

# Information for Term Papers

## Physics 222, Winter 2006

You will be working in groups this semester to write a term paper. 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.

### ***The Proposal***

Before beginning to write your paper, you will first submit a one-page proposal which will give me the chance to make sure you are researching a topic which is significant and relevant to Physics 222. This proposal should be neat, typewritten, and concise. 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 on the topic 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 the format described in the OSA style guide (available at [http://ao.osa.org/submit/style/jrnls\\_style.cfm](http://ao.osa.org/submit/style/jrnls_style.cfm)). 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 the OSA style guide. 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 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. 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.

Before each submission, you will turn in a draft of your paper for review by the Writing Fellows. The Writing Fellows will critically review your paper and then meet with your group individually to discuss things which could improve your paper. You will be given a grade based on whether you submitted the paper on time and whether you attended your conference with the writing fellow. Although the writing fellows will not be giving you a grade on the quality of your paper, you should try to give them the best paper you can. If your paper is in very rough form when you give it to them, they will be forced to focus on simple errors which you probably could have fixed yourself. But if you hand in your best work, they will be able to work with you on more subtle things and help you improve your writing and produce a paper which is better than you could have done on your own. And, as a result, you will end up with a better grade when you submit your paper to me.

### **Length and Style**

- 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.
- The paper should have a cover page containing the title, authors, date, and the abstract.
- The paper should be 10 to 12 pages long for the first submission, and 8 to 10 pages for the second submission (I expect that the paper will get shorter as you work to write things more concisely).
- I've selected the OSA style guide, available at [http://ao.osa.org/submit/style/jrnls\\_style.cfm](http://ao.osa.org/submit/style/jrnls_style.cfm) as the standard for this paper. I've chosen this guide in part because it is used in many physics journals, but mainly because it is very short and concise. If

you have any questions about style or formatting, be sure to ask me. Please conform to the OSA style guide with the following exceptions and additions:

- Do not list author affiliations (I know what school you are from).
- Don't worry about OCIS codes --- don't include them.
- All of the references cited should be placed in a bibliography at the end of the paper. The bibliography should be single spaced.
- Each source should have just one entry in the bibliography --- don't use "ibid," etc. (This is the standard for OSA journals, but it is not made clear in the style guide).
- Whenever possible, include an internet link to any journal article which is also available online. Give the full citation, with the URL at the end, as shown in the OSA style guide and 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.
- Figures and tables should be placed directly in the paper close to the text which refers to them (not at the end of the paper as the OSA guide indicates). Figure and table captions should be single spaced (not double spaced).
- I don't care what format the figures are in (eps, jpg, etc.) because you will be giving me a hard copy, not an electronic one. Also, figures should be large enough to be clear, but not any larger. Use space on the page efficiently.
- You don't have to pay me \$650 to put in a color figure. Just make sure that you have a way to print in color if you want to use color figures.

## Grading Criteria

Below is an explanation of the criteria I will use to grade your papers. At the end of this document you will find the worksheets 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 four components: physics content, reasoning, structure and organization, plus a review and deadlines category to ensure that you go through the review process and submit materials on time. 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 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.

**Review and Deadlines:** I expect you to go through the process of writing a proposal, an outline, drafts, having them reviewed by peers and Writing Fellows, rewriting and polishing. This must all be done by the announced deadlines in order to get full credit for your paper. Part of this score will also be based on how much you contributed to the group's efforts. After submitting the paper to me you will each send me an email stating your name, and then listing each member of your group along with one of the following ratings for this person: "adequate participation," "inadequate participation," "did almost none of the work," or "did not participate at all."

### ***The Second Submission***

My evaluation of the second submission of your paper will be based on four components: physics reasoning, expression, overall quality of the paper, plus a review and deadlines category to ensure that you go through the review process and submit materials on time. 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 information densely and clearly. Pretty pictures that don't help the reader understand the material, or which seem out of place, turn readers off like a cheesy car salesman in an expensive suit. Every non-obvious idea, every quote, and every figure which is taken from another source should be properly cited. 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 located near to the first spot in the text where they are mentioned.

**Review and Deadlines:** This is similar to the "review and deadlines" category for the first submission. The only difference will be that there will be no "proposal" or "outline" for the second submission, but there will be a category for your presentation (see below).

### ***The Presentation***

Near the end of the semester you will be giving a short (8 minute) presentation on your research to the class. I will schedule a time for each group. You should all work to prepare a PowerPoint presentation, and then elect one of your group to give the presentation. The one selected should give the presentation to the rest of the group and get their suggestions for improvement several times before presenting in class.

# Grading Sheet – First Submission

Name(s)

## Physics Content (20%)

Depth / breadth  
Correctness  
Information relevant to the paper's focus  
Information interesting  
Appropriate sources  
Topic interesting and important  
Topic relevant to Physics 222

## Reasoning (20%)

Conclusions  
Discrimination  
Understanding  
Logic  
Persuasiveness  
Ideas connected

## Structure and Organization (20%)

Appearance  
Focus / conciseness  
Flow  
Abstract / final conclusions  
Grammar and Spelling

## Review and Deadlines (40%)

Good proposal and outline, on time  
(10%)  
Polished draft submitted for Writing  
Fellow review (10%)  
Participation in Writing Fellow  
conference (10%)  
Did you pull your weight in the group?  
(10%)

**Total Score (100%)**

# Grading Sheet – Second Submission

Name(s)

## Content and Reasoning (20%)

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

## Expression (20%)

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

## Overall Quality (20%)

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

## Review and Deadlines (40%)

Polished draft submitted for Writing  
Fellow review (10%)  
Participation in writing fellow  
Conference (10%)  
A good presentation from your group  
(10%)  
Did you pull your weight in the group?  
(10%)

**Total Score (100%)**