

Information for Term Papers

Physics 222, Summer 2009

You will be working in groups this semester to write a brief term paper. The purpose of the term paper is to (a) allow you to learn about a topic in modern physics in more depth, and (b) practice the principles of good writing that we will discuss in class. Although you will only be writing one paper, there will be several times when the paper or things related to it are handed in and graded. The deadlines for these submissions are shown in the class schedule. All submissions except for your peer review should be in pdf format and emailed to dallin_durfee@byu.edu by midnight on the date listed in the class schedule.

The Proposal

After researching the general ideas of your paper, you will submit a proposal. This will give me the chance to make sure you are researching a topic which is significant and relevant to Physics 222. It will also let me help you broaden or narrow your topic as needed. This proposal should be neat, typewritten, and concise. If you want full credit, the body of the proposal (not including the authors, title, and sources) should be between 150 and 300 words. An example of a good proposal can be found on the class web page.

At the bottom of the proposal you will list at least three good sources that you have consulted *along with a short description of what information the source contains*. Only one of them can be a web URL or an entry in an encyclopedia or other similar type of source. The other two (or all three) should be books or journal articles. When listing the sources, please use a format similar to the one in the example. Remember that an article from a reviewed journal counts as an article, not just a web page, even if it is available online. Such articles should be referenced as articles, including the name of the journal, etc., and not just a web URL. Note that when you make a citation in your paper you should reference the exact chapter you are referring to. But for the proposal and the outline source lists you can just reference the book as a whole if there is more than one relevant chapter in the book.

The Outline

After submitting the proposal you will continue researching the topic. You will then write an outline of the paper. The outline should be very detailed. It should include:

1. A title at the top,
2. A heading for each section of the paper,
3. A sub-heading for each idea,
4. Where necessary, sub-sub headings, etc.

Below the outline please list all of the references that you plan to cite in your paper in the format described in class and used in the example outline. Under each reference you will give a short description of what information the source contains. An example outline is available on the class web page.

The Presentation

On the day listed in the class schedule your group will give a short (10 minute) presentation on your research to the class. You should all work to prepare a PowerPoint presentation, even if only one person is selected to give the entire presentation. You should practice your presentation *several times* before presenting in class! You will get full points for your presentation if you appear to be well prepared and if your presentation does not run over 10 minutes.

Peer Review

After the first submission of your paper, it will be distributed at random to two or more of your classmates for "peer review." At the same time you will be emailed a copy of someone else's paper to review. This will give you some (hopefully) useful comments on improving your paper. But more importantly, it will give you the chance to learn by critical review. There are some things that are really hard to learn except by critically reviewing other people's writing. Using the "first submission" grading rubric as your guide, you will write an email to me that includes your name, the names of the authors of the paper you reviewed, and a list of specific comments about the paper. The reviews will be anonymous – I will remove your name before forwarding it to the paper's authors.

Where applicable, the comments should reference the specific location that they refer to (for example, "The term 'poobah' in the third sentence of the second paragraph of page 3 is not defined."). Your critique should be kind but honest. It should be constructive, with an attitude of helping rather than judging. I will grade the quality of your review out of 5 possible points.

The Paper

The paper will be submitted to me to be graded twice. The two submissions will be graded on different criteria. For the first submission I want you to focus on the physics and the overall structure of the paper. Proper grammar and spelling should be used, but I will not focus on sentence or paragraph structure on this first submission. Never-the-less, you should make your best effort on all aspects of this first submission so that my response and the peer reviews of the paper can be most useful to you in preparing for the second, final submission.

For the second submission, in addition to fixing things based on my comments on your first submission I want you to focus on refining your understanding of the physics and making individual paragraphs and sentences clear.

Length and Style

- The audience of the paper should be your fellow 222 classmates.
- The paper should be typed using a 12-point font and should be double spaced with 1 inch margins all around the text.
- The paper should be written with a single column. Pages should be numbered.
- Figures should be large enough to be easily understood, but not larger.
- The paper should have a cover page containing the title, authors, date, and the abstract.
- For full credit the paper should be 6 to 8 pages long (not including the cover page) for the first submission, and 4 to 6 pages for the second submission (I expect that the paper will get shorter as you work to write things more concisely).
- All of the references cited should be placed in a bibliography at the end of the paper. References should be single spaced.
- References should be numbered and formatted as shown in the example paper and outline on the class web page.
- For books and journal articles which are available online, please give the full citation, with the URL at the end, as shown in the example proposal and outline on the class web page. If there is a root web page for the journal from which the article can easily be accessed, you can use that root page rather than the longer URL to the article. For example, if I cite an article in *Physical Review Letters*, I could just use the URL of <http://prl.aps.org>, from which the article can be easily found.
- Regular web pages (as opposed to journal articles which also happen to be available online) can be cited in your paper. Please include a title for the page as well as the complete URL in the citation. But be advised that you will be docked points for excessive use of web pages as sources. They often provide a good introduction to material, but they seldom go into enough depth and cannot always be trusted. Books and journal articles should constitute the vast majority of your sources.
- Be sure to include the full title for each reference.
- Unless the idea you are referring to is the topic of the entire book (seldom the case), please refer to the specific chapter in the book which contains the relevant information --- use the "chapter in a book" example on the OSA guide. If the chapter doesn't have a title, just use something like "Chapter 14" as the title.

Grading Criteria

I will not be grading you on everything you've ever learned about writing – just on the things which I will be teaching you. At the end of this document you will find the rubrics I will use in evaluating your papers. While the emphasis is on content, good writing is also given *significant* consideration. Research and experience have shown that good writing promotes clear, deep, and careful thinking and understanding. Furthermore, good technical writing skills will be essential in most of your careers.

The First Submission

My evaluation of the first submission of your paper will be based on three components: physics content, reasoning, and structure/organization. Each component is explained in detail in the following sections.

Physics Content: This part of your evaluation is a measure of the quality of the information in your paper. The topic should be relevant to Physics 222. There should be enough depth so that the reader can understand your topic and enough breadth to make the paper significant and interesting. The physics should, of course, be correct. I will also consider whether you have used good judgment in your choice of ideas to include and exclude and the quality of the sources you have used. It should be obvious that you did significant research on the topic, and that you carefully filtered what you learned such that the paper contains the ideas which are most relevant to the paper's focus.

Reasoning: I expect your paper to be more than just a report of what you found in the literature. You should put something of yourself into it. This part of your evaluation concerns conclusions you have drawn from what you have read. I will judge how well you've connected ideas from the various sources available to you. I will look for a critical reading of the articles you consulted and for an understanding of their content. I will check the conclusions you have drawn and examine whether they are logically consistent and agree with the data from your research. A well-reasoned paper will have solid, tight logic. Your analysis should be clear, concise,

and without fallacy. It should be obvious what physical concepts and experiments you are reporting and explaining, and what conclusions you have drawn. You will do well in this section if I find your paper convincing and persuasive.

Structure and Organization: This part of the evaluation is a measure of how well organized your paper is. In a well organized paper arguments flow in a logical way. The paper should have a well-developed focus that ties the entire paper together. Each paragraph should play a role in developing the focus. Ideas and arguments should be somewhat compartmentalized --- each piece of the puzzle should be examined and discussed, and then you should move onto the next piece. Similar concepts should be grouped together, not fragmented through the paper, and a given topic should only be discussed once. A well written paper mirrors a well written outline. The paper should have a solid abstract which reveals what is contained in the body of the paper and explains the focus of the paper. The paper should begin with an introduction and end with a summary of the important ideas presented. And although I will focus on the broader structure of the paper rather than the wording of sentences and organization inside of each paragraph, I still expect you to use good grammar and spelling.

The Second Submission

My evaluation of the second submission of your paper will be based on four components: physics reasoning, expression, and overall quality of the paper. Each component is explained in detail in the following sections.

Content and Reasoning: This is similar to the “Physics content” and “reasoning” sections for the first submission. I expect you to continue to think about the ideas in your paper and refine your understanding of the material after your first submission of the paper, so I will be holding you to an even higher standard in this category for the second submission.

Expression: Great ideas with faultless reasoning are pointless if you can't get them across. This part of my evaluation deals with the mechanics of your writing. Your paper should have proper grammar, spelling, and an attractive and functional appearance. Your style should be appropriate to your audience (fellow Physics 222 students) and topic. Paragraphs should be well-connected, with good transitions. Each paragraph should discuss a single idea which is defined in a “key sentence” early in the paragraph. Paragraphs should develop their idea logically, completely, and concisely. Sentences should be clear and concise. Although the goal of a technical paper is not to convey the most information with the least number of words, one goal *is* to convey the most information with the least amount of time and effort for the reader.

Overall Quality: This category will evaluate how well the final paper turned out. I will see if you made the corrections I suggested after the first submission. I will judge how well the paper flows overall and how interesting it is. I will also check whether you have all of the details correct. You should have appropriately formatted citations, references to figures, etc. The paper should look nice visually. Figures should look nice and convey ideas clearly. Pretty pictures can do a lot to call attention to your paper --- but beware of eye candy! The reader will not take you seriously if your figures don't convey relevant information densely and clearly. Every non-obvious idea, every quote, and every figure which is taken from another source should be properly cited --- it should be absolutely clear what you have borrowed and from where. Each figure should have a concise caption beginning with a title for the figure. There should be a specific reference to each figure in the paper's main body of text. Figures, tables, and equations should be numbered and located near to the first spot in the text where they are mentioned.

Point Breakdown for the Writing Assignments

The number of points assigned to each writing assignment is listed below. Together, the writing assignments constitute 10% of your grade in this course.

In-class writing	10
Proposal	10
Outline	10
Presentation	10
First Submission	25
Peer Review	5
Second Submission	30

Grading Sheet – First Submission

Name(s)

Physics Content (12 pts)

Depth / breadth

Correctness

Information relevant to the paper's focus

Information interesting

Appropriate sources

Topic interesting and important

Topic relevant to Physics 222

Reasoning (11 pts)

Conclusions

Discrimination

Understanding

Logic

Persuasiveness

Ideas connected

Structure and Organization (12 pts)

Appearance

Focus / conciseness

Flow

Abstract / final conclusions

Grammar and Spelling

Total Score (35 pts)

Grading Sheet – Second Submission

Name(s)

Content and Reasoning (11 pts)

Depth / breadth
Correctness
Appropriate sources
Conclusions
Understanding
Logic
Persuasiveness
Ideas connected

Expression (12 pts)

Concise, clear sentences
Logical flow of ideas in paragraphs
Good transitions between paragraphs
One basic idea per paragraph
Obvious key sentences early in paragraphs
Grammar and spelling

Overall Quality (12 pts)

Focus
Interesting?
Proper reference and citations
Good figures
Overall Flow
Style

Total Score (35 pts)