

Physics Project Rubric

PHYS 212

1 Format and Requirements

Each report **must** include the following sections (they do not need to be numbered):

1. The names of all partners, the course (Phys 212) and section number, the date, and the title of your project.
2. **Abstract:** The abstract briefly motivates the data in the report and summarizes the important findings and methods in less than 200 words. The reader should be able to quickly read the abstract to determine if the paper will be of interest or value to them.
3. **Introduction:** The introduction convinces the reader that this paper is worth their time to read. It also provides the necessary background to understand the project. A general discussion of any techniques or theories used should be included. Summarize the relevant theory and equations. You may want to look up and cite some other references that provide you with added theoretical grounding for the project. Any information presented that is not your original idea must be cited.

This section also includes a statement of what the purpose of your report is, with a clear connection to all prior introduction material, and how you accomplish this goal. The reader should be able to clearly distinguish between what was already known and what you show them in this paper.

4. **Methods:** The methods section describes as briefly as possible all materials, instrumentation (including computer programs), and procedures used during data collection. Be detailed but succinct in your description. Past tense is acceptable in this class; in some of your science classes, passive voice may be preferred. Do not refer to any material that is not available to the general public. Include an apparatus drawing with appropriate labels. If the key equations used in calculations are not derived in your text, they should be derived in this section of the report. For example, if you model the data with a certain equation, that procedure and equation should be included in this section. The goal is to provide enough information for another scientist to completely replicate your experiment.
5. **Results and Discussion:** Here, key pieces of data are reported and results are examined and interpreted. The data should be clearly labeled with units, and usually presented in tabular form. Include a sample calculation for each step of your data analysis. (Note: this means that the equations used to calculate each column in a spreadsheet should be presented.) The results should be displayed in the form of graphs with axes labeled with units. Graphs and tables must be included in the appropriate places in the main body of the text rather than tacked on at the end.

Rather than presenting all results followed by a discussion of all results, you should briefly introduce or motivate a single result and discuss that result. Explain what that result means, compare to the literature (if possible), and discuss any sources of uncertainty. When you feel that you have thoroughly discussed a result, then write a smooth transition to the next result.

To assist the reader, all equations, tables, and figures should be clearly numbered. These elements are numbered separately. A table or figure may not appear before it is introduced in the report; the reader should know what they will be seeing before they see it. There should not be gridlines or titles present in figures, and all data should be legible. Each table or figure should be accompanied by a short caption that very briefly summarizes the data. Note: In scientific publications, figures do not have titles. That information should be included in the caption, which appears below the figure.

6. **Conclusion:** Summarize the results and their importance. Describe any important data in words, rather than referring to equations, figures, or tables. This reminder of what was accomplished should leave the reader with a good impression of the work you did. They should “get the point” even if they skipped everything up until now. Finally, this section includes a statement of future work, regardless of whether you will actually be doing that work. What might be improved or explored at a later date?
7. **References:** List all sources for supporting information. Use a consistent citation style throughout your report. Wikipedia is not an acceptable reference (but may point you on the right track to other useful references).

As you write your report, imagine that the audience consists of introductory physics students from another college who have not seen the apparatus or done the experiment you have done. Would such a reader be able to understand what you did? Would that reader know how you did it and what the significance of your results is?

Helpful hint: Professional scientists have an endless amount of research articles they could read. Many scientists rely only on the abstract to decide if they want to read a paper or not. Does your abstract include all the information they need to make that assessment? Next, in some fields, scientists advise their students to read the introduction, then read the conclusions, and then worry about everything in the middle if they really need to know the details. Does your introduction provide all the necessary background? Does your conclusion adequately summarize your results?

2 Grading Rubric

Your team will receive two grades on this project report: one for the first version and one for the final version. The first submission of your group’s write-up will be graded and returned with extensive comments. Your group should rewrite the report paying careful attention to the comments. Your group must make substantial improvements in your second version of the project report. The second report will be weighted more heavily in the final grade.

For the first version of your report, 75% percent of the grade is based on its scientific merit (see rubric). 25% percent of the grade is based on its appearance (see rubric). For the final version of your report, 55% percent of the grade is based on its scientific merit and 45% percent is based on its appearance. This means it is important that your experimental technique is of the highest quality early in the semester.

Table 1: Project Grading Rubric: Summary, See Detailed Rubrics Below

Scientific Merit	Points Possible
Background and Theory	20
Description of Methods	20
Quality of the Data	30
Accuracy of Data Analysis and Interpretation	30
Format/Appearance	Points Possible
Required Sections	20
Clarity of the Writing	20
Spelling, proof errors, units	20
Tables, graphs, and diagrams	30
Integrated computer use	10

Individual grades on the project report will be based on a combination of the team's grade on the project report and the quality of your contribution to the project as reported by fellow team members. Thus, you will be asked to estimate the relative % that each member, including yourself, has contributed to the overall quality of the project. I will distribute a form for this purpose shortly before Version II of the project report is due. If your group reports that you did not contribute your fair share, your grade will be lowered.

Table 2: Grading Summary

	Version One	Version Two
Scientific Merit	75%	55%
Appearance	25%	45%

Table 3: Project Grading Rubric: **Scientific Merit**

Group: _____

	Unacceptable	Requires Major Improvements	Requires Minor Improvements	Publication-Ready	Points
Background and Theory (20)	(0-5) Zero or very little effort was made to research the background of the project and design an experiment that answers the question at hand.	(6-10) cursory effort was made in background research and experimental design.	(11-15) Effort was made in background research and experimental design, but requires notable additions or revisions.	(16-20) Substantial effort was made in background research and experimental design, and few to zero additions or revisions are necessary.	
Description of Methods (20)	(0-5) Zero or very little description of the methods is provided.	(6-10) The methods are vague or confusing; the reader cannot evaluate or reproduce the experiment.	(11-15) Methods are missing some critical information. Procedure is wrong or inaccurate in some sections. Procedure contains some unnecessary or irrelevant information.	(16-20) Methods contain enough information that the experiment is reproducible. Conveys only necessary and relevant information.	
Quality of the Data (30)	(0-7) No data or very little data is included.	(8-15) Data is present, but the collection methods introduced major errors, or the data collected does not adequately address the problem at hand.	(16-23) Data is present, but collection methods introduced some errors, or the data needs some modification to address the problem at hand.	(24-30) Data is present, collection methods are sound, and the data adequately addresses the problem at hand.	
Accuracy of Data Analysis and Interpretation (30)	(0-7) No or very little data analysis is included	(8-15) Data analysis is present, but extremely lacking, or contains major errors.	(16-23) Data analysis is present, but is missing some elements, or contains some errors. Argument is sometimes weak.	(24-30) Data analysis is present, complete, and accurate, with only very minor errors. Deeply thought-out argument leads logically to conclusions.	
Total:					

Final Score: _____ * _____ + _____ * _____ = _____

Scientific Merit * Weight + Format/Appear. * Weight = Total

Table 4: Project Grading Rubric: **Format/Appearance**

	Unacceptable	Requires Major Improvements	Requires Minor Improvements	Publication-Ready	Points
Required sections (20)	(0-5) Organization of the paper does not resemble the required sections at all.	(6-10) Half or more of the sections are missing, or the sections are present by title alone but most do not include the required material.	(11-15) A few sections are missing, and/or a few sections do not include the required material, and/or material appears in incorrect sections.	(16-20) All sections are present and include all or most of the requirements for each section.	
Clarity of the writing (20)	(0-5) Writing is extremely unclear or disorganized throughout.	(6-10) Most of the writing requires major revision to improve clarity. Sounds like a new student to scientific writing; unclear, verbose, unper- suasive.	(11-15) A few parts of the writing require major revision, or the writing is generally clear but requires some revision throughout. Sounds like a good physics student.	(16-20) The writing is clear and organized throughout. Sounds like a professional physicist; clear, concise, persuasive.	
Spelling, proof errors, units (20)	(0-5) Spelling and grammatical errors are present throughout. Units are almost always missing or incorrect. Equations, vectors, and variables are not formatted correctly.	(6-10) There are many spelling and grammatical errors. Units are often missing or incorrect. Equations, vectors, and variables are often not formatted correctly.	(11-15) There are some spelling and grammatical errors. Units are sometimes missing or incorrect. Equations, vectors, and variables are sometimes not formatted correctly.	(16-20) There are few to zero spelling or grammatical errors. Units are present, as well as properly formatted equations, vectors, and variables.	
Presentation of Data: Tables, graphs, and diagrams (30)	(0-7) Data is not presented as tables, graphs, or diagrams.	(8-15) Most tables, graphs, and diagrams are missing numbers, or are unclear, or appear in the incorrect place in text, or lack a descriptive caption. Or most axes and table headers are missing labels with units.	(16-23) Some tables, graphs, and diagrams are missing some numbers, or are unclear, or appear in the incorrect place in text, or lack a descriptive caption. Or some axes and table headers are missing labels with units. Or some figures include gridlines or titles.	(24-30) Presentation enhances understanding. Tables, graphs, and diagrams are numbered, clear, appear in the correct place in text, and include a descriptive caption. Axes and table headers are labeled with units. Figures do not include gridlines or titles.	
Integrated computer use (10)	(0-3) A computer was not used to produce the report.	(4-5) Many parts of the report are handwritten or hand-drawn, or the pages of the report are “pieced together” on paper.	(6-7) Some parts of the report are handwritten or hand-drawn, or some elements of the report are “pieced together” on paper.	(8-10) All parts of the report were produced on the computer, all elements of the report are in order in one document.	
Total:					