PHYS 267 - Winter 2022
Data Analysis Project Guidelines

Last Updated: February 14, 2022 by Dr. Brenda Lee

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1. Project Overview & Deadlines

A final project related to data analysis will be worth 25% of your final grade, with an additional 5% optional bonus on top of this (ie. a total of 30%). Throughout the course in PHYS 267, you have been exposed to different ways to present data, test data for significance, as well as report your findings. Now, it's time to put all those tools to the test and apply them to some real life data from various fields of Physics.

Deadlines for the project are as follows:

1. **Tuesday, March 8th, 2022**: Must finalize groups and topics by this day. Reminders will be given weekly until then.
2. **Tuesday, March 29th, 2022**: Last day to receive feedback on project prior to submission.
3. **Tuesday, April 5th, 2022**: Deadline for project on the last day of classes. Some flexibility in submission dates are allowed, up until April 8th, 2022. After that, all late projects will receive a grade of 0%, no exceptions.

2. Groups and Topics

This project can be done *individually* or in *groups of 2-3*.

- If done *individually*, you will be expected to perform at least 4 different types of analyses on your dataset
- If done *in groups*, you will be expected to perform at least 6 different types of analyses on your dataset

Make sure you finalize your decision by the deadlines stated in **Part 1**.

The topics for the project will be related to the data set chosen. Your instructor has been collecting various data sets from different fields of Physics for you to perform analyses on. **These data sets will be organized in a folder on LEARN for you to choose from. Please note that you only need to choose 1 data set from 1 field of Physics, and no more.** Each data set will contain the following:

- Quick overview of experimental procedures and goals; how data was collected
- Data file in TXT or CSV format

3. Project Requirements & Grading Distribution

When performing experiments or analyzing data in your career, you will be required to write something similar to a lab report. You will have to explain the experimental protocols, share your results in an easy-to-read format, and analyze your data to make conclusions about any relationships between variables with some level of confidence. This is the goal of the project, and the more thorough and accurate your analysis is, the better the quality of your report. Below, you will find project requirements and a detailed grading rubric of the project.

Project Submission Requirements & Grading Distribution:

- **Introduction (5%):** 0.5-1 page of preamble and introduction to discuss the experiment and how data was collected; what the hypothesis is and the independent/dependent variables. A lot of this information will already be given to you alongside the dataset, but you will have to elaborate and summarize it.
- **Results (25%):** Minimum 1-2 pages of displaying results in different ways, graphs included (ie. present your results in different types of plots) and provide 1 paragraph explainig which presentation is most suitable for this type of data.
- **Analysis (50%):** Minimum 1 page per type of analysis, graphs included (ie. if you are working individually, you should have at least 4 pages of analysis). Comment on significance or confidence levels, and whether there are any known relationships you can infer from your analysis.
- **Discussion (20%):** Minimum 1 page to discuss your findings and compare with any known values or relationships. Comment on sources of error and potentially, how to improve your findings.

Formatting requirements for the project are as follows:

- Page counts refer to Times New Roman, size 12 font, single-spaced on letter-sized paper within normal page margins
- Written report should be at least 7-10 pages; there is no page limit for the main section (Intro/Results/Analysis/Discussion)
- Outside of the required pages above, there should be 1 title/cover page with a suitable title and the names of your group members (or just yourself if doing it alone)

4. Optional Bonus

Project Bonus (3%) - Individual or Group Presentation of Report

In research, it's quite common to present your results in a group meeting or conference. In such a case, you would have to put together a presentation with key points from your results and analysis. For a 3% bonus, you and/or your group will need to create a PowerPoint/slideshow presentation of your work and present it to your instructor before the end of the term. The presentation will be graded out of 30 marks split evenly between presentation clarity and effort, proper analysis, and appropriate discussions and recommendations.

"Fun" Bonus (2%) - Individual Only (Separate from Group Project)

Probability, statistics and data analysis are so commonly used around us. We can do a quick statistical analysis on many things in life, from daily activities and finances to sports events and video game probabilities. For a 2% bonus, submit a short summary paper (~1-2 pages with data, graphs and analysis), presentation, or Jupyter notebook (IPYNB) file that does the following:

- Presents what you've chosen to analyze statistically (ie. how many hours of studying you do per day, how much time you've spent with friends per week, etc.). You can choose anything you think will be interesting to learn more about
- Describe how data was collected and present it in a graph
- Analyze the data with a test and make some conclusions from it

This will be marked out of 10, broken down as follows:

- 4 marks for data collection and graph
- 6 marks for analysis and conclusions