the fit line/ curve) tell us? (Relate back to the physics!)
- ◆ How does this affect what we are looking for?
- ◆ Was this what you expected?
- ◆ Sources of possible error
- ◆ There is an exception for many plots that are all similar, in which case they may be talked about as a whole. However, results and anomalies in each plot must be discussed.
- Calculations do not need to be shown, but equations must be correct and there should always be checks to make sure your calculations are correct, and discussion of these “sanity checks”
- Include your statistical analysis of your data. What is the mean of your results? What is the standard deviation of your results? Quote your final value(s) as the mean +/- std. dev.
- Talk about your results, i.e. relate back to the physics!
- Include all chi square plots and equations. Include your chi squared distribution and fit. What do these results tell you? Does it help validate or invalidate your data collection process?
- Error Analysis
  - Discuss all sources of error and how they affected the results. How can they be avoided/ corrected? Be detailed as this is important for others trying to reproduce your experiment.
- Conclusion
  - What physics were you trying to prove/ disprove/ confirm?
  - **Include your final values with uncertainties and talk about your results!**
  - Did they help prove/ disprove/ confirm the physics? Why?
  - What did you learned, can you improve this experiment (brief summary of error analysis), etc.

## Grading Rubric for PS 315

*Please note that we reserve the right to make any reasonable point reductions. We will always mark if something is wrong.*

\*\*\* Late Lab Write-ups will be penalized 2 points per day it is late. Write-ups are due at the beginning of the lab period. \*\*\*

### ***Ask if you have questions!***

2 pt: introductory information complete (objective/introduction/heading/date, etc.)

4 pt: procedure written in prose & complete

4 pt: half page diagrams and graphs with proper labeling

4 pt: data tables with units & uncertainties

6 pt: analysis clear & correct

6 pt: error analysis well-reasoned

6 pt: complete conclusion with results and corresponding errors presented

6 pt: explanation of data and what results mean physically

2 pt: neatness, clarity of thought progression