Writing Guidelines
Physics 222

Content:
This part of your evaluation is a measure of the quality of the information in your paper. I will begin by looking at the amount of physics/history you have included. Your sources should include books, review articles and research journal articles, not websites. Use websites only to provide you with tutorial help and to guide you to the primary sources. Review articles such as in Scientific American, or Physics Today are very helpful. Use and cite three or more sources per person in your group. Do not cite the textbook. There should be enough depth that the reader can understand your topic and enough breadth to make the paper significant. The physics should be correct. I will also consider whether you have used good judgment in your choice of ideas to include and exclude. An especially important element is how interesting you can make the physics to your reader. Hopefully, you chose a topic that interested you. I will note how well you have conveyed that same interest to your audience.

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. In particular in the second paper you should make conclusions about the significance or veracity of your information. I will judge how well you discriminated between 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. You will do well in this section if I find your paper convincing and persuasive.

Expression and organization:
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. It should have a well developed focus that ties the entire paper together. Each paragraph should play a role in developing the focus. Paragraphs should be well-connected, with good transitions. They should each deal with a single idea, developing it logically, completely, and concisely. Your style should be appropriate to your audience (fellow 222 students) and topic. Don’t include humor, unless it comes from the scientists you write about.

Format:
The paper’s format and attention to mechanical details will help the reader get information from the paper easily, and will not distract from the flow of the paper. As a minimum, it will include:
◊ Title page with title, authors, and abstract
◊ Abstract: give a summary of what your paper accomplishes
◊ Headings that guide the reader
◊ Figures or tables that have titles and captions. These are referred to by number in the text. They appear with the text close to where they are cited, not all at the end.
◊ Doubled spaced with 1”margins, 12 point font.
◊ References follow the guidelines below.
Grading Sheet

Group_________________ Name___________________________________________

Content (18 pts)
depth / breadth
correctness
judgment
interest
appropriate sources
overall impact

Reasoning (12 pts)
conclusions
discrimination
understanding
logic
persuasiveness

Expression and organization (10 pts)
grammar / spelling
appearance
focus / conciseness
flow
style
organization

Format (10 pts)
General Guidelines for the Term Papers:

Any paper handed in (whether for peer review, review by the writing fellows, or to be read by the professor) should be your very best work. The papers should be typed, grammatically correct, spell checked, and well polished.

The target audience for this assignment is your classmates. As such, you should not spend time covering background material which a typical 222 student should already know. Concepts which go beyond the course, however, should be adequately explained.

If you are confused, you are generally safe when you follow the AIP style guidelines, which can be found at [http://www.aip.org/pubservs/style/4thed/toc.html](http://www.aip.org/pubservs/style/4thed/toc.html).

Writing Suggestions for Physics 222

While Researching Your Topic

◊ Remember that the topic you cover should go well beyond what is covered in the textbook.
◊ Make sure you are using current sources.
◊ Use both review-type articles and cutting edge research reports. If you have a long list of cutting-edge hard to understand references and one book or review article, I'll know that you pretty much followed one source, and threw the other references in for looks.
◊ The web is a good resource for getting ideas, but... you can't believe something just because it's on the web. Do not cite web pages. Use review articles, peer-reviewed journal articles and books as your sources.
◊ Use and cite more three or more sources per person in your group.

While Writing the Paper

◊ Read your paper out loud --- you will find many mistakes and get a better feel for how the paper flows this way.
◊ Make a detailed outline and follow it --- one of the biggest problems I see on papers for this course is poor organization and lack of a natural flow!
◊ Don't repeat the same information. This can be avoided by good organization.
◊ Don't include every fact that you've discovered. You will learn more while you research the paper than will fit within the focus of your paper. Have the courage to focus your paper and leave out irrelevant discussions.
◊ Try to write a good, solid paper that conveys information in an easy to read manner.
◊ You need to reference where you get your information in each paragraph or more often, not just for quotes, so that anyone wanting to read further about your statement can know where to go.
◊ Beware of using quotes to say something you don't want to explain. In general, quotes should be used only where you want the author's personality to show through.

Abstract

◊ Does your abstract appear on the title page just under the title?
In your abstract do you clearly identify all of the major topics that will be discussed in your paper?

It is best to write the abstract after the paper is in its final form. An abstract is not an introduction, a soundbite, or a commercial for your paper. An abstract should tell us what the paper accomplishes.

**Introduction**

In the first paragraph or two do you define the subject matter that will be discussed in the paper? Is there a thesis statement early in the introduction?

Do you lay out the organization of the paper so the reader can follow the flow of what you are going to say?

The introduction is not a commercial. For example, something like... "Is the universe going to expand forever? Stay tuned and we'll answer this exciting question and thrill you with..." is not appropriate. "Our story begins with..." is also a bad way to start a scientific paper. I want this paper to be training for real research papers which you will some day be submitting to respectable journals.

**Main Body**

Is your choice of words consistent with scientific writing?

Eliminate meaningless words such as "basically", "obviously", "naturally", "of course", etc.

Does the tone of your paper portray you, the authors, as physicists, as opposed to outsiders to the physics community, as in the following sentence: "Scientists have shown that black holes exist?"

All this does not mean to make your papers sound as dry as possible. It requires you to write very clearly, making your paper flow from one idea to the next.

If you are not sure exactly what an equation or a concept means, are you honest with the reader?

Avoid creating the illusion that you know everything.

Have you eliminated footnotes and parenthetical statements? There are cases where footnotes and parenthetical statements are appropriate; however, if what you say is important enough to include in the paper in the first place it probably should be included in the main body.

Do your transitions lead the reader from one concept to the next without confusion? A good way to test this is to ask a person who is not in the class to read your paper. If he or she has a hard time understanding what you mean, then you need to revise.

When you let someone read your paper, let them use this guide so they can respond more effectively to your paper.

Do your figures have captions (when needed).

**Conclusion**

Does your conclusion restate the main points you discussed in the main body of the paper?

Do you actually make a conclusion (decision, judgment) about what you have learned? Do not overstate the significance.
◊ Be sure not to introduce new information in your conclusion.

Documentation
◊ Have you followed the reference guidelines at the end of this document?
◊ Have you given credit where credit is due, including paraphrases as well as direct quotes?
◊ Did you give credit in figure captions for "borrowed" figures by including a reference. For example, at the end of a figure caption you should write something like... Figure reproduced from [Spe 97].
◊ Is each referenced work listed only once in the Bibliography, regardless of how many times it is cited?

Miscellaneous
◊ Did you insert page numbers?
◊ Did your paper use only the present tense except when treating historical events?
◊ Did you treat mathematical expressions as part of a sentence with appropriate punctuation?
◊ Where appropriate, integrate good pictures and graphs in your paper.
◊ Do your tables and figures have a paragraph in the text that clearly explain what they mean?
◊ Do your tables and graphs appear on the same page where they are discussed whenever possible? Does your paper have the appropriate length?

Before Turning in Your Final Copy
◊ Did you carefully proofread your final copy for grammar and punctuation errors?
◊ Did you spell-check your paper?
◊ Did a fellow 222 classmate review the paper before you turned in the final copy?
Did you read the paper aloud?

References:
You need to reference where you get your information in each paragraph or more often, not just for quotes, so that anyone wanting to read further about your statement can know where to go.

Include endnote references to your sources within your paper. Each endnote should be listed in the order that it first appears in the paper. Each reference should only be referred to by one number or abbreviation. Reference the same number again for multiple citings (don’t use “ibid,” etc.) Any data, information, or figure which comes from another work should be properly referenced. A figure, table, etc., which is copied from another work should include the phrase “reproduced from [x]” in the caption, and x should be a reference to an endnote entry.

Reference guidelines from American Physical Society (condensed)

Superscripts: references[type (2)] are noted in text by the insertion of numerals as either a superscript or on line in this manner:
Smith$^2$ does not agree with the original values given in Ref. 1.
When that use could possibly cause confusion (i.e., Pb$^4$), an in-line form should be used
In the footnote listing at the end of the paper use only the superscript form. *Or, you can use in-line brackets:* Arabic numerals in square brackets in this manner:

Smith and Jones [3] also measured ....

Reference indicators should be at least one full space from words (not closed up to them as with superscripts). Multiple reference indicators should be set closed up within a single set of brackets: Smith and Jones [1,3,5--8] performed .... Reference indicators should be set inside punctuation: The work of Smith [3], that of Jones [4], and our previous work [5--8] disagree with that of Doe and Roe [13]. When the word "reference" is used in specifying a reference, use the abbreviation (unless at the beginning of a sentence) with the indicator in brackets: ... as was shown in Ref. [4]. Note that use of the following form is also acceptable: ... as was shown in [4].

| (a) How to list authors | J. M. Smith, Phys. Rev B 26, 1 (1982).  
| Five or more authors (*et al.* optional; use of *et al.* journal specific; note that Phys. Rev. C requires that 10 or fewer authors be listed and *et al.* not be used in such cases) |  |

| Two sources: | [Note that a semicolon is used between sources.]  

| (c) How to list same author, same source, different volume and page | J. M. Smith, Phys. Rev. B 24, 3 (1981); 26, 1 (1982).  

| (d) How to list same author, same source, same volume number, same year, and different page numbers | J. M. Smith, Phys. Rev. B 26, 1 (1982); 26, 6 (1982). [Note that both page numbers are listed separately.]  

| (e) How to list different authors and | J. M. Smith, Phys. Rev. B. 26, 1 (1982); R. Brown, *Heavy Ions* |
| (f) How to list different authors, same sources | J. M. Smith, Phys. Rev. B 26, 1 (1982); R. Brown, *ibid.* 24, 3 (1981); C. Green, *ibid.* 24, 22 (1981). [Note that *ibid.* is used instead of repeating the journal name.] |
J. M. Smith, Phys. Rev. D (to be published). [accepted for publication]  
[Most reports are considered to be unpublished. Those reports considered as full publications should be designated without the parenthetical unpublished at the end of the reference.]  
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>(l) Preprints (journal specific)</td>
<td></td>
</tr>
<tr>
<td>(m) Theses</td>
<td></td>
</tr>
</tbody>
</table>
| (n) Others | J. M. Smith (private communication).  
[cited in another paper]  
Writing Guidelines
Physics 222

Content:
This part of your evaluation is a measure of the quality of the information in your paper. I will begin by looking at the amount of physics/history you have included. Your sources should include books, review articles and research journal articles, not websites. Use websites only to provide you with tutorial help and to guide you to the primary sources. Review articles such as in Scientific American, or Physics Today are very helpful. Use and cite three or more sources per person in your group. Do not cite the textbook. There should be enough depth that the reader can understand your topic and enough breadth to make the paper significant. The physics should be correct. I will also consider whether you have used good judgment in your choice of ideas to include and exclude. An especially important element is how interesting you can make the physics to your reader. Hopefully, you chose a topic that interested you. I will note how well you have conveyed that same interest to your audience.

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. In particular in the second paper you should make conclusions about the significance or veracity of your information. I will judge how well you discriminated between 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. You will do well in this section if I find your paper convincing and persuasive.

Expression and organization:
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. It should have a well developed focus that ties the entire paper together. Each paragraph should play a role in developing the focus. Paragraphs should be well-connected, with good transitions. They should each deal with a single idea, developing it logically, completely, and concisely. Your style should be appropriate to your audience (fellow 222 students) and topic. Don’t include humor, unless it comes from the scientists you write about.

Format:
The paper’s format and attention to mechanical details will help the reader get information from the paper easily, and will not distract from the flow of the paper. As a minimum, it will include:
◊ Title page with title, authors, and abstract
◊ Abstract: give a summary of what your paper accomplishes
◊ Headings that guide the reader
◊ Figures or tables that have titles and captions. These are referred to by number in the text. They appear with the text close to where they are cited, not all at the end.
◊ Doubled spaced with 1”Margins, 12 point font.
◊ References follow the guidelines below.
Grading Sheet

Group_________________ Name___________________________________________

Content (18 pts)
depth / breadth
correctness
judgment
interest
appropriate sources
overall impact

Reasoning (12 pts)
conclusions
discrimination
understanding
logic
persuasiveness

Expression and organization (10 pts)
grahm / spelling
appearance
focus / conciseness
flow
style
organization

Format (10 pts)
General Guidelines for the Term Papers:

Any paper handed in (whether for peer review, review by the writing fellows, or to be read by the professor) should be your very best work. The papers should be typed, grammatically correct, spell checked, and well polished.

The target audience for this assignment is your classmates. As such, you should not spend time covering background material which a typical 222 student should already know. Concepts which go beyond the course, however, should be adequately explained.

If you are confused, you are generally safe when you follow the AIP style guidelines, which can be found at [http://www.aip.org/pubservs/style/4thed/toc.html](http://www.aip.org/pubservs/style/4thed/toc.html).

Writing Suggestions for Physics 222

While Researching Your Topic
- Remember that the topic you cover should go well beyond what is covered in the textbook.
- Make sure you are using current sources.
- Use both review-type articles and cutting edge research reports. If you have a long list of cutting-edge hard to understand references and one book or review article, I'll know that you pretty much followed one source, and threw the other references in for looks.
- The web is a good resource for getting ideas, but... you can't believe something just because it's on the web. Do not cite web pages. Use review articles, peer-reviewed journal articles and books as your sources.
- Use and cite more three or more sources per person in your group.

While Writing the Paper
- Read your paper out loud --- you will find many mistakes and get a better feel for how the paper flows this way.
- Make a detailed outline and follow it --- one of the biggest problems I see on papers for this course is poor organization and lack of a natural flow!
- Don't repeat the same information. This can be avoided by good organization.
- Don't include every fact that you've discovered. You will learn more while you research the paper than will fit within the focus of your paper. Have the courage to focus your paper and leave out irrelevant discussions.
- Try to write a good, solid paper that conveys information in an easy to read manner.
- You need to reference where you get your information in each paragraph or more often, not just for quotes, so that anyone wanting to read further about your statement can know where to go.
- Beware of using quotes to say something you don't want to explain. In general, quotes should be used only where you want the author's personality to show through.

Abstract
- Does your abstract appear on the title page just under the title?
◊ In your abstract do you clearly identify all of the major topics that will be discussed in your paper?
◊ It is best to write the abstract after the paper is in its final form. An abstract is not an introduction, a soundbite, or a commercial for your paper. An abstract should tell us what the paper accomplishes.

**Introduction**

In the first paragraph or two do you define the subject matter that will be discussed in the paper?

**Is there a thesis statement early in the introduction?**

Are you comfortable with the scope of your paper? Is your paper broad enough to be significant? Is it narrow enough to be adequately covered within the time and space allotted?

◊ If you include a section of background information in your paper, do you explain clearly how it relates to the main topic you are exploring?
◊ The introduction is usually best written after the main body of the paper is complete.
◊ Do you lay out the organization of the paper so the reader can follow the flow of what you are going to say?
◊ The introduction is not a commercial. For example, something like... "Is the universe going to expand forever? Stay tuned and we'll answer this exciting question and thrill you with..." is not appropriate. "Our story begins with..." is also a bad way to start a scientific paper. I want this paper to be training for real research papers which you will some day be submitting to respectable journals.

**Main Body**

◊ Is your choice of words consistent with scientific writing?
◊ Eliminate meaningless words such as "basically", "obviously", "naturally", "of course", etc.
◊ Does the tone of your paper portray you, the authors, as physicists, as opposed to outsiders to the physics community, as in the following sentence: "Scientists have shown that black holes exist?"
◊ All this does not mean to make your papers sound as dry as possible. It requires you to write very clearly, making your paper flow from one idea to the next.
◊ If you are not sure exactly what an equation or a concept means, are you honest with the reader?
◊ Avoid creating the illusion that you know everything.
◊ Have you eliminated footnotes and parenthetical statements? There are cases where footnotes and parenthetical statements are appropriate; however, if what you say is important enough to include in the paper in the first place it probably should be included in the main body.
◊ Do your transitions lead the reader from one concept to the next without confusion? A good way to test this is to ask a person who is not in the class to read your paper. If he or she has a hard time understanding what you mean, then you need to revise.
◊ When you let someone read your paper, let them use this guide so they can respond more effectively to your paper.
◊ Do your figures have captions (when needed).

**Conclusion**

◊ Does your conclusion restate the main points you discussed in the main body of the paper?
◊ Do you actually make a conclusion (decision, judgment) about what you have learned? Do not overstate the significance.
◊ Be sure not to introduce new information in your conclusion.

**Documentation**
◊ Have you followed the reference guidelines at the end of this document?
◊ Have you given credit where credit is due, including paraphrases as well as direct quotes?
◊ Did you give credit in figure captions for "borrowed" figures by including a reference. For example, at the end of a figure caption you should write something like... Figure reproduced from [Spe 97].
◊ Is each referenced work listed only once in the Bibliography, regardless of how many times it is cited?

**Miscellaneous**
◊ Did you insert page numbers?
◊ Did your paper use only the present tense except when treating historical events?
◊ Did you treat mathematical expressions as part of a sentence with appropriate punctuation?
◊ Where appropriate, integrate good pictures and graphs in your paper.
◊ Do your tables and figures have a paragraph in the text that clearly explain what they mean?
◊ Do your tables and graphs appear on the same page where they are discussed whenever possible? Does your paper have the appropriate length?

**Before Turning in Your Final Copy**
◊ Did you carefully proofread your final copy for grammar and punctuation errors?
◊ Did you spell-check your paper?
◊ Did a fellow 222 classmate review the paper before you turned in the final copy?
Did you read the paper aloud?

**References**

You need to reference where you get your information in each paragraph or more often, not just for quotes, so that anyone wanting to read further about your statement can know where to go.

Include endnote references to your sources within your paper. Each endnote should be listed in the order that it first appears in the paper. Each reference should only be referred to by one number or abbreviation. Reference the same number again for multiple citations (don’t use “ibid,” etc.) Any data, information, or figure which comes from another work should be properly referenced. A figure, table, etc., which is copied from another work should include the phrase “reproduced from [x]” in the caption, and x should be a reference to an endnote entry.

**Reference guidelines from American Physical Society (condensed)**

*Superscripts*: references[type (2)] are noted in text by the insertion of numerals as either a superscript or on line in this manner:

Smith$^2$ does not agree with the original values given in Ref. 1.
When that use could possibly cause confusion (i.e., Pb$^4$), an in-line form should be used.
[Pb (Ref. 4)]. In the footnote listing at the end of the paper use only the superscript form. 

*Or, you can use in-line brackets:* Arabic numerals in square brackets in this manner:

Smith and Jones [3] also measured ....

Reference indicators should be at least one full space from words (not closed up to them as with superscripts). Multiple reference indicators should be set closed up within a single set of brackets: Smith and Jones [1,3,5--8] performed .... Reference indicators should be set inside punctuation: The work of Smith [3], that of Jones [4], and our previous work [5--8] disagree with that of Doe and Roe [13]. When the word "reference" is used in specifying a reference, use the abbreviation (unless at the beginning of a sentence) with the indicator in brackets: ... as was shown in Ref. [4]. Note that use of the following form is also acceptable: ... as was shown in [4].

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Three or four authors:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Five or more authors (<em>et al.</em> optional; use of <em>et al.</em> journal specific; note that Phys. Rev. C requires that 10 or fewer authors be listed and <em>et al.</em> not be used in such cases)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>One source:</td>
<td></td>
<td>[Note that a semicolon is used between sources.]</td>
</tr>
<tr>
<td>Three or more sources:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(c) How to list same author, same source, different volume and page</td>
<td>J. M. Smith, Phys. Rev. B 24, 3 (1981); 26, 1 (1982).</td>
<td></td>
</tr>
<tr>
<td>(d) How to list same author, same source, same volume number, same year, and different page numbers</td>
<td>J. M. Smith, Phys. Rev. B 26, 1 (1982); 26, 6 (1982). [Note that both page numbers are listed separately.]</td>
<td></td>
</tr>
<tr>
<td>(e) How to list different authors and</td>
<td>J. M. Smith, Phys. Rev. B. 26, 1 (1982); R. Brown, Heavy Ions</td>
<td></td>
</tr>
</tbody>
</table>

*Note that Phys. Rev. C requires that 10 or fewer authors be listed and *et al.* not be used in such cases.*
|-------------------|------------------------------------------------------------------|
J. M. Smith, Phys. Rev. D (to be published). [accepted for publication]  
[published, use italic title; additional information (Vol., Chap., Sec., p., etc.) as appropriate]  
<table>
<thead>
<tr>
<th>Type</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>[Most reports are considered to be unpublished. Those reports considered as full publications should be designated without the parenthetical unpublished at the end of the reference.]</td>
</tr>
<tr>
<td>(l) Preprints (journal specific)</td>
<td></td>
</tr>
<tr>
<td>(m) Theses</td>
<td></td>
</tr>
<tr>
<td>(n) Others</td>
<td>J. M. Smith (private communication).</td>
</tr>
</tbody>
</table>
Writing Guidelines
Physics 222

Content:
This part of your evaluation is a measure of the quality of the information in your paper. I will begin by looking at the amount of physics/history you have included. Your sources should include books, review articles and research journal articles, not websites. Use websites only to provide you with tutorial help and to guide you to the primary sources. Review articles such as in Scientific American, or Physics Today are very helpful. Use and cite three or more sources per person in your group. Do not cite the textbook. There should be enough depth that the reader can understand your topic and enough breadth to make the paper significant. The physics should be correct. I will also consider whether you have used good judgment in your choice of ideas to include and exclude. An especially important element is how interesting you can make the physics to your reader. Hopefully, you chose a topic that interested you. I will note how well you have conveyed that same interest to your audience.

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. In particular in the second paper you should make conclusions about the significance or veracity of your information. I will judge how well you discriminated between 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. You will do well in this section if I find your paper convincing and persuasive.

Expression and organization:
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. It should have a well developed focus that ties the entire paper together. Each paragraph should play a role in developing the focus. Paragraphs should be well-connected, with good transitions. They should each deal with a single idea, developing it logically, completely, and concisely. Your style should be appropriate to your audience (fellow 222 students) and topic. Don’t include humor, unless it comes from the scientists you write about.

Format:
The paper’s format and attention to mechanical details will help the reader get information from the paper easily, and will not distract from the flow of the paper. As a minimum, it will include:

◊ Title page with title, authors, and abstract
◊ Abstract: give a summary of what your paper accomplishes
◊ Headings that guide the reader
◊ Figures or tables that have titles and captions. These are referred to by number in the text. They appear with the text close to where they are cited, not all at the end.
◊ Doubled spaced with 1” margins, 12 point font.
◊ References follow the guidelines below.
Grading Sheet

Group_________________ Name___________________________________________

Content (18 pts)
depth / breadth
correctness
judgment
interest
appropriate sources
overall impact

Reasoning (12 pts)
conclusions
discrimination
understanding
logic
persuasiveness

Expression and organization (10 pts)
grammar / spelling
appearance
focus / conciseness
flow
style
organization

Format (10 pts)
General Guidelines for the Term Papers:

Any paper handed in (whether for peer review, review by the writing fellows, or to be read by the professor) should be your very best work. The papers should be typed, grammatically correct, spell checked, and well polished.

The target audience for this assignment is your classmates. As such, you should not spend time covering background material which a typical 222 student should already know. Concepts which go beyond the course, however, should be adequately explained.

If you are confused, you are generally safe when you follow the AIP style guidelines, which can be found at http://www.aip.org/pubservs/style/4thed/toc.html.

Writing Suggestions for Physics 222

While Researching Your Topic

◊ Remember that the topic you cover should go well beyond what is covered in the textbook.
◊ Make sure you are using current sources.
◊ Use both review-type articles and cutting edge research reports. If you have a long list of cutting-edge hard to understand references and one book or review article, I'll know that you pretty much followed one source, and threw the other references in for looks.
◊ The web is a good resource for getting ideas, but... you can't believe something just because it's on the web. Do not cite web pages. Use review articles, peer-reviewed journal articles and books as your sources.
◊ Use and cite more three or more sources per person in your group.

While Writing the Paper

◊ Read your paper out loud --- you will find many mistakes and get a better feel for how the paper flows this way.
◊ Make a detailed outline and follow it --- one of the biggest problems I see on papers for this course is poor organization and lack of a natural flow!
◊ Don't repeat the same information. This can be avoided by good organization.
◊ Don't include every fact that you've discovered. You will learn more while you research the paper than will fit within the focus of your paper. Have the courage to focus your paper and leave out irrelevant discussions.
◊ Try to write a good, solid paper that conveys information in an easy to read manner.
◊ You need to reference where you get your information in each paragraph or more often, not just for quotes, so that anyone wanting to read further about your statement can know where to go.
◊ Beware of using quotes to say something you don't want to explain. In general, quotes should be used only where you want the author's personality to show through.

Abstract

◊ Does your abstract appear on the title page just under the title?
◊ In your abstract do you clearly identify all of the major topics that will be discussed in your paper?
◊ It is best to write the abstract after the paper is in its final form. **An abstract is not an introduction, a soundbite, or a commercial for your paper.** An abstract should tell us what the paper **accomplishes.**

**Introduction**
In the first paragraph or two do you define the subject matter that will be discussed in the paper?
**Is there a thesis statement early in the introduction?**
Are you comfortable with the scope of your paper? Is your paper broad enough to be significant? Is it narrow enough to be adequately covered within the time and space allotted?
◊ If you include a section of background information in your paper, do you explain clearly how it relates to the main topic you are exploring?
◊ The introduction is usually best written after the main body of the paper is complete.
◊ Do you lay out the organization of the paper so the reader can follow the flow of what you are going to say?
◊ The introduction is not a commercial. For example, something like... "Is the universe going to expand forever? Stay tuned and we'll answer this exciting question and thrill you with..." is not appropriate. "Our story begins with..." is also a bad way to start a scientific paper. I want this paper to be training for real research papers which you will some day be submitting to respectable journals.

**Main Body**
◊ Is your choice of words consistent with scientific writing?
◊ Eliminate meaningless words such as "basically", "obviously", "naturally", "of course", etc.
◊ Does the tone of your paper portray you, the authors, as physicists, as opposed to outsiders to the physics community, as in the following sentence: "Scientists have shown that black holes exist?"
◊ All this does not mean to make your papers sound as dry as possible. It requires you to write very clearly, making your paper flow from one idea to the next.
◊ If you are not sure exactly what an equation or a concept means, are you honest with the reader?
◊ Avoid creating the illusion that you know everything.
◊ Have you eliminated footnotes and parenthetical statements? There are cases where footnotes and parenthetical statements are appropriate; however, if what you say is important enough to include in the paper in the first place it probably should be included in the main body.
◊ Do your transitions lead the reader from one concept to the next without confusion? A good way to test this is to ask a person who is not in the class to read your paper. If he or she has a hard time understanding what you mean, then you need to revise.
◊ When you let someone read your paper, let them use this guide so they can respond more effectively to your paper.
◊ Do your figures have captions (when needed).

**Conclusion**
◊ Does your conclusion restate the main points you discussed in the main body of the paper?
◊ Do you actually make a conclusion (decision, judgment) about what you have learned? Do not overstate the significance.
◊ Be sure not to introduce new information in your conclusion.

**Documentation**
◊ Have you followed the reference guidelines at the end of this document?
◊ Have you given credit where credit is due, including paraphrases as well as direct quotes?
◊ Did you give credit in figure captions for "borrowed" figures by including a reference. For example, at the end of a figure caption you should write something like... Figure reproduced from [Spe 97].
◊ Is each referenced work listed only once in the Bibliography, regardless of how many times it is cited?

**Miscellaneous**
◊ Did you insert page numbers?
◊ Did your paper use only the present tense except when treating historical events?
◊ Did you treat mathematical expressions as part of a sentence with appropriate punctuation?
◊ Where appropriate, integrate good pictures and graphs in your paper.
◊ Do your tables and figures have a paragraph in the text that clearly explain what they mean?
◊ Do your tables and graphs appear on the same page where they are discussed whenever possible? Does your paper have the appropriate length?

**Before Turning in Your Final Copy**
◊ Did you carefully proofread your final copy for grammar and punctuation errors?
◊ Did you spell-check your paper?
◊ Did a fellow 222 classmate review the paper before you turned in the final copy?
Did you read the paper aloud?

**References**:

You need to reference where you get your information in each paragraph or more often, not just for quotes, so that anyone wanting to read further about your statement can know where to go.

Include endnote references to your sources within your paper. Each endnote should be listed in the order that it first appears in the paper. Each reference should only be referred to by one number or abbreviation. Reference the same number again for multiple citings (don’t use “ibid,” etc.) Any data, information, or figure which comes from another work should be properly referenced. A figure, table, etc., which is copied from another work should include the phrase “reproduced from [x]” in the caption, and x should be a reference to an endnote entry.

**Reference guidelines from American Physical Society (condensed)**

*Superscripts:* references[type (2)] are noted in text by the insertion of numerals as either a superscript or on line in this manner:

Smith\(^2\) does not agree with the original values given in Ref. 1.
When that use could possibly cause confusion (i.e., Pb\(^4\)), an in-line form should be used.
[Pb (Ref. 4)]. In the footnote listing at the end of the paper use only the superscript form. 

*Or, you can use in-line brackets:* Arabic numerals in square brackets in this manner:

Smith and Jones [3] also measured ....

Reference indicators should be at least one full space from words (not closed up to them as with superscripts). Multiple reference indicators should be set closed up within a single set of brackets: Smith and Jones [1,3,5--8] performed .... Reference indicators should be set inside punctuation: The work of Smith [3], that of Jones [4], and our previous work [5--8] disagree with that of Doe and Roe [13]. When the word "reference" is used in specifying a reference, use the abbreviation (unless at the beginning of a sentence) with the indicator in brackets: ... as was shown in Ref. [4]. Note that use of the following form is also acceptable: ... as was shown in [4].

<table>
<thead>
<tr>
<th>(a) How to list authors</th>
<th>J. M. Smith, Phys. Rev B 26, 1 (1982).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Five or more authors (<em>et al.</em> optional; use of <em>et al.</em> journal specific; note that Phys. Rev. C requires that 10 or fewer authors be listed and <em>et al.</em> not be used in such cases)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Two sources:</td>
<td>[Note that a semicolon is used between sources.]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(c) How to list same author, same source, different volume and page</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>(d) How to list same author, same source, same volume number, same year, and different page numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>J. M. Smith, Phys. Rev. B 26, 1 (1982); 26, 6 (1982). [Note that both page numbers are listed separately.]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(e) How to list different authors and</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source Type</td>
</tr>
<tr>
<td>-----------------------------</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
(k) Reports

| Most reports are considered to be unpublished. Those reports considered as full publications should be designated without the parenthetical unpublished at the end of the reference. |

(l) Preprints (journal specific)

(m) Theses

(n) Others

| J. M. Smith (private communication). |
Writing Guidelines
Physics 222

Content:
This part of your evaluation is a measure of the quality of the information in your paper. I will begin by looking at the amount of physics/history you have included. Your sources should include books, review articles and research journal articles, not websites. Use websites only to provide you with tutorial help and to guide you to the primary sources. Review articles such as in Scientific American, or Physics Today are very helpful. Use and cite three or more sources per person in your group. Do not cite the textbook. There should be enough depth that the reader can understand your topic and enough breadth to make the paper significant. The physics should be correct. I will also consider whether you have used good judgment in your choice of ideas to include and exclude. An especially important element is how interesting you can make the physics to your reader. Hopefully, you chose a topic that interested you. I will note how well you have conveyed that same interest to your audience.

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. In particular in the second paper you should make conclusions about the significance or veracity of your information. I will judge how well you discriminated between 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. You will do well in this section if I find your paper convincing and persuasive.

Expression and organization:
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. It should have a well developed focus that ties the entire paper together. Each paragraph should play a role in developing the focus. Paragraphs should be well-connected, with good transitions. They should each deal with a single idea, developing it logically, completely, and concisely. Your style should be appropriate to your audience (fellow 222 students) and topic. Don’t include humor, unless it comes from the scientists you write about.

Format:
The paper’s format and attention to mechanical details will help the reader get information from the paper easily, and will not distract from the flow of the paper. As a minimum, it will include:
◊ Title page with title, authors, and abstract
◊ Abstract: give a summary of what your paper accomplishes
◊ Headings that guide the reader
◊ Figures or tables that have titles and captions. These are referred to by number in the text. They appear with the text close to where they are cited, not all at the end.
◊ Doubled spaced with 1”margins, 12 point font.
◊ References follow the guidelines below.
Grading Sheet

Group_________________ Name___________________________________________

Content (18 pts)
depth / breadth
correctness
judgment
interest
appropriate sources
overall impact

Reasoning (12 pts)
conclusions
discrimination
understanding
logic
persuasiveness

Expression and organization (10 pts)
grahma / spelling
appearance
focus / conciseness
flow
style
organization

Format (10 pts)
General Guidelines for the Term Papers:

Any paper handed in (whether for peer review, review by the writing fellows, or to be read by the professor) should be your very best work. The papers should be typed, grammatically correct, spell checked, and well polished.

The target audience for this assignment is your classmates. As such, you should not spend time covering background material which a typical 222 student should already know. Concepts which go beyond the course, however, should be adequately explained.

If you are confused, you are generally safe when you follow the AIP style guidelines, which can be found at http://www.aip.org/pubservs/style/4thed/toc.html.

Writing Suggestions for Physics 222

While Researching Your Topic

◊ Remember that the topic you cover should go well beyond what is covered in the textbook.
◊ Make sure you are using current sources.
◊ Use both review-type articles and cutting edge research reports. If you have a long list of cutting-edge hard to understand references and one book or review article, I'll know that you pretty much followed one source, and threw the other references in for looks.
◊ The web is a good resource for getting ideas, but... you can't believe something just because it's on the web. Do not cite web pages. Use review articles, peer-reviewed journal articles and books as your sources.
◊ Use and cite more three or more sources per person in your group.

While Writing the Paper

◊ Read your paper out loud --- you will find many mistakes and get a better feel for how the paper flows this way.
◊ Make a detailed outline and follow it --- one of the biggest problems I see on papers for this course is poor organization and lack of a natural flow!
◊ Don't repeat the same information. This can be avoided by good organization.
◊ Don't include every fact that you've discovered. You will learn more while you research the paper than will fit within the focus of your paper. Have the courage to focus your paper and leave out irrelevant discussions.
◊ Try to write a good, solid paper that conveys information in an easy to read manner.
◊ You need to reference where you get your information in each paragraph or more often, not just for quotes, so that anyone wanting to read further about your statement can know where to go.
◊ Beware of using quotes to say something you don't want to explain. In general, quotes should be used only where you want the author's personality to show through.

Abstract

◊ Does your abstract appear on the title page just under the title?
In your abstract do you clearly identify all of the major topics that will be discussed in your paper?

It is best to write the abstract after the paper is in its final form. An abstract is not an introduction, a soundbite, or a commercial for your paper. An abstract should tell us what the paper accomplishes.

Introduction
In the first paragraph or two do you define the subject matter that will be discussed in the paper?

Is there a thesis statement early in the introduction?
Are you comfortable with the scope of your paper? Is it narrow enough to be significant? Is it narrow enough to be adequately covered within the time and space allotted?

If you include a section of background information in your paper, do you explain clearly how it relates to the main topic you are exploring?

The introduction is usually best written after the main body of the paper is complete.

Do you lay out the organization of the paper so the reader can follow the flow of what you are going to say?

The introduction is not a commercial. For example, something like... "Is the universe going to expand forever? Stay tuned and we'll answer this exciting question and thrill you with..." is not appropriate. "Our story begins with..." is also a bad way to start a scientific paper. I want this paper to be training for real research papers which you will some day be submitting to respectable journals.

Main Body

Is your choice of words consistent with scientific writing?

Eliminate meaningless words such as "basically", "obviously", "naturally", "of course", etc.

Does the tone of your paper portray you, the authors, as physicists, as opposed to outsiders to the physics community, as in the following sentence: "Scientists have shown that black holes exist?"

All this does not mean to make your papers sound as dry as possible. It requires you to write very clearly, making your paper flow from one idea to the next.

If you are not sure exactly what an equation or a concept means, are you honest with the reader?

Avoid creating the illusion that you know everything.

Have you eliminated footnotes and parenthetical statements? There are cases where footnotes and parenthetical statements are appropriate; however, if what you say is important enough to include in the paper in the first place it probably should be included in the main body.

Do your transitions lead the reader from one concept to the next without confusion? A good way to test this is to ask a person who is not in the class to read your paper. If he or she has a hard time understanding what you mean, then you need to revise.

When you let someone read your paper, let them use this guide so they can respond more effectively to your paper.

Do your figures have captions (when needed).

Conclusion

Does your conclusion restate the main points you discussed in the main body of the paper?

Do you actually make a conclusion (decision, judgment) about what you have learned? Do not overstate the significance.
◊ Be sure not to introduce new information in your conclusion.

**Documentation**
◊ Have you followed the reference guidelines at the end of this document?
◊ Have you given credit where credit is due, including paraphrases as well as direct quotes?
◊ Did you give credit in figure captions for "borrowed" figures by including a reference. For example, at the end of a figure caption you should write something like... Figure reproduced from [Spe 97].
◊ Is each referenced work listed only once in the Bibliography, regardless of how many times it is cited?

**Miscellaneous**
◊ Did you insert page numbers?
◊ Did your paper use only the present tense except when treating historical events?
◊ Did you treat mathematical expressions as part of a sentence with appropriate punctuation?
◊ Where appropriate, integrate good pictures and graphs in your paper.
◊ Do your tables and figures have a paragraph in the text that clearly explain what they mean?
◊ Do your tables and graphs appear on the same page where they are discussed whenever possible? Does your paper have the appropriate length?

**Before Turning in Your Final Copy**
◊ Did you carefully proofread your final copy for grammar and punctuation errors?
◊ Did you spell-check your paper?
◊ Did a fellow 222 classmate review the paper before you turned in the final copy?
Did you read the paper aloud?

**References:**

You need to reference where you get your information in each paragraph or more often, not just for quotes, so that anyone wanting to read further about your statement can know where to go.

Include endnote references to your sources within your paper. Each endnote should be listed in the order that it first appears in the paper. Each reference should only be referred to by one number or abbreviation. Reference the same number again for multiple citings (don’t use “ibid,” etc.) Any data, information, or figure which comes from another work should be properly referenced. A figure, table, etc., which is copied from another work should include the phrase “reproduced from [x]” in the caption, and x should be a reference to an endnote entry.

**Reference guidelines from American Physical Society (condensed)**

*Superscripts:* references[type (2)] are noted in text by the insertion of numerals as either a superscript or on line in this manner:

- Smith\(^2\) does not agree with the original values given in Ref. 1.
- When that use could possibly cause confusion (i.e., Pb\(^4\)), an in-line form should be used
In the footnote listing at the end of the paper use only the superscript form. *Or, you can use in-line brackets:* Arabic numerals in square brackets in this manner:

Smith and Jones [3] also measured ...

Reference indicators should be at least one full space from words (not closed up to them as with superscripts). Multiple reference indicators should be set closed up within a single set of brackets:

Smith and Jones [1,3,5--8] performed .... Reference indicators should be set inside punctuation: The work of Smith [3], that of Jones [4], and our previous work [5--8] disagree with that of Doe and Roe [13]. When the word "reference" is used in specifying a reference, use the abbreviation (unless at the beginning of a sentence) with the indicator in brackets: ... as was shown in Ref. [4]. Note that use of the following form is also acceptable: ... as was shown in [4].

<table>
<thead>
<tr>
<th>(a) How to list authors</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Five or more authors (<em>et al.</em> optional; use of <em>et al.</em> journal specific; note that Phys. Rev. C requires that 10 or fewer authors be listed and <em>et al.</em> not be used in such cases)</td>
<td>J. M. Smith <em>et al.</em>, Phys. Rev B <strong>26</strong>, 1 (1982).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(b) How to list sources</th>
<th></th>
</tr>
</thead>
</table>


| (d) How to list same author, same source, same volume number, same year, and different page numbers | J. M. Smith, Phys. Rev. B **26**, 1 (1982); **26**, 6 (1982). [Note that both page numbers are listed separately.] |

<table>
<thead>
<tr>
<th>(e) How to list different authors and</th>
<th>J. M. Smith, Phys. Rev. B. <strong>26</strong>, 1 (1982); R. Brown, <em>Heavy Ions</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>(f) How to list different authors, same sources</td>
<td>J. M. Smith, Phys. Rev. B 26, 1 (1982); R. Brown, <em>ibid.</em> 24, 3 (1981); C. Green, <em>ibid.</em> 24, 22 (1981). [Note that <em>ibid.</em> is used instead of repeating the journal name.]</td>
</tr>
</tbody>
</table>
|                  | [Most reports are considered to be unpublished. Those reports considered as full publications should be designated without the parenthetical unpublished at the end of the reference.]  
| (l) Preprints (journal specific) | |
| (m) Theses       | |
| (n) Others       | J. M. Smith (private communication).  
|                  | [cited in another paper]  
Writing Guidelines
Physics 222

Content:
This part of your evaluation is a measure of the quality of the information in your paper. I will begin by looking at the amount of physics/history you have included. Your sources should include books, review articles and research journal articles, not websites. Use websites only to provide you with tutorial help and to guide you to the primary sources. Review articles such as in Scientific American, or Physics Today are very helpful. Use and cite three or more sources per person in your group. Do not cite the textbook. There should be enough depth that the reader can understand your topic and enough breadth to make the paper significant. The physics should be correct. I will also consider whether you have used good judgment in your choice of ideas to include and exclude. An especially important element is how interesting you can make the physics to your reader. Hopefully, you chose a topic that interested you. I will note how well you have conveyed that same interest to your audience.

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. In particular in the second paper you should make conclusions about the significance or veracity of your information. I will judge how well you discriminated between 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. You will do well in this section if I find your paper convincing and persuasive.

Expression and organization:
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. It should have a well developed focus that ties the entire paper together. Each paragraph should play a role in developing the focus. Paragraphs should be well-connected, with good transitions. They should each deal with a single idea, developing it logically, completely, and concisely. Your style should be appropriate to your audience (fellow 222 students) and topic. Don’t include humor, unless it comes from the scientists you write about.

Format:
The paper’s format and attention to mechanical details will help the reader get information from the paper easily, and will not distract from the flow of the paper. As a minimum, it will include:
◊ Title page with title, authors, and abstract
◊ Abstract: give a summary of what your paper accomplishes
◊ Headings that guide the reader
◊ Figures or tables that have titles and captions. These are referred to by number in the text. They appear with the text close to where they are cited, not all at the end.
◊ Doubled spaced with 1”margins, 12 point font.
◊ References follow the guidelines below.
Grading Sheet

Group_________________ Name___________________________________________

Content (18 pts)
depth / breadth
correctness
judgment
interest
appropriate sources
overall impact

Reasoning (12 pts)
conclusions
discrimination
understanding
logic
persuasiveness

Expression and organization (10 pts)
grammar / spelling
appearance
focus / conciseness
flow
style
organization

Format (10 pts)
General Guidelines for the Term Papers:

Any paper handed in (whether for peer review, review by the writing fellows, or to be read by the professor) should be your very best work. The papers should be typed, grammatically correct, spell checked, and well polished.

The target audience for this assignment is your classmates. As such, you should not spend time covering background material which a typical 222 student should already know. Concepts which go beyond the course, however, should be adequately explained.

If you are confused, you are generally safe when you follow the AIP style guidelines, which can be found at http://www.aip.org/pubservs/style/4thed/toc.html.

Writing Suggestions for Physics 222

While Researching Your Topic
◊ Remember that the topic you cover should go well beyond what is covered in the textbook.
◊ Make sure you are using current sources.
◊ Use both review-type articles and cutting edge research reports. If you have a long list of cutting-edge hard to understand references and one book or review article, I'll know that you pretty much followed one source, and threw the other references in for looks.
◊ The web is a good resource for getting ideas, but... you can't believe something just because it's on the web. Do not cite web pages. Use review articles, peer-reviewed journal articles and books as your sources.
◊ Use and cite more three or more sources per person in your group.

While Writing the Paper
◊ Read your paper out loud --- you will find many mistakes and get a better feel for how the paper flows this way.
◊ Make a detailed outline and follow it --- one of the biggest problems I see on papers for this course is poor organization and lack of a natural flow!
◊ Don't repeat the same information. This can be avoided by good organization.
◊ Don't include every fact that you've discovered. You will learn more while you research the paper than will fit within the focus of your paper. Have the courage to focus your paper and leave out irrelevant discussions.
◊ Try to write a good, solid paper that conveys information in an easy to read manner.
◊ You need to reference where you get your information in each paragraph or more often, not just for quotes, so that anyone wanting to read further about your statement can know where to go.
◊ Beware of using quotes to say something you don't want to explain. In general, quotes should be used only where you want the author's personality to show through.

Abstract
◊ Does your abstract appear on the title page just under the title?
◊ In your abstract do you clearly identify all of the major topics that will be discussed in your paper?
◊ It is best to write the abstract after the paper is in its final form. An abstract is not an introduction, a soundbite, or a commercial for your paper. An abstract should tell us what the paper accomplishes.

Introduction
In the first paragraph or two do you define the subject matter that will be discussed in the paper?
Is there a thesis statement early in the introduction?
Are you comfortable with the scope of your paper? Is your paper broad enough to be significant? Is it narrow enough to be adequately covered within the time and space allotted?
◊ If you include a section of background information in your paper, do you explain clearly how it relates to the main topic you are exploring?
◊ The introduction is usually best written after the main body of the paper is complete.
◊ Do you lay out the organization of the paper so the reader can follow the flow of what you are going to say?
◊ The introduction is not a commercial. For example, something like... "Is the universe going to expand forever? Stay tuned and we'll answer this exciting question and thrill you with..." is not appropriate. "Our story begins with..." is also a bad way to start a scientific paper. I want this paper to be training for real research papers which you will some day be submitting to respectable journals.

Main Body
◊ Is your choice of words consistent with scientific writing?
◊ Eliminate meaningless words such as "basically", "obviously", "naturally", "of course", etc.
◊ Does the tone of your paper portray you, the authors, as physicists, as opposed to outsiders to the physics community, as in the following sentence: "Scientists have shown that black holes exist?"
◊ All this does not mean to make your papers sound as dry as possible. It requires you to write very clearly, making your paper flow from one idea to the next.
◊ If you are not sure exactly what an equation or a concept means, are you honest with the reader?
◊ Avoid creating the illusion that you know everything.
◊ Have you eliminated footnotes and parenthetical statements? There are cases where footnotes and parenthetical statements are appropriate; however, if what you say is important enough to include in the paper in the first place it probably should be included in the main body.
◊ Do your transitions lead the reader from one concept to the next without confusion? A good way to test this is to ask a person who is not in the class to read your paper. If he or she has a hard time understanding what you mean, then you need to revise.
◊ When you let someone read your paper, let them use this guide so they can respond more effectively to your paper.
◊ Do your figures have captions (when needed).

Conclusion
◊ Does your conclusion restate the main points you discussed in the main body of the paper?
◊ Do you actually make a conclusion (decision, judgment) about what you have learned? Do not overstate the significance.
◊ Be sure not to introduce new information in your conclusion.

**Documentation**
◊ Have you followed the reference guidelines at the end of this document?
◊ Have you given credit where credit is due, including paraphrases as well as direct quotes?
◊ Did you give credit in figure captions for "borrowed" figures by including a reference. For example, at the end of a figure caption you should write something like... Figure reproduced from [Spe 97].
◊ Is each referenced work listed only once in the Bibliography, regardless of how many times it is cited?

**Miscellaneous**
◊ Did you insert page numbers?
◊ Did your paper use only the present tense except when treating historical events?
◊ Did you treat mathematical expressions as part of a sentence with appropriate punctuation?
◊ Where appropriate, integrate good pictures and graphs in your paper.
◊ Do your tables and figures have a paragraph in the text that clearly explain what they mean?
◊ Do your tables and graphs appear on the same page where they are discussed whenever possible? Does your paper have the appropriate length?

**Before Turning in Your Final Copy**
◊ Did you carefully proofread your final copy for grammar and punctuation errors?
◊ Did you spell-check your paper?
◊ Did a fellow 222 classmate review the paper before you turned in the final copy?
Did you read the paper aloud?

**References :**

You need to reference where you get your information in each paragraph or more often, not just for quotes, so that anyone wanting to read further about your statement can know where to go.

Include endnote references to your sources within your paper. Each endnote should be listed in the order that it first appears in the paper. Each reference should only be referred to by one number or abbreviation. Reference the same number again for multiple citings (don’t use “ibid,” etc.) Any data, information, or figure which comes from another work should be properly referenced. A figure, table, etc., which is copied from another work should include the phrase “reproduced from [x]” in the caption, and x should be a reference to an endnote entry.

**Reference guidelines from American Physical Society (condensed**

*Superscripts:* references[type (2)] are noted in text by the insertion of numerals as either a superscript or on line in this manner:

- Smith[^2] does not agree with the original values given in Ref. 1.
- When that use could possibly cause confusion (i.e., Pb[^4]), an in-line form should be used
[Pb (Ref. 4)]. In the footnote listing at the end of the paper use only the superscript form.

Or, you can use in-line brackets: Arabic numerals in square brackets in this manner:

Smith and Jones [3] also measured ....

Reference indicators should be at least one full space from words (not closed up to them as with superscripts). Multiple reference indicators should be set closed up within a single set of brackets: Smith and Jones [1,3,5--8] performed .... Reference indicators should be set inside punctuation: The work of Smith [3], that of Jones [4], and our previous work [5--8] disagree with that of Doe and Roe [13]. When the word "reference" is used in specifying a reference, use the abbreviation (unless at the beginning of a sentence) with the indicator in brackets: ... as was shown in Ref. [4]. Note that use of the following form is also acceptable: ... as was shown in [4].

<table>
<thead>
<tr>
<th>(a) How to list authors</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Five or more authors (et al. optional; use of et al. journal specific; note that Phys. Rev. C requires that 10 or fewer authors be listed and et al. not be used in such cases)</td>
<td>J. M. Smith et al., Phys. Rev B 26, 1 (1982).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(b) How to list sources</th>
<th></th>
</tr>
</thead>
</table>

[Note that a semicolon is used between sources.]

| (c) How to list same author, same source, different volume and page | J. M. Smith, Phys. Rev. B 24, 3 (1981); 26, 1 (1982). |

| (d) How to list same author, same source, same volume number, same year, and different page numbers | J. M. Smith, Phys. Rev. B 26, 1 (1982); 26, 6 (1982). [Note that both page numbers are listed separately.] |

| (e) How to list different authors and | J. M. Smith, Phys. Rev. B, 26, 1 (1982); R. Brown, Heavy Ions |
### different sources


### (f) How to list different authors, same sources


### (g) How to list multiple parts in a single footnote


### (h) Journals


J. M. Smith, Phys. Rev. D (to be published). [accepted for publication]


### (i) Books


### (j) Proceedings


<table>
<thead>
<tr>
<th>Type</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>[Most reports are considered to be unpublished. Those reports considered as full publications should be designated without the parenthetical unpublished at the end of the reference.]</td>
</tr>
<tr>
<td>(l) Preprints</td>
<td>J. M. Smith (private communication).</td>
</tr>
<tr>
<td></td>
<td>[cited in another paper]</td>
</tr>
</tbody>
</table>
Writing Guidelines
Physics 222

Content:
This part of your evaluation is a measure of the quality of the information in your paper. I will begin by looking at the amount of physics/history you have included. Your sources should include books, review articles and research journal articles, not websites. Use websites only to provide you with tutorial help and to guide you to the primary sources. Review articles such as in Scientific American, or Physics Today are very helpful. Use and cite three or more sources per person in your group. Do not cite the textbook. There should be enough depth that the reader can understand your topic and enough breadth to make the paper significant. The physics should be correct. I will also consider whether you have used good judgment in your choice of ideas to include and exclude. An especially important element is how interesting you can make the physics to your reader. Hopefully, you chose a topic that interested you. I will note how well you have conveyed that same interest to your audience.

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. In particular in the second paper you should make conclusions about the significance or veracity of your information. I will judge how well you discriminated between 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. You will do well in this section if I find your paper convincing and persuasive.

Expression and organization:
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. It should have a well developed focus that ties the entire paper together. Each paragraph should play a role in developing the focus. Paragraphs should be well-connected, with good transitions. They should each deal with a single idea, developing it logically, completely, and concisely. Your style should be appropriate to your audience (fellow 222 students) and topic. Don’t include humor, unless it comes from the scientists you write about.

Format:
The paper’s format and attention to mechanical details will help the reader get information from the paper easily, and will not distract from the flow of the paper. As a minimum, it will include:
◊ Title page with title, authors, and abstract
◊ Abstract: give a summary of what your paper accomplishes
◊ Headings that guide the reader
◊ Figures or tables that have titles and captions. These are referred to by number in the text. They appear with the text close to where they are cited, not all at the end.
◊ Doubled spaced with 1”margins, 12 point font.
◊ References follow the guidelines below.
Grading Sheet

Group_________________ Name___________________________________________

Content (18 pts)
- depth / breadth
- correctness
- judgment
- interest
- appropriate sources
- overall impact

Reasoning (12 pts)
- conclusions
- discrimination
- understanding
- logic
- persuasiveness

Expression and organization (10 pts)
- grammar / spelling
- appearance
- focus / conciseness
- flow
- style
- organization

Format (10 pts)
General Guidelines for the Term Papers:

Any paper handed in (whether for peer review, review by the writing fellows, or to be read by the professor) should be your very best work. The papers should be typed, grammatically correct, spell checked, and well polished.

The target audience for this assignment is your classmates. As such, you should not spend time covering background material which a typical 222 student should already know. Concepts which go beyond the course, however, should be adequately explained.

If you are confused, you are generally safe when you follow the AIP style guidelines, which can be found at http://www.aip.org/pubservs/style/4thed/toc.html.

Writing Suggestions for Physics 222

While Researching Your Topic
◊ Remember that the topic you cover should go well beyond what is covered in the textbook.
◊ Make sure you are using current sources.
◊ Use both review-type articles and cutting edge research reports. If you have a long list of cutting-edge hard to understand references and one book or review article, I'll know that you pretty much followed one source, and threw the other references in for looks.
◊ The web is a good resource for getting ideas, but... you can't believe something just because it's on the web. Do not cite web pages. Use review articles, peer-reviewed journal articles and books as your sources.
◊ Use and cite more three or more sources per person in your group.

While Writing the Paper
◊ Read your paper out loud --- you will find many mistakes and get a better feel for how the paper flows this way.
◊ Make a detailed outline and follow it --- one of the biggest problems I see on papers for this course is poor organization and lack of a natural flow!
◊ Don't repeat the same information. This can be avoided by good organization.
◊ Don't include every fact that you've discovered. You will learn more while you research the paper than will fit within the focus of your paper. Have the courage to focus your paper and leave out irrelevant discussions.
◊ Try to write a good, solid paper that conveys information in an easy to read manner.
◊ You need to reference where you get your information in each paragraph or more often, not just for quotes, so that anyone wanting to read further about your statement can know where to go.
◊ Beware of using quotes to say something you don't want to explain. In general, quotes should be used only where you want the author's personality to show through.

Abstract
◊ Does your abstract appear on the title page just under the title?
In your abstract do you clearly identify all of the major topics that will be discussed in your paper?

It is best to write the abstract after the paper is in its final form. An abstract is not an introduction, a soundbite, or a commercial for your paper. An abstract should tell us what the paper accomplishes.

Introduction

In the first paragraph or two do you define the subject matter that will be discussed in the paper?

Is there a thesis statement early in the introduction?

Are you comfortable with the scope of your paper? Is your paper broad enough to be significant? Is it narrow enough to be adequately covered within the time and space allotted?

If you include a section of background information in your paper, do you explain clearly how it relates to the main topic you are exploring?

The introduction is usually best written after the main body of the paper is complete.

Do you lay out the organization of the paper so the reader can follow the flow of what you are going to say?

The introduction is not a commercial. For example, something like... "Is the universe going to expand forever? Stay tuned and we'll answer this exciting question and thrill you with..." is not appropriate. "Our story begins with..." is also a bad way to start a scientific paper. I want this paper to be training for real research papers which you will some day be submitting to respectable journals.

Main Body

Is your choice of words consistent with scientific writing?

Eliminate meaningless words such as "basically", "obviously", "naturally", "of course", etc.

Does the tone of your paper portray you, the authors, as physicists, as opposed to outsiders to the physics community, as in the following sentence: "Scientists have shown that black holes exist?"

All this does not mean to make your papers sound as dry as possible. It requires you to write very clearly, making your paper flow from one idea to the next.

If you are not sure exactly what an equation or a concept means, are you honest with the reader?

Avoid creating the illusion that you know everything.

Have you eliminated footnotes and parenthetical statements? There are cases where footnotes and parenthetical statements are appropriate; however, if what you say is important enough to include in the paper in the first place it probably should be included in the main body.

Do your transitions lead the reader from one concept to the next without confusion? A good way to test this is to ask a person who is not in the class to read your paper. If he or she has a hard time understanding what you mean, then you need to revise.

When you let someone read your paper, let them use this guide so they can respond more effectively to your paper.

Do your figures have captions (when needed).

Conclusion

Does your conclusion restate the main points you discussed in the main body of the paper?

Do you actually make a conclusion (decision, judgment) about what you have learned? Do not overstate the significance.
Be sure not to introduce new information in your conclusion.

**Documentation**

◊ Have you followed the reference guidelines at the end of this document?
◊ Have you given credit where credit is due, including paraphrases as well as direct quotes?
◊ Did you give credit in figure captions for "borrowed" figures by including a reference.
  For example, at the end of a figure caption you should write something like... Figure
  reproduced from [Spe 97].
◊ Is each referenced work listed only once in the Bibliography, regardless of how many
  times it is cited?

**Miscellaneous**

◊ Did you insert page numbers?
◊ Did your paper use only the present tense except when treating historical events?
◊ Did you treat mathematical expressions as part of a sentence with appropriate
  punctuation?
◊ Where appropriate, integrate good pictures and graphs in your paper.
◊ Do your tables and figures have a paragraph in the text that clearly explain what they
  mean?
◊ Do your tables and graphs appear on the same page where they are discussed whenever
  possible? Does your paper have the appropriate length?

**Before Turning in Your Final Copy**

◊ Did you carefully proofread your final copy for grammar and punctuation errors?
◊ Did you spell-check your paper?
◊ Did a fellow 222 classmate review the paper before you turned in the final copy?
Did you read the paper aloud?

**References:**

You need to reference where you get your information in each paragraph or more often, not just
for quotes, so that anyone wanting to read further about your statement can know where to go.

Include endnote references to your sources within your paper. Each endnote should be listed in
the order that it first appears in the paper. Each reference should only be referred to by one
number or abbreviation. Reference the same number again for multiple citings (don’t use “ibid,”
etc.) Any data, information, or figure which comes from another work should be properly
referenced. A figure, table, etc., which is copied from another work should include the phrase
“reproduced from [x]” in the caption, and x should be a reference to an endnote entry.

**Reference guidelines from American Physical Society (condensed)**

*Superscripts:* references[2] are noted in text by the insertion of numerals as either a superscript
or on line in this manner:

Smith\(^2\) does not agree with the original values given in Ref. 1.

When that use could possibly cause confusion (i.e., \(\text{Pb}^4\)), an in-line form should be used
[Pb (Ref. 4)]. In the footnote listing at the end of the paper use only the superscript form. 

Or, you can use in-line brackets: Arabic numerals in square brackets in this manner:

Smith and Jones [3] also measured ....

Reference indicators should be at least one full space from words (not closed up to them as with superscripts). Multiple reference indicators should be set closed up within a single set of brackets:

Smith and Jones [1,3,5--8] performed .... Reference indicators should be set inside punctuation: The work of Smith [3], that of Jones [4], and our previous work [5--8] disagree with that of Doe and Roe [13]. When the word "reference" is used in specifying a reference, use the abbreviation (unless at the beginning of a sentence) with the indicator in brackets: ... as was shown in Ref. [4]. Note that use of the following form is also acceptable: ... as was shown in [4].

| (a) How to list authors | J. M. Smith, Phys. Rev B 26, 1 (1982).  
| Five or more authors (et al. optional; use of et al. journal specific; note that Phys. Rev. C requires that 10 or fewer authors be listed and et al. not be used in such cases) |  |

| Two sources: | [Note that a semicolon is used between sources.]  

| (c) How to list same author, same source, different volume and page | J. M. Smith, Phys. Rev. B 24, 3 (1981); 26, 1 (1982).  

| (d) How to list same author, same source, same volume number, same year, and different page numbers | J. M. Smith, Phys. Rev. B 26, 1 (1982); 26, 6 (1982). [Note that both page numbers are listed separately.]  

<table>
<thead>
<tr>
<th>(e) How to list different authors and</th>
<th>J. M. Smith, Phys. Rev. B. 26, 1 (1982); R. Brown, Heavy Ions</th>
</tr>
</thead>
<tbody>
<tr>
<td>(f) How to list different authors, same sources</td>
<td>J. M. Smith, Phys. Rev. B 26, 1 (1982); R. Brown, <em>ibid.</em> 24, 3 (1981); C. Green, <em>ibid.</em> 24, 22 (1981). [Note that <em>ibid.</em> is used instead of repeating the journal name.]</td>
</tr>
</tbody>
</table>
J. M. Smith, Phys. Rev. D (to be published). [accepted for publication]  
[published, use italic title; additional information (Vol., Chap., Sec., p., etc.) as appropriate]  
| (l) Preprints (journal specific)                  |                                                                                                                             |
| (m) Theses                                       |                                                                                                                             |
Writing Guidelines
Physics 222

Content:
This part of your evaluation is a measure of the quality of the information in your paper. I will begin by looking at the amount of physics/history you have included. Your sources should include books, review articles and research journal articles, not websites. Use websites only to provide you with tutorial help and to guide you to the primary sources. Review articles such as in Scientific American, or Physics Today are very helpful. Use and cite three or more sources per person in your group. Do not cite the textbook. There should be enough depth that the reader can understand your topic and enough breadth to make the paper significant. The physics should be correct. I will also consider whether you have used good judgment in your choice of ideas to include and exclude. An especially important element is how interesting you can make the physics to your reader. Hopefully, you chose a topic that interested you. I will note how well you have conveyed that same interest to your audience.

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. In particular in the second paper you should make conclusions about the significance or veracity of your information. I will judge how well you discriminated between 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. You will do well in this section if I find your paper convincing and persuasive.

Expression and organization:
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. It should have a well developed focus that ties the entire paper together. Each paragraph should play a role in developing the focus. Paragraphs should be well-connected, with good transitions. They should each deal with a single idea, developing it logically, completely, and concisely. Your style should be appropriate to your audience (fellow 222 students) and topic. Don’t include humor, unless it comes from the scientists you write about.

Format:
The paper’s format and attention to mechanical details will help the reader get information from the paper easily, and will not distract from the flow of the paper. As a minimum, it will include:
◊ Title page with title, authors, and abstract
◊ Abstract: give a summary of what your paper accomplishes
◊ Headings that guide the reader
◊ Figures or tables that have titles and captions. These are referred to by number in the text. They appear with the text close to where they are cited, not all at the end.
◊ Doubled spaced with 1” margins, 12 point font.
◊ References follow the guidelines below.
Grading Sheet

Group_________________ Name___________________________________________

Content (18 pts)
depth / breadth
correctness
judgment
interest
appropriate sources
overall impact

Reasoning (12 pts)
conclusions
discrimination
understanding
logic
persuasiveness

Expression and organization (10 pts)
grammar / spelling
appearance
focus / conciseness
flow
style
organization

Format (10 pts)
General Guidelines for the Term Papers:

Any paper handed in (whether for peer review, review by the writing fellows, or to be read by the professor) should be your very best work. The papers should be typed, grammatically correct, spell checked, and well polished.

The target audience for this assignment is your classmates. As such, you should not spend time covering background material which a typical 222 student should already know. Concepts which go beyond the course, however, should be adequately explained.

If you are confused, you are generally safe when you follow the AIP style guidelines, which can be found at http://www.aip.org/pubservs/style/4thed/toc.html.

Writing Suggestions for Physics 222

While Researching Your Topic
◊ Remember that the topic you cover should go well beyond what is covered in the textbook.
◊ Make sure you are using current sources.
◊ Use both review-type articles and cutting edge research reports. If you have a long list of cutting-edge hard to understand references and one book or review article, I'll know that you pretty much followed one source, and threw the other references in for looks.
◊ The web is a good resource for getting ideas, but... you can't believe something just because it's on the web. Do not cite web pages. Use review articles, peer-reviewed journal articles and books as your sources.
◊ Use and cite more three or more sources per person in your group.

While Writing the Paper
◊ Read your paper out loud --- you will find many mistakes and get a better feel for how the paper flows this way.
◊ Make a detailed outline and follow it --- one of the biggest problems I see on papers for this course is poor organization and lack of a natural flow!
◊ Don't repeat the same information. This can be avoided by good organization.
◊ Don't include every fact that you've discovered. You will learn more while you research the paper than will fit within the focus of your paper. Have the courage to focus your paper and leave out irrelevant discussions.
◊ Try to write a good, solid paper that conveys information in an easy to read manner.
◊ You need to reference where you get your information in each paragraph or more often, not just for quotes, so that anyone wanting to read further about your statement can know where to go.
◊ Beware of using quotes to say something you don't want to explain. In general, quotes should be used only where you want the author's personality to show through.

Abstract
◊ Does your abstract appear on the title page just under the title?
In your abstract do you clearly identify all of the major topics that will be discussed in your paper?

It is best to write the abstract after the paper is in its final form. An abstract is not an introduction, a soundbite, or a commercial for your paper. An abstract should tell us what the paper accomplishes.

Introduction
In the first paragraph or two do you define the subject matter that will be discussed in the paper?

Is there a thesis statement early in the introduction?
Are you comfortable with the scope of your paper? Is your paper broad enough to be significant? Is it narrow enough to be adequately covered within the time and space allotted?

If you include a section of background information in your paper, do you explain clearly how it relates to the main topic you are exploring?

The introduction is usually best written after the main body of the paper is complete.

Do you lay out the organization of the paper so the reader can follow the flow of what you are going to say?

The introduction is not a commercial. For example, something like... "Is the universe going to expand forever? Stay tuned and we'll answer this exciting question and thrill you with..." is not appropriate. "Our story begins with..." is also a bad way to start a scientific paper. I want this paper to be training for real research papers which you will some day be submitting to respectable journals.

Main Body

Is your choice of words consistent with scientific writing?

Eliminate meaningless words such as "basically", "obviously", "naturally", "of course", etc.

Does the tone of your paper portray you, the authors, as physicists, as opposed to outsiders to the physics community, as in the following sentence: "Scientists have shown that black holes exist?"

All this does not mean to make your papers sound as dry as possible. It requires you to write very clearly, making your paper flow from one idea to the next.

If you are not sure exactly what an equation or a concept means, are you honest with the reader?

Avoid creating the illusion that you know everything.

Have you eliminated footnotes and parenthetical statements? There are cases where footnotes and parenthetical statements are appropriate; however, if what you say is important enough to include in the paper in the first place it probably should be included in the main body.

Do your transitions lead the reader from one concept to the next without confusion? A good way to test this is to ask a person who is not in the class to read your paper. If he or she has a hard time understanding what you mean, then you need to revise.

When you let someone read your paper, let them use this guide so they can respond more effectively to your paper.

Do your figures have captions (when needed).

Conclusion

Does your conclusion restate the main points you discussed in the main body of the paper?

Do you actually make a conclusion (decision, judgment) about what you have learned? Do not overstate the significance.
◊ Be sure not to introduce new information in your conclusion.

Documentation
◊ Have you followed the reference guidelines at the end of this document?
◊ Have you given credit where credit is due, including paraphrases as well as direct quotes?
◊ Did you give credit in figure captions for "borrowed" figures by including a reference. For example, at the end of a figure caption you should write something like... Figure reproduced from [Spe 97].
◊ Is each referenced work listed only once in the Bibliography, regardless of how many times it is cited?

Miscellaneous
◊ Did you insert page numbers?
◊ Did your paper use only the present tense except when treating historical events?
◊ Did you treat mathematical expressions as part of a sentence with appropriate punctuation?
◊ Where appropriate, integrate good pictures and graphs in your paper.
◊ Do your tables and figures have a paragraph in the text that clearly explain what they mean?
◊ Do your tables and graphs appear on the same page where they are discussed whenever possible? Does your paper have the appropriate length?

Before Turning in Your Final Copy
◊ Did you carefully proofread your final copy for grammar and punctuation errors?
◊ Did you spell-check your paper?
◊ Did a fellow 222 classmate review the paper before you turned in the final copy?
 Did you read the paper aloud?

References :

You need to reference where you get your information in each paragraph or more often, not just for quotes, so that anyone wanting to read further about your statement can know where to go.

Include endnote references to your sources within your paper. Each endnote should be listed in the order that it first appears in the paper. Each reference should only be referred to by one number or abbreviation. Reference the same number again for multiple citings (don’t use “ibid,” etc.) Any data, information, or figure which comes from another work should be properly referenced. A figure, table, etc., which is copied from another work should include the phrase “reproduced from [x]” in the caption, and x should be a reference to an endnote entry.

Reference guidelines from American Physical Society (condensed)

Superscripts: references[type (2)] are noted in text by the insertion of numerals as either a superscript or on line in this manner:

Smith\(^2\) does not agree with the original values given in Ref. 1.
When that use could possibly cause confusion (i.e., Pb\(^4\)), an in-line form should be used
[Pb (Ref. 4)]. In the footnote listing at the end of the paper use only the superscript form. *Or, you can use in-line brackets:* Arabic numerals in square brackets in this manner:

Smith and Jones [3] also measured ....

Reference indicators should be at least one full space from words (not closed up to them as with superscripts). Multiple reference indicators should be set closed up within a single set of brackets: Smith and Jones [1,3,5--8] performed .... Reference indicators should be set inside punctuation: The work of Smith [3], that of Jones [4], and our previous work [5--8] disagree with that of Doe and Roe [13]. When the word "reference" is used in specifying a reference, use the abbreviation (unless at the beginning of a sentence) with the indicator in brackets: ... as was shown in Ref. [4]. Note that use of the following form is also acceptable: ... as was shown in [4].

<table>
<thead>
<tr>
<th>(a) How to list authors</th>
<th>J. M. Smith, Phys. Rev B 26, 1 (1982).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Five or more authors (<em>et al.</em> optional; use of <em>et al.</em> journal specific; note that Phys. Rev. C requires that 10 or fewer authors be listed and <em>et al.</em> not be used in such cases)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Three or more sources:</td>
<td>Note that a semicolon is used between sources.</td>
</tr>
</tbody>
</table>

| (c) How to list same author, same source, different volume and page | J. M. Smith, Phys. Rev. B 24, 3 (1981); 26, 1 (1982). |

| (d) How to list same author, same source, same volume number, same year, and different page numbers | J. M. Smith, Phys. Rev. B 26, 1 (1982); 26, 6 (1982). [Note that both page numbers are listed separately.] |

| (e) How to list different authors and                      | J. M. Smith, Phys. Rev. B. 26, 1 (1982); R. Brown, *Heavy Ions* |

| (f) How to list different authors and                      | J. M. Smith, Phys. Rev. B. 26, 1 (1982); R. Brown, *Heavy Ions* |

| (g) How to list different authors and                      | J. M. Smith, Phys. Rev. B. 26, 1 (1982); R. Brown, *Heavy Ions* |

| (h) How to list different authors and                      | J. M. Smith, Phys. Rev. B. 26, 1 (1982); R. Brown, *Heavy Ions* |

| (i) How to list different authors and                      | J. M. Smith, Phys. Rev. B. 26, 1 (1982); R. Brown, *Heavy Ions* |

| (j) How to list different authors and                      | J. M. Smith, Phys. Rev. B. 26, 1 (1982); R. Brown, *Heavy Ions* |

| (k) How to list different authors and                      | J. M. Smith, Phys. Rev. B. 26, 1 (1982); R. Brown, *Heavy Ions* |

| (l) How to list different authors and                      | J. M. Smith, Phys. Rev. B. 26, 1 (1982); R. Brown, *Heavy Ions* |

| (m) How to list different authors and                      | J. M. Smith, Phys. Rev. B. 26, 1 (1982); R. Brown, *Heavy Ions* |

| (n) How to list different authors and                      | J. M. Smith, Phys. Rev. B. 26, 1 (1982); R. Brown, *Heavy Ions* |

| (o) How to list different authors and                      | J. M. Smith, Phys. Rev. B. 26, 1 (1982); R. Brown, *Heavy Ions* |

| (p) How to list different authors and                      | J. M. Smith, Phys. Rev. B. 26, 1 (1982); R. Brown, *Heavy Ions* |

| (q) How to list different authors and                      | J. M. Smith, Phys. Rev. B. 26, 1 (1982); R. Brown, *Heavy Ions* |

| (r) How to list different authors and                      | J. M. Smith, Phys. Rev. B. 26, 1 (1982); R. Brown, *Heavy Ions* |

| (s) How to list different authors and                      | J. M. Smith, Phys. Rev. B. 26, 1 (1982); R. Brown, *Heavy Ions* |

| (t) How to list different authors and                      | J. M. Smith, Phys. Rev. B. 26, 1 (1982); R. Brown, *Heavy Ions* |

| (u) How to list different authors and                      | J. M. Smith, Phys. Rev. B. 26, 1 (1982); R. Brown, *Heavy Ions* |

| (v) How to list different authors and                      | J. M. Smith, Phys. Rev. B. 26, 1 (1982); R. Brown, *Heavy Ions* |

| (w) How to list different authors and                      | J. M. Smith, Phys. Rev. B. 26, 1 (1982); R. Brown, *Heavy Ions* |

| (x) How to list different authors and                      | J. M. Smith, Phys. Rev. B. 26, 1 (1982); R. Brown, *Heavy Ions* |

| (y) How to list different authors and                      | J. M. Smith, Phys. Rev. B. 26, 1 (1982); R. Brown, *Heavy Ions* |

<table>
<thead>
<tr>
<th>(z) How to list different authors and</th>
<th>J. M. Smith, Phys. Rev. B. 26, 1 (1982); R. Brown, <em>Heavy Ions</em></th>
</tr>
</thead>
</table>
J. M. Smith, Phys. Rev. D (to be published). [accepted for publication]  
[published, use italic title; additional information (Vol., Chap., Sec., p., etc.) as appropriate]  
|                  | [Most reports are considered to be unpublished. Those reports considered as full publications should be designated without the parenthetical unpublished at the end of the reference.]  
| (l) Preprints (journal specific) | |
| (m) Theses       | |
| (n) Others       | J. M. Smith (private communication).  
|                  | [cited in another paper]  
Writing Guidelines  
Physics 222  

Content:  
This part of your evaluation is a measure of the quality of the information in your paper. I will begin by looking at the amount of physics/history you have included. Your sources should include books, review articles and research journal articles, not websites. Use websites only to provide you with tutorial help and to guide you to the primary sources. Review articles such as in Scientific American, or Physics Today are very helpful. Use and cite three or more sources per person in your group. Do not cite the textbook. There should be enough depth that the reader can understand your topic and enough breadth to make the paper significant. The physics should be correct. I will also consider whether you have used good judgment in your choice of ideas to include and exclude. An especially important element is how interesting you can make the physics to your reader. Hopefully, you chose a topic that interested you. I will note how well you have conveyed that same interest to your audience.  

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. In particular in the second paper you should make conclusions about the significance or veracity of your information. I will judge how well you discriminated between 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. You will do well in this section if I find your paper convincing and persuasive.  

Expression and organization:  
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. It should have a well developed focus that ties the entire paper together. Each paragraph should play a role in developing the focus. Paragraphs should be well-connected, with good transitions. They should each deal with a single idea, developing it logically, completely, and concisely. Your style should be appropriate to your audience (fellow 222 students) and topic. Don’t include humor, unless it comes from the scientists you write about.  

Format:  
The paper’s format and attention to mechanical details will help the reader get information from the paper easily, and will not distract from the flow of the paper. As a minimum, it will include:  
◊ Title page with title, authors, and abstract  
◊ Abstract: give a summary of what your paper accomplishes  
◊ Headings that guide the reader  
◊ Figures or tables that have titles and captions. These are referred to by number in the text. They appear with the text close to where they are cited, not all at the end.  
◊ Doubled spaced with 1”margins, 12 point font.  
◊ References follow the guidelines below.
Grading Sheet

Group_________________ Name___________________________________________

Content (18 pts)
depth / breadth
correctness
judgment
interest
appropriate sources
overall impact

Reasoning (12 pts)
conclusions
discrimination
understanding
logic
persuasiveness

Expression and organization (10 pts)
grammar / spelling
appearance
focus / conciseness
flow
style
organization

Format  (10 pts)
General Guidelines for the Term Papers:

Any paper handed in (whether for peer review, review by the writing fellows, or to be read by the professor) should be your very best work. The papers should be typed, grammatically correct, spell checked, and well polished.

The target audience for this assignment is your classmates. As such, you should not spend time covering background material which a typical 222 student should already know. Concepts which go beyond the course, however, should be adequately explained.

If you are confused, you are generally safe when you follow the AIP style guidelines, which can be found at http://www.aip.org/pubservs/style/4thed/toc.html.

Writing Suggestions for Physics 222

While Researching Your Topic

◊ Remember that the topic you cover should go well beyond what is covered in the textbook.
◊ Make sure you are using current sources.
◊ Use both review-type articles and cutting edge research reports. If you have a long list of cutting-edge hard to understand references and one book or review article, I'll know that you pretty much followed one source, and threw the other references in for looks.
◊ The web is a good resource for getting ideas, but... you can't believe something just because it's on the web. Do not cite web pages. Use review articles, peer-reviewed journal articles and books as your sources.
◊ Use and cite more three or more sources per person in your group.

While Writing the Paper

◊ Read your paper out loud --- you will find many mistakes and get a better feel for how the paper flows this way.
◊ Make a detailed outline and follow it --- one of the biggest problems I see on papers for this course is poor organization and lack of a natural flow!
◊ Don't repeat the same information. This can be avoided by good organization.
◊ Don't include every fact that you've discovered. You will learn more while you research the paper than will fit within the focus of your paper. Have the courage to focus your paper and leave out irrelevant discussions.
◊ Try to write a good, solid paper that conveys information in an easy to read manner.
◊ You need to reference where you get your information in each paragraph or more often, not just for quotes, so that anyone wanting to read further about your statement can know where to go.
◊ Beware of using quotes to say something you don't want to explain. In general, quotes should be used only where you want the author's personality to show through.

Abstract

◊ Does your abstract appear on the title page just under the title?
In your abstract do you clearly identify all of the major topics that will be discussed in your paper?

It is best to write the abstract after the paper is in its final form. An abstract is not an introduction, a soundbite, or a commercial for your paper. An abstract should tell us what the paper accomplishes.

**Introduction**

In the first paragraph or two do you define the subject matter that will be discussed in the paper?

Is there a thesis statement early in the introduction?

Are you comfortable with the scope of your paper? Is your paper broad enough to be significant? Is it narrow enough to be adequately covered within the time and space allotted?

- If you include a section of background information in your paper, do you explain clearly how it relates to the main topic you are exploring?
- The introduction is usually best written after the main body of the paper is complete.
- Do you lay out the organization of the paper so the reader can follow the flow of what you are going to say?
- The introduction is not a commercial. For example, something like... "Is the universe going to expand forever? Stay tuned and we'll answer this exciting question and thrill you with..." is not appropriate. "Our story begins with..." is also a bad way to start a scientific paper. I want this paper to be training for real research papers which you will some day be submitting to respectable journals.

**Main Body**

- Is your choice of words consistent with scientific writing?
- Eliminate meaningless words such as "basically", "obviously", "naturally", "of course", etc.
- Does the tone of your paper portray you, the authors, as physicists, as opposed to outsiders to the physics community, as in the following sentence: "Scientists have shown that black holes exist?"
- All this does not mean to make your papers sound as dry as possible. It requires you to write very clearly, making your paper flow from one idea to the next.
- If you are not sure exactly what an equation or a concept means, are you honest with the reader?
- Avoid creating the illusion that you know everything.
- Have you eliminated footnotes and parenthetical statements? There are cases where footnotes and parenthetical statements are appropriate; however, if what you say is important enough to include in the paper in the first place it probably should be included in the main body.
- Do your transitions lead the reader from one concept to the next without confusion? A good way to test this is to ask a person who is not in the class to read your paper. If he or she has a hard time understanding what you mean, then you need to revise.
- When you let someone read your paper, let them use this guide so they can respond more effectively to your paper.
- Do your figures have captions (when needed).

**Conclusion**

- Does your conclusion restate the main points you discussed in the main body of the paper?
- Do you actually make a conclusion (decision, judgment) about what you have learned? Do not overstate the significance.
Be sure not to introduce new information in your conclusion.

**Documentation**
- Have you followed the reference guidelines at the end of this document?
- Have you given credit where credit is due, including paraphrases as well as direct quotes?
- Did you give credit in figure captions for "borrowed" figures by including a reference. For example, at the end of a figure caption you should write something like... Figure reproduced from [Spe 97].
- Is each referenced work listed only once in the Bibliography, regardless of how many times it is cited?

**Miscellaneous**
- Did you insert page numbers?
- Did your paper use only the present tense except when treating historical events?
- Did you treat mathematical expressions as part of a sentence with appropriate punctuation?
- Where appropriate, integrate good pictures and graphs in your paper.
- Do your tables and figures have a paragraph in the text that clearly explain what they mean?
- Do your tables and graphs appear on the same page where they are discussed whenever possible? Does your paper have the appropriate length?

**Before Turning in Your Final Copy**
- Did you carefully proofread your final copy for grammar and punctuation errors?
- Did you spell-check your paper?
- Did a fellow 222 classmate review the paper before you turned in the final copy?

Did you read the paper aloud?

**References**

You need to reference where you get your information in each paragraph or more often, not just for quotes, so that anyone wanting to read further about your statement can know where to go.

Include endnote references to your sources within your paper. Each endnote should be listed in the order that it first appears in the paper. Each reference should only be referred to by one number or abbreviation. Reference the same number again for multiple citings (don’t use “ibid,” etc.) Any data, information, or figure which comes from another work should be properly referenced. A figure, table, etc., which is copied from another work should include the phrase “reproduced from [x]” in the caption, and x should be a reference to an endnote entry.

**Reference guidelines from American Physical Society (condensed)**

*Superscripts:* references[type (2)] are noted in text by the insertion of numerals as either a superscript or on line in this manner:

- Smith$^2$ does not agree with the original values given in Ref. 1.
- When that use could possibly cause confusion (i.e., Pb$^4$), an in-line form should be used
Reference indicators should be at least one full space from words (not closed up to them as with superscripts). Multiple reference indicators should be set closed up within a single set of brackets: Smith and Jones \cite{1,3,5--8} performed .... Reference indicators should be set inside punctuation: The work of Smith \cite{3}, that of Jones \cite{4}, and our previous work \cite{5--8} disagree with that of Doe and Roe \cite{13}. When the word "reference" is used in specifying a reference, use the abbreviation (unless at the beginning of a sentence) with the indicator in brackets: ... as was shown in Ref. \cite{4}. Note that use of the following form is also acceptable: ... as was shown in \cite{4}.

<table>
<thead>
<tr>
<th>(a) How to list authors</th>
<th>J. M. Smith, Phys. Rev B 26, 1 (1982).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Five or more authors (\textit{et al.} optional; use of \textit{et al.} journal specific; note that Phys. Rev. C requires that 10 or fewer authors be listed and \textit{et al.} not be used in such cases)</td>
<td></td>
</tr>
</tbody>
</table>

|------------------------|--------------------------------------------------------------------------|

<table>
<thead>
<tr>
<th>(c) How to list same author, same source, different volume and page</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>(d) How to list same author, same source, same volume number, same year, and different page numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>J. M. Smith, Phys. Rev. B 26, 1 (1982); 26, 6 (1982). [Note that both page numbers are listed separately.]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(e) How to list different authors and</th>
</tr>
</thead>
<tbody>
<tr>
<td>------------------------------------</td>
</tr>
</tbody>
</table>
J. M. Smith, Phys. Rev. D (to be published). [accepted for publication]  
<table>
<thead>
<tr>
<th>Type</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>[Most reports are considered to be unpublished. Those reports considered as full publications should be designated without the parenthetical unpublished at the end of the reference.]</td>
</tr>
<tr>
<td>(l) Preprints (journal specific)</td>
<td></td>
</tr>
<tr>
<td>(m) Theses</td>
<td>J. M. Smith (private communication).</td>
</tr>
</tbody>
</table>
Writing Guidelines
Physics 222

Content:
This part of your evaluation is a measure of the quality of the information in your paper. I will begin by looking at the amount of physics/history you have included. Your sources should include books, review articles and research journal articles, not websites. Use websites only to provide you with tutorial help and to guide you to the primary sources. Review articles such as in Scientific American, or Physics Today are very helpful. Use and cite three or more sources per person in your group. Do not cite the textbook. There should be enough depth that the reader can understand your topic and enough breadth to make the paper significant. The physics should be correct. I will also consider whether you have used good judgment in your choice of ideas to include and exclude. An especially important element is how interesting you can make the physics to your reader. Hopefully, you chose a topic that interested you. I will note how well you have conveyed that same interest to your audience.

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. In particular in the second paper you should make conclusions about the significance or veracity of your information. I will judge how well you discriminated between 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. You will do well in this section if I find your paper convincing and persuasive.

Expression and organization:
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. It should have a well developed focus that ties the entire paper together. Each paragraph should play a role in developing the focus. Paragraphs should be well-connected, with good transitions. They should each deal with a single idea, developing it logically, completely, and concisely. Your style should be appropriate to your audience (fellow 222 students) and topic. Don’t include humor, unless it comes from the scientists you write about.

Format:
The paper’s format and attention to mechanical details will help the reader get information from the paper easily, and will not distract from the flow of the paper. As a minimum, it will include:
◊ Title page with title, authors, and abstract
◊ Abstract: give a summary of what your paper accomplishes
◊ Headings that guide the reader
◊ Figures or tables that have titles and captions. These are referred to by number in the text. They appear with the text close to where they are cited, not all at the end.
◊ Doubled spaced with 1”margins, 12 point font.
◊ References follow the guidelines below.
Grading Sheet

Group_________________ Name___________________________________________

Content (18 pts)
depth / breadth
correctness
judgment
interest
appropriate sources
overall impact

Reasoning (12 pts)
conclusions
discrimination
understanding
logic
persuasiveness

Expression and organization (10 pts)
graham / spelling
appearance
focus / conciseness
flow
style
organization

Format (10 pts)
General Guidelines for the Term Papers:

Any paper handed in (whether for peer review, review by the writing fellows, or to be read by the professor) should be your very best work. The papers should be typed, grammatically correct, spell checked, and well polished.

The target audience for this assignment is your classmates. As such, you should not spend time covering background material which a typical 222 student should already know. Concepts which go beyond the course, however, should be adequately explained.

If you are confused, you are generally safe when you follow the AIP style guidelines, which can be found at http://www.aip.org/pubservs/style/4thed/toc.html.

Writing Suggestions for Physics 222

While Researching Your Topic
- Remember that the topic you cover should go well beyond what is covered in the textbook.
- Make sure you are using current sources.
- Use both review-type articles and cutting edge research reports. If you have a long list of cutting-edge hard to understand references and one book or review article, I'll know that you pretty much followed one source, and threw the other references in for looks.
- The web is a good resource for getting ideas, but... you can't believe something just because it's on the web. Do not cite web pages. Use review articles, peer-reviewed journal articles and books as your sources.
- Use and cite more three or more sources per person in your group.

While Writing the Paper
- Read your paper out loud --- you will find many mistakes and get a better feel for how the paper flows this way.
- Make a detailed outline and follow it --- one of the biggest problems I see on papers for this course is poor organization and lack of a natural flow!
- Don't repeat the same information. This can be avoided by good organization.
- Don't include every fact that you've discovered. You will learn more while you research the paper than will fit within the focus of your paper. Have the courage to focus your paper and leave out irrelevant discussions.
- Try to write a good, solid paper that conveys information in an easy to read manner.
- You need to reference where you get your information in each paragraph or more often, not just for quotes, so that anyone wanting to read further about your statement can know where to go.
- Beware of using quotes to say something you don't want to explain. In general, quotes should be used only where you want the author's personality to show through.

Abstract
- Does your abstract appear on the title page just under the title?
In your abstract do you clearly identify all of the major topics that will be discussed in your paper?
◊ It is best to write the abstract after the paper is in its final form. An abstract is not an introduction, a soundbite, or a commercial for your paper. An abstract should tell us what the paper accomplishes.

**Introduction**

In the first paragraph or two do you define the subject matter that will be discussed in the paper?

**Is there a thesis statement early in the introduction?**

Are you comfortable with the scope of your paper? Is your paper broad enough to be significant? Is it narrow enough to be adequately covered within the time and space allotted?

◊ If you include a section of background information in your paper, do you explain clearly how it relates to the main topic you are exploring?
◊ The introduction is usually best written after the main body of the paper is complete.
◊ Do you lay out the organization of the paper so the reader can follow the flow of what you are going to say?
◊ The introduction is not a commercial. For example, something like... "Is the universe going to expand forever? Stay tuned and we'll answer this exciting question and thrill you with..." is not appropriate. "Our story begins with..." is also a bad way to start a scientific paper. I want this paper to be training for real research papers which you will some day be submitting to respectable journals.

**Main Body**

◊ Is your choice of words consistent with scientific writing?
◊ Eliminate meaningless words such as "basically", "obviously", "naturally", "of course", etc.
◊ Does the tone of your paper portray you, the authors, as physicists, as opposed to outsiders to the physics community, as in the following sentence: "Scientists have shown that black holes exist?"
◊ All this does not mean to make your papers sound as dry as possible. It requires you to write very clearly, making your paper flow from one idea to the next.
◊ If you are not sure exactly what an equation or a concept means, are you honest with the reader?
◊ Avoid creating the illusion that you know everything.
◊ Have you eliminated footnotes and parenthetical statements? There are cases where footnotes and parenthetical statements are appropriate; however, if what you say is important enough to include in the paper in the first place it probably should be included in the main body.
◊ Do your transitions lead the reader from one concept to the next without confusion? A good way to test this is to ask a person who is not in the class to read your paper. If he or she has a hard time understanding what you mean, then you need to revise.
◊ When you let someone read your paper, let them use this guide so they can respond more effectively to your paper.
◊ Do your figures have captions (when needed).

**Conclusion**

◊ Does your conclusion restate the main points you discussed in the main body of the paper?
◊ Do you actually make a conclusion (decision, judgment) about what you have learned? Do not overstate the significance.
◊ Be sure not to introduce new information in your conclusion.

**Documentation**
◊ Have you followed the reference guidelines at the end of this document?
◊ Have you given credit where credit is due, including paraphrases as well as direct quotes?
◊ Did you give credit in figure captions for "borrowed" figures by including a reference. For example, at the end of a figure caption you should write something like... Figure reproduced from [Spe 97].
◊ Is each referenced work listed only once in the Bibliography, regardless of how many times it is cited?

**Miscellaneous**
◊ Did you insert page numbers?
◊ Did your paper use only the present tense except when treating historical events?
◊ Did you treat mathematical expressions as part of a sentence with appropriate punctuation?
◊ Where appropriate, integrate good pictures and graphs in your paper.
◊ Do your tables and figures have a paragraph in the text that clearly explain what they mean?
◊ Do your tables and graphs appear on the same page where they are discussed whenever possible? Does your paper have the appropriate length?

**Before Turning in Your Final Copy**
◊ Did you carefully proofread your final copy for grammar and punctuation errors?
◊ Did you spell-check your paper?
◊ Did a fellow 222 classmate review the paper before you turned in the final copy?

Did you read the paper aloud?

**References:**

You need to reference where you get your information in each paragraph or more often, not just for quotes, so that anyone wanting to read further about your statement can know where to go.

Include endnote references to your sources within your paper. Each endnote should be listed in the order that it first appears in the paper. Each reference should only be referred to by one number or abbreviation. Reference the same number again for multiple citings (don’t use “ibid,” etc.) Any data, information, or figure which comes from another work should be properly referenced. A figure, table, etc., which is copied from another work should include the phrase “reproduced from [x]” in the caption, and x should be a reference to an endnote entry.

**Reference guidelines from American Physical Society (condensed)**

*Superscripts:* references[2] are noted in text by the insertion of numerals as either a superscript or on line in this manner:

Smith\textsuperscript{2} does not agree with the original values given in Ref. 1.

When that use could possibly cause confusion (i.e., Pb\textsuperscript{4}), an in-line form should be used
In the footnote listing at the end of the paper use only the superscript form.

Or, you can use in-line brackets: Arabic numerals in square brackets in this manner:

Smith and Jones [3] also measured ....

Reference indicators should be at least one full space from words (not closed up to them as with superscripts). Multiple reference indicators should be set closed up within a single set of brackets: Smith and Jones [1,3,5--8] performed .... Reference indicators should be set inside punctuation: The work of Smith [3], that of Jones [4], and our previous work [5--8] disagree with that of Doe and Roe [13]. When the word "reference" is used in specifying a reference, use the abbreviation (unless at the beginning of a sentence) with the indicator in brackets: ... as was shown in Ref. [4]. Note that use of the following form is also acceptable: ... as was shown in [4].

<table>
<thead>
<tr>
<th>(a) How to list authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>One author:</td>
</tr>
<tr>
<td>Two authors:</td>
</tr>
<tr>
<td>Three or four authors:</td>
</tr>
<tr>
<td>Five or more authors (et al. optional; use of et al. journal specific; note that Phys. Rev. C requires that 10 or fewer authors be listed and et al. not be used in such cases)</td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>(b) How to list sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>One source:</td>
</tr>
<tr>
<td>Two sources:</td>
</tr>
<tr>
<td>Three or more sources:</td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>(c) How to list same author, same source, different volume and page</th>
</tr>
</thead>
</table>


<table>
<thead>
<tr>
<th>(d) How to list same author, same source, same volume number, same year, and different page numbers</th>
</tr>
</thead>
</table>

| J. M. Smith, Phys. Rev. B 26, 1 (1982); 26, 6 (1982). [Note that both page numbers are listed separately.] |

<table>
<thead>
<tr>
<th>(e) How to list different authors and</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>(f) How to list different authors, same sources</strong></td>
<td>J. M. Smith, Phys. Rev. B 26, 1 (1982); R. Brown, <em>ibid.</em> 24, 3 (1981); C. Green, <em>ibid.</em> 24, 22 (1981). [Note that <em>ibid.</em> is used instead of repeating the journal name.]</td>
</tr>
</tbody>
</table>
J. M. Smith, Phys. Rev. D (to be published). [accepted for publication]  
[published, use italic title; additional information (Vol., Chap., Sec., p., etc.) as appropriate]  
|                               | [Most reports are considered to be unpublished. Those reports considered as full publications should be designated without the parenthetical unpublished at the end of the reference.]  
| (l) Preprints (journal specific) |  |
| (m) Theses                     |  |
| (n) Others                     | J. M. Smith (private communication).  
|                               | [cited in another paper]  
Writing Guidelines
Physics 222

Content:
This part of your evaluation is a measure of the quality of the information in your paper. I will begin by looking at the amount of physics/history you have included. Your sources should include books, review articles and research journal articles, not websites. Use websites only to provide you with tutorial help and to guide you to the primary sources. Review articles such as in Scientific American, or Physics Today are very helpful. Use and cite three or more sources per person in your group. Do not cite the textbook. There should be enough depth that the reader can understand your topic and enough breadth to make the paper significant. The physics should be correct. I will also consider whether you have used good judgment in your choice of ideas to include and exclude. An especially important element is how interesting you can make the physics to your reader. Hopefully, you chose a topic that interested you. I will note how well you have conveyed that same interest to your audience.

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. In particular in the second paper you should make conclusions about the significance or veracity of your information. I will judge how well you discriminated between 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. You will do well in this section if I find your paper convincing and persuasive.

Expression and organization:
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. It should have a well developed focus that ties the entire paper together. Each paragraph should play a role in developing the focus. Paragraphs should be well-connected, with good transitions. They should each deal with a single idea, developing it logically, completely, and concisely. Your style should be appropriate to your audience (fellow 222 students) and topic. Don’t include humor, unless it comes from the scientists you write about.

Format:
The paper’s format and attention to mechanical details will help the reader get information from the paper easily, and will not distract from the flow of the paper. As a minimum, it will include:
◊ Title page with title, authors, and abstract
◊ Abstract: give a summary of what your paper accomplishes
◊ Headings that guide the reader
◊ Figures or tables that have titles and captions. These are referred to by number in the text. They appear with the text close to where they are cited, not all at the end.
◊ Doubled spaced with 1”margins, 12 point font.
◊ References follow the guidelines below.
Grading Sheet

Group_________________ Name___________________________________________

Content (18 pts)
depth / breadth
Correctness
Judgment
Interest
Appropriate sources
Overall impact

Reasoning (12 pts)
Conclusions
Discrimination
Understanding
Logic
Persuasiveness

Expression and organization (10 pts)
Grammar / spelling
Appearance
Focus / conciseness
Flow
Style
Organization

Format (10 pts)
General Guidelines for the Term Papers:

Any paper handed in (whether for peer review, review by the writing fellows, or to be read by the professor) should be your very best work. The papers should be typed, grammatically correct, spell checked, and well polished.

The target audience for this assignment is your classmates. As such, you should not spend time covering background material which a typical 222 student should already know. Concepts which go beyond the course, however, should be adequately explained.

If you are confused, you are generally safe when you follow the AIP style guidelines, which can be found at http://www.aip.org/pubservs/style/4thed/toc.html.

Writing Suggestions for Physics 222

While Researching Your Topic
◊ Remember that the topic you cover should go well beyond what is covered in the textbook.
◊ Make sure you are using current sources.
◊ Use both review-type articles and cutting edge research reports. If you have a long list of cutting-edge hard to understand references and one book or review article, I'll know that you pretty much followed one source, and threw the other references in for looks.
◊ The web is a good resource for getting ideas, but... you can't believe something just because it's on the web. Do not cite web pages. Use review articles, peer-reviewed journal articles and books as your sources.
◊ Use and cite more three or more sources per person in your group.

While Writing the Paper
◊ Read your paper out loud --- you will find many mistakes and get a better feel for how the paper flows this way.
◊ Make a detailed outline and follow it --- one of the biggest problems I see on papers for this course is poor organization and lack of a natural flow!
◊ Don't repeat the same information. This can be avoided by good organization.
◊ Don't include every fact that you've discovered. You will learn more while you research the paper than will fit within the focus of your paper. Have the courage to focus your paper and leave out irrelevant discussions.
◊ Try to write a good, solid paper that conveys information in an easy to read manner.
◊ You need to reference where you get your information in each paragraph or more often, not just for quotes, so that anyone wanting to read further about your statement can know where to go.
◊ Beware of using quotes to say something you don't want to explain. In general, quotes should be used only where you want the author's personality to show through.

Abstract
◊ Does your abstract appear on the title page just under the title?
In your abstract do you clearly identify all of the major topics that will be discussed in your paper?

It is best to write the abstract after the paper is in its final form. **An abstract is not an introduction, a soundbite, or a commercial for your paper.** An abstract should tell us what the paper **accomplishes.**

**Introduction**

In the first paragraph or two do you define the subject matter that will be discussed in the paper? **Is there a thesis statement early in the introduction?**

Are you comfortable with the scope of your paper? Is your paper broad enough to be significant? Is it narrow enough to be adequately covered within the time and space allotted?

- If you include a section of background information in your paper, do you explain clearly how it relates to the main topic you are exploring?
- The introduction is usually best written after the main body of the paper is complete.
- Do you lay out the organization of the paper so the reader can follow the flow of what you are going to say?
- The introduction is not a commercial. For example, something like... "Is the universe going to expand forever? Stay tuned and we'll answer this exciting question and thrill you with..." is not appropriate. "Our story begins with..." is also a bad way to start a scientific paper. I want this paper to be training for real research papers which you will some day be submitting to respectable journals.

**Main Body**

- Is your choice of words consistent with scientific writing?
- Eliminate meaningless words such as "basically", "obviously", "naturally", "of course", etc.
- Does the tone of your paper portray you, the authors, as physicists, as opposed to outsiders to the physics community, as in the following sentence: "Scientists have shown that black holes exist?"
- All this does not mean to make your papers sound as dry as possible. It requires you to write very clearly, making your paper flow from one idea to the next.
- If you are not sure exactly what an equation or a concept means, are you honest with the reader?
- Avoid creating the illusion that you know everything.
- Have you eliminated footnotes and parenthetical statements? There are cases where footnotes and parenthetical statements are appropriate; however, if what you say is important enough to include in the paper in the first place it probably should be included in the main body.
- Do your transitions lead the reader from one concept to the next without confusion? A good way to test this is to ask a person who is not in the class to read your paper. If he or she has a hard time understanding what you mean, then you need to revise.
- When you let someone read your paper, let them use this guide so they can respond more effectively to your paper.
- Do your figures have captions (when needed).

**Conclusion**

- Does your conclusion restate the main points you discussed in the main body of the paper?
- Do you actually make a conclusion (decision, judgment) about what you have learned? Do not overstate the significance.
◊ Be sure not to introduce new information in your conclusion.

Documentation
◊ Have you followed the reference guidelines at the end of this document?
◊ Have you given credit where credit is due, including paraphrases as well as direct quotes?
◊ Did you give credit in figure captions for "borrowed" figures by including a reference. For example, at the end of a figure caption you should write something like... Figure reproduced from [Spe 97].
◊ Is each referenced work listed only once in the Bibliography, regardless of how many times it is cited?

Miscellaneous
◊ Did you insert page numbers?
◊ Did your paper use only the present tense except when treating historical events?
◊ Did you treat mathematical expressions as part of a sentence with appropriate punctuation?
◊ Where appropriate, integrate good pictures and graphs in your paper.
◊ Do your tables and figures have a paragraph in the text that clearly explain what they mean?
◊ Do your tables and graphs appear on the same page where they are discussed whenever possible? Does your paper have the appropriate length?

Before Turning in Your Final Copy
◊ Did you carefully proofread your final copy for grammar and punctuation errors?
◊ Did you spell-check your paper?
◊ Did a fellow 222 classmate review the paper before you turned in the final copy?
Did you read the paper aloud?

References:

You need to reference where you get your information in each paragraph or more often, not just for quotes, so that anyone wanting to read further about your statement can know where to go.

Include endnote references to your sources within your paper. Each endnote should be listed in the order that it first appears in the paper. Each reference should only be referred to by one number or abbreviation. Reference the same number again for multiple citings (don’t use “ibid,” etc.) Any data, information, or figure which comes from another work should be properly referenced. A figure, table, etc., which is copied from another work should include the phrase “reproduced from [x]” in the caption, and x should be a reference to an endnote entry.

Reference guidelines from American Physical Society (condensed)

Superscripts: references[type (2)] are noted in text by the insertion of numerals as either a superscript or on line in this manner:

Smith\(^2\) does not agree with the original values given in Ref. 1.
When that use could possibly cause confusion (i.e., Pb\(^4\)), an in-line form should be used
[Pb (Ref. 4)]. In the footnote listing at the end of the paper use only the superscript form. Or, you can use in-line brackets: Arabic numerals in square brackets in this manner:

Smith and Jones [3] also measured ...

Reference indicators should be at least one full space from words (not closed up to them as with superscripts). Multiple reference indicators should be set closed up within a single set of brackets: Smith and Jones [1,3,5--8] performed .... Reference indicators should be set inside punctuation: The work of Smith [3], that of Jones [4], and our previous work [5--8] disagree with that of Doe and Roe [13]. When the word "reference" is used in specifying a reference, use the abbreviation (unless at the beginning of a sentence) with the indicator in brackets: ... as was shown in Ref. [4]. Note that use of the following form is also acceptable: ... as was shown in [4].

| (a) How to list authors | J. M. Smith, Phys. Rev B 26, 1 (1982).  
|---|---|
| One author:  
Two authors:  
Three or four authors:  
Five or more authors (et al. optional; use of et al. journal specific; note that Phys. Rev. C requires that 10 or fewer authors be listed and et al. not be used in such cases) |  
[Note that a semicolon is used between sources.]  
| One source:  
Two sources:  
Three or more sources: |  
<p>| (c) How to list same author, same source, different volume and page | J. M. Smith, Phys. Rev. B 24, 3 (1981); 26, 1 (1982). |
|<br />
| (d) How to list same author, same source, same volume number, same year, and different page numbers | J. M. Smith, Phys. Rev. B 26, 1 (1982); 26, 6 (1982). [Note that both page numbers are listed separately.] |
|</p>
<table>
<thead>
<tr>
<th>(e) How to list different authors and</th>
<th>J. M. Smith, Phys. Rev. B, 26, 1 (1982); R. Brown, Heavy Ions</th>
</tr>
</thead>
<tbody>
<tr>
<td>(l) Preprints (journal specific)</td>
<td></td>
</tr>
<tr>
<td>(m) Theses</td>
<td></td>
</tr>
</tbody>
</table>
Writing Guidelines
Physics 222

Content:
This part of your evaluation is a measure of the quality of the information in your paper. I will begin by looking at the amount of physics/history you have included. Your sources should include books, review articles and research journal articles, not websites. Use websites only to provide you with tutorial help and to guide you to the primary sources. Review articles such as in Scientific American, or Physics Today are very helpful. Use and cite three or more sources per person in your group. Do not cite the textbook. There should be enough depth that the reader can understand your topic and enough breadth to make the paper significant. The physics should be correct. I will also consider whether you have used good judgment in your choice of ideas to include and exclude. An especially important element is how interesting you can make the physics to your reader. Hopefully, you chose a topic that interested you. I will note how well you have conveyed that same interest to your audience.

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. In particular in the second paper you should make conclusions about the significance or veracity of your information. I will judge how well you discriminated between 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. You will do well in this section if I find your paper convincing and persuasive.

Expression and organization:
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. It should have a well developed focus that ties the entire paper together. Each paragraph should play a role in developing the focus. Paragraphs should be well-connected, with good transitions. They should each deal with a single idea, developing it logically, completely, and concisely. Your style should be appropriate to your audience (fellow 222 students) and topic. Don’t include humor, unless it comes from the scientists you write about.

Format:
The paper’s format and attention to mechanical details will help the reader get information from the paper easily, and will not distract from the flow of the paper. As a minimum, it will include:
◊ Title page with title, authors, and abstract
◊ Abstract: give a summary of what your paper accomplishes
◊ Headings that guide the reader
◊ Figures or tables that have titles and captions. These are referred to by number in the text. They appear with the text close to where they are cited, not all at the end.
◊ Doubled spaced with 1”margins, 12 point font.
◊ References follow the guidelines below.
Grading Sheet

Group_________________ Name___________________________________________

Content (18 pts)
depth / breadth
correctness
judgment
interest
appropriate sources
overall impact

Reasoning (12 pts)
conclusions
discrimination
understanding
logic
persuasiveness

Expression and organization (10 pts)
grammar / spelling
appearance
focus / conciseness
flow
style
organization

Format (10 pts)
General Guidelines for the Term Papers:

Any paper handed in (whether for peer review, review by the writing fellows, or to be read by the professor) should be your very best work. The papers should be typed, grammatically correct, spell checked, and well polished.

The target audience for this assignment is your classmates. As such, you should not spend time covering background material which a typical 222 student should already know. Concepts which go beyond the course, however, should be adequately explained.

If you are confused, you are generally safe when you follow the AIP style guidelines, which can be found at http://www.aip.org/pubservs/style/4thed/toc.html.

Writing Suggestions for Physics 222

While Researching Your Topic
◊ Remember that the topic you cover should go well beyond what is covered in the textbook.
◊ Make sure you are using current sources.
◊ Use both review-type articles and cutting edge research reports. If you have a long list of cutting-edge hard to understand references and one book or review article, I'll know that you pretty much followed one source, and threw the other references in for looks.
◊ The web is a good resource for getting ideas, but... you can't believe something just because it's on the web. Do not cite web pages. Use review articles, peer-reviewed journal articles and books as your sources.
◊ Use and cite more three or more sources per person in your group.

While Writing the Paper
◊ Read your paper out loud --- you will find many mistakes and get a better feel for how the paper flows this way.
◊ Make a detailed outline and follow it --- one of the biggest problems I see on papers for this course is poor organization and lack of a natural flow!
◊ Don't repeat the same information. This can be avoided by good organization.
◊ Don't include every fact that you've discovered. You will learn more while you research the paper than will fit within the focus of your paper. Have the courage to focus your paper and leave out irrelevant discussions.
◊ Try to write a good, solid paper that conveys information in an easy to read manner.
◊ You need to reference where you get your information in each paragraph or more often, not just for quotes, so that anyone wanting to read further about your statement can know where to go.
◊ Beware of using quotes to say something you don't want to explain. In general, quotes should be used only where you want the author's personality to show through.

Abstract
◊ Does your abstract appear on the title page just under the title?
◊ In your abstract do you clearly identify all of the major topics that will be discussed in your paper?
◊ It is best to write the abstract after the paper is in its final form. **An abstract is not an introduction, a soundbite, or a commercial for your paper.** An abstract should tell us what the paper **accomplishes.**

**Introduction**
In the first paragraph or two do you define the subject matter that will be discussed in the paper?

**Is there a thesis statement early in the introduction?**
Are you comfortable with the scope of your paper? Is your paper broad enough to be significant? Is it narrow enough to be adequately covered within the time and space allotted?

◊ If you include a section of background information in your paper, do you explain clearly how it relates to the main topic you are exploring?
◊ The introduction is usually best written after the main body of the paper is complete.
◊ Do you lay out the organization of the paper so the reader can follow the flow of what you are going to say?
◊ The introduction is not a commercial. For example, something like... "Is the universe going to expand forever? Stay tuned and we'll answer this exciting question and thrill you with..." is not appropriate. "Our story begins with..." is also a bad way to start a scientific paper. I want this paper to be training for real research papers which you will some day be submitting to respectable journals.

**Main Body**

◊ Is your choice of words consistent with scientific writing?
◊ Eliminate meaningless words such as "basically", "obviously", "naturally", "of course", etc.
◊ Does the tone of your paper portray you, the authors, as physicists, as opposed to outsiders to the physics community, as in the following sentence: "Scientists have shown that black holes exist?"
◊ All this does not mean to make your papers sound as dry as possible. It requires you to write very clearly, making your paper flow from one idea to the next.
◊ If you are not sure exactly what an equation or a concept means, are you honest with the reader?
◊ Avoid creating the illusion that you know everything.
◊ Have you eliminated footnotes and parenthetical statements? There are cases where footnotes and parenthetical statements are appropriate; however, if what you say is important enough to include in the paper in the first place it probably should be included in the main body.
◊ Do your transitions lead the reader from one concept to the next without confusion? A good way to test this is to ask a person who is not in the class to read your paper. If he or she has a hard time understanding what you mean, then you need to revise.
◊ When you let someone read your paper, let them use this guide so they can respond more effectively to your paper.
◊ Do your figures have captions (when needed).

**Conclusion**

◊ Does your conclusion restate the main points you discussed in the main body of the paper?
◊ Do you actually make a conclusion (decision, judgment) about what you have learned? Do not overstate the significance.
◊ Be sure not to introduce new information in your conclusion.

**Documentation**
◊ Have you followed the reference guidelines at the end of this document?
◊ Have you given credit where credit is due, including paraphrases as well as direct quotes?
◊ Did you give credit in figure captions for "borrowed" figures by including a reference. For example, at the end of a figure caption you should write something like... Figure reproduced from [Spe 97].
◊ Is each referenced work listed only once in the Bibliography, regardless of how many times it is cited?

**Miscellaneous**
◊ Did you insert page numbers?
◊ Did your paper use only the present tense except when treating historical events?
◊ Did you treat mathematical expressions as part of a sentence with appropriate punctuation?
◊ Where appropriate, integrate good pictures and graphs in your paper.
◊ Do your tables and figures have a paragraph in the text that clearly explain what they mean?
◊ Do your tables and graphs appear on the same page where they are discussed whenever possible? Does your paper have the appropriate length?

**Before Turning in Your Final Copy**
◊ Did you carefully proofread your final copy for grammar and punctuation errors?
◊ Did you spell-check your paper?
◊ Did a fellow 222 classmate review the paper before you turned in the final copy?
Did you read the paper aloud?

**References:**

You need to reference where you get your information in each paragraph or more often, not just for quotes, so that anyone wanting to read further about your statement can know where to go.

Include endnote references to your sources within your paper. Each endnote should be listed in the order that it first appears in the paper. Each reference should only be referred to by one number or abbreviation. Reference the same number again for multiple citings (don’t use “ibid,” etc.) Any data, information, or figure which comes from another work should be properly referenced. A figure, table, etc., which is copied from another work should include the phrase “reproduced from [x]” in the caption, and x should be a reference to an endnote entry.

**Reference guidelines from American Physical Society (condensed Superscripts):** references[type (2)] are noted in text by the insertion of numerals as either a superscript or on line in this manner:

Smith$^2$ does not agree with the original values given in Ref. 1. When that use could possibly cause confusion (i.e., Pb$^4$), an in-line form should be used
[Pb (Ref. 4)]. In the footnote listing at the end of the paper use only the superscript form.  

Or, you can use in-line brackets: Arabic numerals in square brackets in this manner:  

Smith and Jones [3] also measured .... 

Reference indicators should be at least one full space from words (not closed up to them as with superscripts). Multiple reference indicators should be set closed up within a single set of brackets: Smith and Jones [1,3,5--8] performed .... Reference indicators should be set inside punctuation: The work of Smith [3], that of Jones [4], and our previous work [5--8] disagree with that of Doe and Roe [13]. When the word "reference" is used in specifying a reference, use the abbreviation (unless at the beginning of a sentence) with the indicator in brackets: ... as was shown in Ref. [4]. Note that use of the following form is also acceptable: ... as was shown in [4].

| (a) How to list authors | J. M. Smith, Phys. Rev B 26, 1 (1982).  
| Five or more authors (et al. optional; use of et al. journal specific; note that Phys. Rev. C requires that 10 or fewer authors be listed and et al. not be used in such cases) |  |

| Two sources: | [Note that a semicolon is used between sources.]  

| (c) How to list same author, same source, different volume and page | J. M. Smith, Phys. Rev. B 24, 3 (1981); 26, 1 (1982).  |

| (d) How to list same author, same source, same volume number, same year, and different page numbers | J. M. Smith, Phys. Rev. B 26, 1 (1982); 26, 6 (1982). [Note that both page numbers are listed separately.]  |

| (e) How to list different authors and | J. M. Smith, Phys. Rev. B. 26, 1 (1982); R. Brown, Heavy Ions |
### different sources


### (f) How to list different authors, same sources


### (g) How to list multiple parts in a single footnote


### (h) Journals

J. M. Smith, Phys. Rev. D (to be published). [accepted for publication]

### (i) Books


### (j) Proceedings

<table>
<thead>
<tr>
<th>Category</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>[Most reports are considered to be unpublished. Those reports considered as full publications should be designated without the parenthetical unpublished at the end of the reference.]</td>
</tr>
<tr>
<td>(l) Preprints (journal specific)</td>
<td></td>
</tr>
<tr>
<td>(m) Theses</td>
<td></td>
</tr>
<tr>
<td>(n) Others</td>
<td>J. M. Smith (private communication).</td>
</tr>
<tr>
<td></td>
<td>[cited in another paper]</td>
</tr>
</tbody>
</table>
Writing Guidelines
Physics 222

Content:
This part of your evaluation is a measure of the quality of the information in your paper. I will begin by looking at the amount of physics/history you have included. Your sources should include books, review articles and research journal articles, not websites. Use websites only to provide you with tutorial help and to guide you to the primary sources. Review articles such as in Scientific American, or Physics Today are very helpful. Use and cite three or more sources per person in your group. Do not cite the textbook. There should be enough depth that the reader can understand your topic and enough breadth to make the paper significant. The physics should be correct. I will also consider whether you have used good judgment in your choice of ideas to include and exclude. An especially important element is how interesting you can make the physics to your reader. Hopefully, you chose a topic that interested you. I will note how well you have conveyed that same interest to your audience.

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. In particular in the second paper you should make conclusions about the significance or veracity of your information. I will judge how well you discriminated between 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. You will do well in this section if I find your paper convincing and persuasive.

Expression and organization:
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. It should have a well developed focus that ties the entire paper together. Each paragraph should play a role in developing the focus. Paragraphs should be well-connected, with good transitions. They should each deal with a single idea, developing it logically, completely, and concisely. Your style should be appropriate to your audience (fellow 222 students) and topic. Don’t include humor, unless it comes from the scientists you write about.

Format:
The paper’s format and attention to mechanical details will help the reader get information from the paper easily, and will not distract from the flow of the paper. As a minimum, it will include:
◊ Title page with title, authors, and abstract
◊ Abstract: give a summary of what your paper accomplishes
◊ Headings that guide the reader
◊ Figures or tables that have titles and captions. These are referred to by number in the text. They appear with the text close to where they are cited, not all at the end.
◊ Doubled spaced with 1” margins, 12 point font.
◊ References follow the guidelines below.
Grading Sheet

Group_________________ Name___________________________________________

Content (18 pts)
depth / breadth
correctness
judgment
interest
appropriate sources
overall impact

Reasoning (12 pts)
conclusions
discrimination
understanding
logic
persuasiveness

Expression and organization (10 pts)
graham / spelling
appearance
focus / conciseness
flow
style
organization

Format (10 pts)
General Guidelines for the Term Papers:

Any paper handed in (whether for peer review, review by the writing fellows, or to be read by the professor) should be your very best work. The papers should be typed, grammatically correct, spell checked, and well polished.

The target audience for this assignment is your classmates. As such, you should not spend time covering background material which a typical 222 student should already know. Concepts which go beyond the course, however, should be adequately explained.

If you are confused, you are generally safe when you follow the AIP style guidelines, which can be found at http://www.aip.org/pubservs/style/4thed/toc.html.

Writing Suggestions for Physics 222

While Researching Your Topic

◊ Remember that the topic you cover should go well beyond what is covered in the textbook.
◊ Make sure you are using current sources.
◊ Use both review-type articles and cutting edge research reports. If you have a long list of cutting-edge hard to understand references and one book or review article, I'll know that you pretty much followed one source, and threw the other references in for looks.
◊ The web is a good resource for getting ideas, but... you can't believe something just because it's on the web. Do not cite web pages. Use review articles, peer-reviewed journal articles and books as your sources.
◊ Use and cite more three or more sources per person in your group.

While Writing the Paper

◊ Read your paper out loud --- you will find many mistakes and get a better feel for how the paper flows this way.
◊ Make a detailed outline and follow it --- one of the biggest problems I see on papers for this course is poor organization and lack of a natural flow!
◊ Don't repeat the same information. This can be avoided by good organization.
◊ Don't include every fact that you've discovered. You will learn more while you research the paper than will fit within the focus of your paper. Have the courage to focus your paper and leave out irrelevant discussions.
◊ Try to write a good, solid paper that conveys information in an easy to read manner.
◊ You need to reference where you get your information in each paragraph or more often, not just for quotes, so that anyone wanting to read further about your statement can know where to go.
◊ Beware of using quotes to say something you don't want to explain. In general, quotes should be used only where you want the author's personality to show through.

Abstract

◊ Does your abstract appear on the title page just under the title?
In your abstract do you clearly identify all of the major topics that will be discussed in your paper?

It is best to write the abstract after the paper is in its final form. An abstract is not an introduction, a soundbite, or a commercial for your paper. An abstract should tell us what the paper accomplishments.

Introduction
In the first paragraph or two do you define the subject matter that will be discussed in the paper?

Is there a thesis statement early in the introduction?
Are you comfortable with the scope of your paper? Is your paper broad enough to be significant? Is it narrow enough to be adequately covered within the time and space allotted?

If you include a section of background information in your paper, do you explain clearly how it relates to the main topic you are exploring?

The introduction is usually best written after the main body of the paper is complete.

Do you lay out the organization of the paper so the reader can follow the flow of what you are going to say?

The introduction is not a commercial. For example, something like... "Is the universe going to expand forever? Stay tuned and we'll answer this exciting question and thrill you with..." is not appropriate. "Our story begins with..." is also a bad way to start a scientific paper. I want this paper to be training for real research papers which you will some day be submitting to respectable journals.

Main Body

Is your choice of words consistent with scientific writing?

Eliminate meaningless words such as "basically", "obviously", "naturally", "of course", etc.

Does the tone of your paper portray you, the authors, as physicists, as opposed to outsiders to the physics community, as in the following sentence: "Scientists have shown that black holes exist?"

All this does not mean to make your papers sound as dry as possible. It requires you to write very clearly, making your paper flow from one idea to the next.

If you are not sure exactly what an equation or a concept means, are you honest with the reader?

Avoid creating the illusion that you know everything.

Have you eliminated footnotes and parenthetical statements? There are cases where footnotes and parenthetical statements are appropriate; however, if what you say is important enough to include in the paper in the first place it probably should be included in the main body.

Do your transitions lead the reader from one concept to the next without confusion? A good way to test this is to ask a person who is not in the class to read your paper. If he or she has a hard time understanding what you mean, then you need to revise.

When you let someone read your paper, let them use this guide so they can respond more effectively to your paper.

Do your figures have captions (when needed).

Conclusion

Does your conclusion restate the main points you discussed in the main body of the paper?

Do you actually make a conclusion (decision, judgment) about what you have learned? Do not overstate the significance.
◊ Be sure not to introduce new information in your conclusion.

**Documentation**
◊ Have you followed the reference guidelines at the end of this document?
◊ Have you given credit where credit is due, including paraphrases as well as direct quotes?
◊ Did you give credit in figure captions for "borrowed" figures by including a reference. For example, at the end of a figure caption you should write something like... Figure reproduced from [Spe 97].
◊ Is each referenced work listed only once in the Bibliography, regardless of how many times it is cited?

**Miscellaneous**
◊ Did you insert page numbers?
◊ Did your paper use only the present tense except when treating historical events?
◊ Did you treat mathematical expressions as part of a sentence with appropriate punctuation?
◊ Where appropriate, integrate good pictures and graphs in your paper.
◊ Do your tables and figures have a paragraph in the text that clearly explain what they mean?
◊ Do your tables and graphs appear on the same page where they are discussed whenever possible? Does your paper have the appropriate length?

**Before Turning in Your Final Copy**
◊ Did you carefully proofread your final copy for grammar and punctuation errors?
◊ Did you spell-check your paper?
◊ Did a fellow 222 classmate review the paper before you turned in the final copy?
Did you read the paper aloud?

**References** :

You need to reference where you get your information in each paragraph or more often, not just for quotes, so that anyone wanting to read further about your statement can know where to go.

Include endnote references to your sources within your paper. Each endnote should be listed in the order that it first appears in the paper. Each reference should only be referred to by one number or abbreviation. Reference the same number again for multiple citings (don’t use “ibid,” etc.) Any data, information, or figure which comes from another work should be properly referenced. A figure, table, etc., which is copied from another work should include the phrase “reproduced from [x]” in the caption, and x should be a reference to an endnote entry.

**Reference guidelines from American Physical Society (condensed)**

*Superscripts*: references[type (2)] are noted in text by the insertion of numerals as either a superscript or on line in this manner:

Smith\(^2\) does not agree with the original values given in Ref. 1.
When that use could possibly cause confusion (i.e., Pb\(^4\)), an in-line form should be used
In the footnote listing at the end of the paper use only the superscript form. *Or, you can use in-line brackets:* Arabic numerals in square brackets in this manner:

Smith and Jones [3] also measured ....

Reference indicators should be at least one full space from words (not closed up to them as with superscripts). Multiple reference indicators should be set closed up within a single set of brackets: Smith and Jones [1,3,5--8] performed .... Reference indicators should be set inside punctuation: The work of Smith [3], that of Jones [4], and our previous work [5--8] disagree with that of Doe and Roe [13]. When the word "reference" is used in specifying a reference, use the abbreviation (unless at the beginning of a sentence) with the indicator in brackets: ... as was shown in Ref. [4]. Note that use of the following form is also acceptable: ... as was shown in [4].

(a) How to list authors

| Five or more authors (et al. optional; use of et al. journal specific; note that Phys. Rev. C requires that 10 or fewer authors be listed and et al. not be used in such cases) | J. M. Smith *et al.*, Phys. Rev B 26, 1 (1982). |

(b) How to list sources


[Note that a semicolon is used between sources.]

(c) How to list same author, same source, different volume and page


(d) How to list same author, same source, same volume number, same year, and different page numbers

| J. M. Smith, Phys. Rev. B 26, 1 (1982); 26, 6 (1982). [Note that both page numbers are listed separately.] |

(e) How to list different authors and sources

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>(f) How to list different authors, same sources</td>
<td>J. M. Smith, Phys. Rev. B 26, 1 (1982); R. Brown, <em>ibid.</em> 24, 3 (1981); C. Green, <em>ibid.</em> 24, 22 (1981). [Note that <em>ibid.</em> is used instead of repeating the journal name.]</td>
</tr>
<tr>
<td></td>
<td>J. M. Smith, Phys. Rev. D (to be published). [accepted for publication]</td>
</tr>
</tbody>
</table>
[Most reports are considered to be unpublished. Those reports considered as full publications should be designated without the parenthetical unpublished at the end of the reference.]
| (l) Preprints (journal specific) |
| (m) Theses |
| (n) Others | J. M. Smith (private communication).
[cited in another paper]
Writing Guidelines  
Physics 222

Content:
This part of your evaluation is a measure of the quality of the information in your paper. I will begin by looking at the amount of physics/history you have included. Your sources should include books, review articles and research journal articles, not websites. Use websites only to provide you with tutorial help and to guide you to the primary sources. Review articles such as in Scientific American, or Physics Today are very helpful. Use and cite three or more sources per person in your group. Do not cite the textbook. There should be enough depth that the reader can understand your topic and enough breadth to make the paper significant. The physics should be correct. I will also consider whether you have used good judgment in your choice of ideas to include and exclude. An especially important element is how interesting you can make the physics to your reader. Hopefully, you chose a topic that interested you. I will note how well you have conveyed that same interest to your audience.

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. In particular in the second paper you should make conclusions about the significance or veracity of your information. I will judge how well you discriminated between 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. You will do well in this section if I find your paper convincing and persuasive.

Expression and organization:
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. It should have a well developed focus that ties the entire paper together. Each paragraph should play a role in developing the focus. Paragraphs should be well-connected, with good transitions. They should each deal with a single idea, developing it logically, completely, and concisely. Your style should be appropriate to your audience (fellow 222 students) and topic. Don’t include humor, unless it comes from the scientists you write about.

Format:
The paper’s format and attention to mechanical details will help the reader get information from the paper easily, and will not distract from the flow of the paper. As a minimum, it will include:
- Title page with title, authors, and abstract
- Abstract: give a summary of what your paper accomplishes
- Headings that guide the reader
- Figures or tables that have titles and captions. These are referred to by number in the text. They appear with the text close to where they are cited, not all at the end.
- Doubled spaced with 1” margins, 12 point font.
- References follow the guidelines below.
Grading Sheet

Group_________________ Name___________________________________________

Content (18 pts)
depth / breadth
correctness
judgment
interest
appropriate sources
overall impact

Reasoning (12 pts)
conclusions
discrimination
understanding
logic
persuasiveness

Expression and organization (10 pts)
grammar / spelling
appearance
focus / conciseness
flow
style
organization

Format (10 pts)
General Guidelines for the Term Papers:

Any paper handed in (whether for peer review, review by the writing fellows, or to be read by the professor) should be your very best work. The papers should be typed, grammatically correct, spell checked, and well polished.

The target audience for this assignment is your classmates. As such, you should not spend time covering background material which a typical 222 student should already know. Concepts which go beyond the course, however, should be adequately explained.

If you are confused, you are generally safe when you follow the AIP style guidelines, which can be found at http://www.aip.org/pubservs/style/4thed/toc.html.

Writing Suggestions for Physics 222

While Researching Your Topic

◊ Remember that the topic you cover should go well beyond what is covered in the textbook.
◊ Make sure you are using current sources.
◊ Use both review-type articles and cutting edge research reports. If you have a long list of cutting-edge hard to understand references and one book or review article, I'll know that you pretty much followed one source, and threw the other references in for looks.
◊ The web is a good resource for getting ideas, but... you can't believe something just because it's on the web. Do not cite web pages. Use review articles, peer-reviewed journal articles and books as your sources.
◊ Use and cite more three or more sources per person in your group.

While Writing the Paper

◊ Read your paper out loud --- you will find many mistakes and get a better feel for how the paper flows this way.
◊ Make a detailed outline and follow it --- one of the biggest problems I see on papers for this course is poor organization and lack of a natural flow!
◊ Don't repeat the same information. This can be avoided by good organization.
◊ Don't include every fact that you've discovered. You will learn more while you research the paper than will fit within the focus of your paper. Have the courage to focus your paper and leave out irrelevant discussions.
◊ Try to write a good, solid paper that conveys information in an easy to read manner.
◊ You need to reference where you get your information in each paragraph or more often, not just for quotes, so that anyone wanting to read further about your statement can know where to go.
◊ Beware of using quotes to say something you don't want to explain. In general, quotes should be used only where you want the author's personality to show through.

Abstract

◊ Does your abstract appear on the title page just under the title?
In your abstract do you clearly identify all of the major topics that will be discussed in your paper?

It is best to write the abstract after the paper is in its final form. An abstract is not an introduction, a soundbite, or a commercial for your paper. An abstract should tell us what the paper accomplishes.

**Introduction**

In the first paragraph or two do you define the subject matter that will be discussed in the paper?

**Is there a thesis statement early in the introduction?**

Are you comfortable with the scope of your paper? Is your paper broad enough to be significant? Is it narrow enough to be adequately covered within the time and space allotted?

- If you include a section of background information in your paper, do you explain clearly how it relates to the main topic you are exploring?
- The introduction is usually best written after the main body of the paper is complete.
- Do you lay out the organization of the paper so the reader can follow the flow of what you are going to say?
- The introduction is not a commercial. For example, something like "Is the universe going to expand forever? Stay tuned and we'll answer this exciting question and thrill you with..." is not appropriate. "Our story begins with..." is also a bad way to start a scientific paper. I want this paper to be training for real research papers which you will some day be submitting to respectable journals.

**Main Body**

- Is your choice of words consistent with scientific writing?
- Eliminate meaningless words such as "basically", "obviously", "naturally", "of course", etc.
- Does the tone of your paper portray you, the authors, as physicists, as opposed to outsiders to the physics community, as in the following sentence: "Scientists have shown that black holes exist?"
- All this does not mean to make your papers sound as dry as possible. It requires you to write very clearly, making your paper flow from one idea to the next.
- If you are not sure exactly what an equation or a concept means, are you honest with the reader?
- Avoid creating the illusion that you know everything.
- Have you eliminated footnotes and parenthetical statements? There are cases where footnotes and parenthetical statements are appropriate; however, if what you say is important enough to include in the paper in the first place it probably should be included in the main body.
- Do your transitions lead the reader from one concept to the next without confusion? A good way to test this is to ask a person who is not in the class to read your paper. If he or she has a hard time understanding what you mean, then you need to revise.
- When you let someone read your paper, let them use this guide so they can respond more effectively to your paper.
- Do your figures have captions (when needed).

**Conclusion**

- Does your conclusion restate the main points you discussed in the main body of the paper?
- Do you actually make a conclusion (decision, judgment) about what you have learned? Do not overstate the significance.
◊ Be sure not to introduce new information in your conclusion.

**Documentation**
◊ Have you followed the reference guidelines at the end of this document?
◊ Have you given credit where credit is due, including paraphrases as well as direct quotes?
◊ Did you give credit in figure captions for "borrowed" figures by including a reference. For example, at the end of a figure caption you should write something like... Figure reproduced from [Spe 97].
◊ Is each referenced work listed only once in the Bibliography, regardless of how many times it is cited?

**Miscellaneous**
◊ Did you insert page numbers?
◊ Did your paper use only the present tense except when treating historical events?
◊ Did you treat mathematical expressions as part of a sentence with appropriate punctuation?
◊ Where appropriate, integrate good pictures and graphs in your paper.
◊ Do your tables and figures have a paragraph in the text that clearly explain what they mean?
◊ Do your tables and graphs appear on the same page where they are discussed whenever possible? Does your paper have the appropriate length?

**Before Turning in Your Final Copy**
◊ Did you carefully proofread your final copy for grammar and punctuation errors?
◊ Did you spell-check your paper?
◊ Did a fellow 222 classmate review the paper before you turned in the final copy?
Did you read the paper aloud?

**References:**

You need to reference where you get your information in each paragraph or more often, not just for quotes, so that anyone wanting to read further about your statement can know where to go.

Include endnote references to your sources within your paper. Each endnote should be listed in the order that it first appears in the paper. Each reference should only be referred to by one number or abbreviation. Reference the same number again for multiple citings (don’t use “ibid,” etc.) Any data, information, or figure which comes from another work should be properly referenced. A figure, table, etc., which is copied from another work should include the phrase “reproduced from [x]” in the caption, and x should be a reference to an endnote entry.

**Reference guidelines from American Physical Society (condensed)**

*Superscripts:* references[type (2)] are noted in text by the insertion of numerals as either a superscript or on line in this manner:
   
   Smith\(^2\) does not agree with the original values given in Ref. 1.  
   When that use could possibly cause confusion (i.e., Pb\(^4\)), an in-line form should be used
[Pb (Ref. 4)]. In the footnote listing at the end of the paper use only the superscript form. Or, you can use in-line brackets: Arabic numerals in square brackets in this manner:

Smith and Jones [3] also measured ....

Reference indicators should be at least one full space from words (not closed up to them as with superscripts). Multiple reference indicators should be set closed up within a single set of brackets: Smith and Jones [1,3,5--8] performed .... Reference indicators should be set inside punctuation: The work of Smith [3], that of Jones [4], and our previous work [5--8] disagree with that of Doe and Roe [13]. When the word "reference" is used in specifying a reference, use the abbreviation (unless at the beginning of a sentence) with the indicator in brackets: ... as was shown in Ref. [4]. Note that use of the following form is also acceptable: ... as was shown in [4].

<table>
<thead>
<tr>
<th>(a) How to list authors</th>
<th>J. M. Smith, Phys. Rev B 26, 1 (1982).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Five or more authors (et al. optional; use of et al. journal specific; note that Phys. Rev. C requires that 10 or fewer authors be listed and et al. not be used in such cases)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Two sources:</td>
<td>[Note that a semicolon is used between sources.]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(c) How to list same author, same source, different volume and page</th>
<th>J. M. Smith, Phys. Rev. B 24, 3 (1981); 26, 1 (1982).</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>(d) How to list same author, same source, same volume number, same year, and different page numbers</th>
<th>J. M. Smith, Phys. Rev. B 26, 1 (1982); 26, 6 (1982). [Note that both page numbers are listed separately.]</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>(e) How to list different authors and</th>
<th>J. M. Smith, Phys. Rev. B. 26, 1 (1982); R. Brown, <em>Heavy Ions</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>-------------------</td>
<td>--------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Category</td>
<td>Reference</td>
</tr>
<tr>
<td>---------------</td>
<td>---------------------------------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td>[Most reports are considered to be unpublished. Those reports considered as full publications should be designated without the parenthetical unpublished at the end of the reference.]</td>
</tr>
<tr>
<td>(l) Preprints (journal specific)</td>
<td></td>
</tr>
<tr>
<td>(m) Theses</td>
<td>J. M. Smith (private communication).</td>
</tr>
<tr>
<td></td>
<td>[cited in another paper]</td>
</tr>
</tbody>
</table>
Writing Guidelines
Physics 222

Content:
This part of your evaluation is a measure of the quality of the information in your paper. I will begin by looking at the amount of physics/history you have included. Your sources should include books, review articles and research journal articles, not websites. Use websites only to provide you with tutorial help and to guide you to the primary sources. Review articles such as in Scientific American, or Physics Today are very helpful. Use and cite three or more sources per person in your group. Do not cite the textbook. There should be enough depth that the reader can understand your topic and enough breadth to make the paper significant. The physics should be correct. I will also consider whether you have used good judgment in your choice of ideas to include and exclude. An especially important element is how interesting you can make the physics to your reader. Hopefully, you chose a topic that interested you. I will note how well you have conveyed that same interest to your audience.

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. In particular in the second paper you should make conclusions about the significance or veracity of your information. I will judge how well you discriminated between 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. You will do well in this section if I find your paper convincing and persuasive.

Expression and organization:
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. It should have a well developed focus that ties the entire paper together. Each paragraph should play a role in developing the focus. Paragraphs should be well-connected, with good transitions. They should each deal with a single idea, developing it logically, completely, and concisely. Your style should be appropriate to your audience (fellow 222 students) and topic. Don’t include humor, unless it comes from the scientists you write about.

Format:
The paper’s format and attention to mechanical details will help the reader get information from the paper easily, and will not distract from the flow of the paper. As a minimum, it will include:
◊ Title page with title, authors, and abstract
◊ Abstract: give a summary of what your paper accomplishes
◊ Headings that guide the reader
◊ Figures or tables that have titles and captions. These are referred to by number in the text. They appear with the text close to where they are cited, not all at the end.
◊ Doubled spaced with 1”margins, 12 point font.
◊ References follow the guidelines below.
Grading Sheet

Group_________________ Name___________________________________________

Content (18 pts)
depth / breadth
correctness
judgment
interest
appropriate sources
overall impact

Reasoning (12 pts)
conclusions
discrimination
understanding
logic
persuasiveness

Expression and organization (10 pts)
grammar / spelling
appearance
focus / conciseness
flow
style
organization

Format (10 pts)
General Guidelines for the Term Papers:

Any paper handed in (whether for peer review, review by the writing fellows, or to be
read by the professor) should be your very best work. The papers should be typed,
grammatically correct, spell checked, and well polished.

The target audience for this assignment is your classmates. As such, you should not spend time
covering background material which a typical 222 student should already know. Concepts which
go beyond the course, however, should be adequately explained.

If you are confused, you are generally safe when you follow the AIP style guidelines, which can
be found at http://www.aip.org/pubservs/style/4thed/toc.html.

Writing Suggestions for Physics 222

While Researching Your Topic

◊ Remember that the topic you cover should go well beyond what is covered in the
textbook.
◊ Make sure you are using current sources.
◊ Use both review-type articles and cutting edge research reports. If you have a long list of
cutting-edge hard to understand references and one book or review article, I'll know that
you pretty much followed one source, and threw the other references in for looks.
◊ The web is a good resource for getting ideas, but... you can't believe something just
because it's on the web. Do not cite web pages. Use review articles, peer-reviewed
journal articles and books as your sources.
◊ Good sources of review articles include Physics Today, Scientific American, Reviews of
◊ Good sources of cutting edge research reports include Physical Review Letters, Physical
◊ Use and cite more three or more sources per person in your group.

While Writing the Paper

◊ Read your paper out loud --- you will find many mistakes and get a better feel for how
the paper flows this way.
◊ Make a detailed outline and follow it --- one of the biggest problems I see on papers for
this course is poor organization and lack of a natural flow!
◊ Don't repeat the same information. This can be avoided by good organization.
◊ Don't include every fact that you've discovered. You will learn more while you research
the paper than will fit within the focus of your paper. Have the courage to focus your
paper and leave out irrelevant discussions.
◊ Try to write a good, solid paper that conveys information in an easy to read manner.
◊ You need to reference where you get your information in each paragraph or more often,
not just for quotes, so that anyone wanting to read further about your statement can know
where to go.
◊ Beware of using quotes to say something you don't want to explain. In general, quotes
should be used only where you want the author's personality to show through.

Abstract

◊ Does your abstract appear on the title page just under the title?
◊ In your abstract do you clearly identify all of the major topics that will be discussed in your paper?
◊ It is best to write the abstract after the paper is in its final form. An abstract is not an introduction, a soundbite, or a commercial for your paper. An abstract should tell us what the paper accomplishes.

Introduction
In the first paragraph or two do you define the subject matter that will be discussed in the paper?
Is there a thesis statement early in the introduction?
Are you comfortable with the scope of your paper? Is your paper broad enough to be significant? Is it narrow enough to be adequately covered within the time and space allotted?
◊ If you include a section of background information in your paper, do you explain clearly how it relates to the main topic you are exploring?
◊ The introduction is usually best written after the main body of the paper is complete.
◊ Do you lay out the organization of the paper so the reader can follow the flow of what you are going to say?
◊ The introduction is not a commercial. For example, something like... "Is the universe going to expand forever? Stay tuned and we'll answer this exciting question and thrill you with..." is not appropriate. "Our story begins with..." is also a bad way to start a scientific paper. I want this paper to be training for real research papers which you will some day be submitting to respectable journals.

Main Body
◊ Is your choice of words consistent with scientific writing?
◊ Eliminate meaningless words such as "basically", "obviously", "naturally", "of course", etc.
◊ Does the tone of your paper portray you, the authors, as physicists, as opposed to outsiders to the physics community, as in the following sentence: "Scientists have shown that black holes exist?"
◊ All this does not mean to make your papers sound as dry as possible. It requires you to write very clearly, making your paper flow from one idea to the next.
◊ If you are not sure exactly what an equation or a concept means, are you honest with the reader?
◊ Avoid creating the illusion that you know everything.
◊ Have you eliminated footnotes and parenthetical statements? There are cases where footnotes and parenthetical statements are appropriate; however, if what you say is important enough to include in the paper in the first place it probably should be included in the main body.
◊ Do your transitions lead the reader from one concept to the next without confusion? A good way to test this is to ask a person who is not in the class to read your paper. If he or she has a hard time understanding what you mean, then you need to revise.
◊ When you let someone read your paper, let them use this guide so they can respond more effectively to your paper.
◊ Do your figures have captions (when needed).

Conclusion
◊ Does your conclusion restate the main points you discussed in the main body of the paper?
◊ Do you actually make a conclusion (decision, judgment) about what you have learned? Do not overstate the significance.
◊ Be sure not to introduce new information in your conclusion.

Documentation
◊ Have you followed the reference guidelines at the end of this document?
◊ Have you given credit where credit is due, including paraphrases as well as direct quotes?
◊ Did you give credit in figure captions for "borrowed" figures by including a reference. For example, at the end of a figure caption you should write something like... Figure reproduced from [Spe 97].
◊ Is each referenced work listed only once in the Bibliography, regardless of how many times it is cited?

Miscellaneous
◊ Did you insert page numbers?
◊ Did your paper use only the present tense except when treating historical events?
◊ Did you treat mathematical expressions as part of a sentence with appropriate punctuation?
◊ Where appropriate, integrate good pictures and graphs in your paper.
◊ Do your tables and figures have a paragraph in the text that clearly explain what they mean?
◊ Do your tables and graphs appear on the same page where they are discussed whenever possible? Does your paper have the appropriate length?

Before Turning in Your Final Copy
◊ Did you carefully proofread your final copy for grammar and punctuation errors?
◊ Did you spell-check your paper?
◊ Did a fellow 222 classmate review the paper before you turned in the final copy?
Did you read the paper aloud?

References:
You need to reference where you get your information in each paragraph or more often, not just for quotes, so that anyone wanting to read further about your statement can know where to go.

Include endnote references to your sources within your paper. Each endnote should be listed in the order that it first appears in the paper. Each reference should only be referred to by one number or abbreviation. Reference the same number again for multiple citings (don’t use “ibid,” etc.) Any data, information, or figure which comes from another work should be properly referenced. A figure, table, etc., which is copied from another work should include the phrase “reproduced from [x]” in the caption, and x should be a reference to an endnote entry.

Reference guidelines from American Physical Society (condensed)

Superscripts: references[type (2)] are noted in text by the insertion of numerals as either a superscript or on line in this manner:
Smith\(^2\) does not agree with the original values given in Ref. 1.
When that use could possibly cause confusion (i.e., Pb\(^4\)), an in-line form should be used.
In the footnote listing at the end of the paper use only the superscript form. Or, you can use in-line brackets: Arabic numerals in square brackets in this manner:

Smith and Jones [3] also measured ....

Reference indicators should be at least one full space from words (not closed up to them as with superscripts). Multiple reference indicators should be set closed up within a single set of brackets:

Smith and Jones [1,3,5--8] performed .... Reference indicators should be set inside punctuation: The work of Smith [3], that of Jones [4], and our previous work [5--8] disagree with that of Doe and Roe [13]. When the word "reference" is used in specifying a reference, use the abbreviation (unless at the beginning of a sentence) with the indicator in brackets: ... as was shown in Ref. [4]. Note that use of the following form is also acceptable: ... as was shown in [4].

<table>
<thead>
<tr>
<th>(a) How to list authors</th>
<th>J. M. Smith, Phys. Rev B 26, 1 (1982).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Five or more authors (et al. optional; use of et al. journal specific; note that Phys. Rev. C requires that 10 or fewer authors be listed and et al. not be used in such cases)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Two sources:</td>
<td>[Note that a semicolon is used between sources.]</td>
</tr>
</tbody>
</table>

| (c) How to list same author, same source, different volume and page | J. M. Smith, Phys. Rev. B 24, 3 (1981); 26, 1 (1982). |

| (d) How to list same author, same source, same volume number, same year, and different page numbers | J. M. Smith, Phys. Rev. B 26, 1 (1982); 26, 6 (1982). [Note that both page numbers are listed separately.] |

| (e) How to list different authors and | J. M. Smith, Phys. Rev. B. 26, 1 (1982); R. Brown, Heavy Ions |
| (f) How to list different authors, same sources | J. M. Smith, Phys. Rev. B 26, 1 (1982); R. Brown, *ibid.* 24, 3 (1981); C. Green, *ibid.* 24, 22 (1981). [Note that *ibid.* is used instead of repeating the journal name.] |
J. M. Smith, Phys. Rev. D (to be published). [accepted for publication]  
[published, use italic title; additional information (Vol., Chap., Sec., p., etc.) as appropriate]  
<table>
<thead>
<tr>
<th>Category</th>
<th>Example References</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>[Most reports are considered to be unpublished. Those reports</td>
</tr>
<tr>
<td></td>
<td>considered as full publications should be designated without the</td>
</tr>
<tr>
<td></td>
<td>parenthetical unpublished at the end of the reference.]</td>
</tr>
<tr>
<td>(l) Preprints (journal</td>
<td>J. M. Smith (private communication).</td>
</tr>
<tr>
<td></td>
<td>[cited in another paper]</td>
</tr>
<tr>
<td></td>
<td>J. M. Smith, computer code CRUX, Bell Laboratories, Murray Hill, NJ,</td>
</tr>
<tr>
<td></td>
<td>1972.</td>
</tr>
</tbody>
</table>
Writing Guidelines
Physics 222

Content:
This part of your evaluation is a measure of the quality of the information in your paper. I will begin by looking at the amount of physics/history you have included. Your sources should include books, review articles and research journal articles, not websites. Use websites only to provide you with tutorial help and to guide you to the primary sources. Review articles such as in Scientific American, or Physics Today are very helpful. Use and cite three or more sources per person in your group. Do not cite the textbook. There should be enough depth that the reader can understand your topic and enough breadth to make the paper significant. The physics should be correct. I will also consider whether you have used good judgment in your choice of ideas to include and exclude. An especially important element is how interesting you can make the physics to your reader. Hopefully, you chose a topic that interested you. I will note how well you have conveyed that same interest to your audience.

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. In particular in the second paper you should make conclusions about the significance or veracity of your information. I will judge how well you discriminated between 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. You will do well in this section if I find your paper convincing and persuasive.

Expression and organization:
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. It should have a well developed focus that ties the entire paper together. Each paragraph should play a role in developing the focus. Paragraphs should be well-connected, with good transitions. They should each deal with a single idea, developing it logically, completely, and concisely. Your style should be appropriate to your audience (fellow 222 students) and topic. Don’t include humor, unless it comes from the scientists you write about.

Format:
The paper’s format and attention to mechanical details will help the reader get information from the paper easily, and will not distract from the flow of the paper. As a minimum, it will include:
◊ Title page with title, authors, and abstract
◊ Abstract: give a summary of what your paper accomplishes
◊ Headings that guide the reader
◊ Figures or tables that have titles and captions. These are referred to by number in the text. They appear with the text close to where they are cited, not all at the end.
◊ Doubled spaced with 1”margins, 12 point font.
◊ References follow the guidelines below.
Grading Sheet

Group_________________ Name___________________________________________

Content (18 pts)
depth / breadth
correctness
judgment
interest
appropriate sources
overall impact

Reasoning (12 pts)
conclusions
discrimination
understanding
logic
persuasiveness

Expression and organization (10 pts)
grammar / spelling
appearance
focus / conciseness
flow
style
organization

Format (10 pts)
General Guidelines for the Term Papers:

Any paper handed in (whether for peer review, review by the writing fellows, or to be read by the professor) should be your very best work. The papers should be typed, grammatically correct, spell checked, and well polished.

The target audience for this assignment is your classmates. As such, you should not spend time covering background material which a typical 222 student should already know. Concepts which go beyond the course, however, should be adequately explained.

If you are confused, you are generally safe when you follow the AIP style guidelines, which can be found at http://www.aip.org/pubservs/style/4thed/toc.html.

Writing Suggestions for Physics 222

While Researching Your Topic

◊ Remember that the topic you cover should go well beyond what is covered in the textbook.
◊ Make sure you are using current sources.
◊ Use both review-type articles and cutting edge research reports. If you have a long list of cutting-edge hard to understand references and one book or review article, I'll know that you pretty much followed one source, and threw the other references in for looks.
◊ The web is a good resource for getting ideas, but... you can't believe something just because it's on the web. Do not cite web pages. Use review articles, peer-reviewed journal articles and books as your sources.
◊ Use and cite more three or more sources per person in your group.

While Writing the Paper

◊ Read your paper out loud --- you will find many mistakes and get a better feel for how the paper flows this way.
◊ Make a detailed outline and follow it --- one of the biggest problems I see on papers for this course is poor organization and lack of a natural flow!
◊ Don't repeat the same information. This can be avoided by good organization.
◊ Don't include every fact that you've discovered. You will learn more while you research the paper than will fit within the focus of your paper. Have the courage to focus your paper and leave out irrelevant discussions.
◊ Try to write a good, solid paper that conveys information in an easy to read manner.
◊ You need to reference where you get your information in each paragraph or more often, not just for quotes, so that anyone wanting to read further about your statement can know where to go.
◊ Beware of using quotes to say something you don't want to explain. In general, quotes should be used only where you want the author's personality to show through.

Abstract

◊ Does your abstract appear on the title page just under the title?
In your abstract do you clearly identify all of the major topics that will be discussed in your paper?

It is best to write the abstract after the paper is in its final form. An abstract is not an introduction, a soundbite, or a commercial for your paper. An abstract should tell us what the paper accomplishes.

Introduction
In the first paragraph or two do you define the subject matter that will be discussed in the paper?

Is there a thesis statement early in the introduction?
Are you comfortable with the scope of your paper? Is your paper broad enough to be significant? Is it narrow enough to be adequately covered within the time and space allotted?

If you include a section of background information in your paper, do you explain clearly how it relates to the main topic you are exploring?

The introduction is usually best written after the main body of the paper is complete.

Do you lay out the organization of the paper so the reader can follow the flow of what you are going to say?

The introduction is not a commercial. For example, something like... "Is the universe going to expand forever? Stay tuned and we'll answer this exciting question and thrill you with..." is not appropriate. "Our story begins with..." is also a bad way to start a scientific paper. I want this paper to be training for real research papers which you will someday be submitting to respectable journals.

Main Body

Is your choice of words consistent with scientific writing?

Eliminate meaningless words such as "basically", "obviously", "naturally", "of course", etc.

Does the tone of your paper portray you, the authors, as physicists, as opposed to outsiders to the physics community, as in the following sentence: "Scientists have shown that black holes exist?"

All this does not mean to make your papers sound as dry as possible. It requires you to write very clearly, making your paper flow from one idea to the next.

If you are not sure exactly what an equation or a concept means, are you honest with the reader?

Avoid creating the illusion that you know everything.

Have you eliminated footnotes and parenthetical statements? There are cases where footnotes and parenthetical statements are appropriate; however, if what you say is important enough to include in the paper in the first place it probably should be included in the main body.

Do your transitions lead the reader from one concept to the next without confusion? A good way to test this is to ask a person who is not in the class to read your paper. If he or she has a hard time understanding what you mean, then you need to revise.

When you let someone read your paper, let them use this guide so they can respond more effectively to your paper.

Do your figures have captions (when needed).

Conclusion

Does your conclusion restate the main points you discussed in the main body of the paper?

Do you actually make a conclusion (decision, judgment) about what you have learned? Do not overstate the significance.
◊ Be sure not to introduce new information in your conclusion.

Documentation
◊ Have you followed the reference guidelines at the end of this document?
◊ Have you given credit where credit is due, including paraphrases as well as direct quotes?
◊ Did you give credit in figure captions for "borrowed" figures by including a reference. For example, at the end of a figure caption you should write something like... Figure reproduced from [Spe 97].
◊ Is each referenced work listed only once in the Bibliography, regardless of how many times it is cited?

Miscellaneous
◊ Did you insert page numbers?
◊ Did your paper use only the present tense except when treating historical events?
◊ Did you treat mathematical expressions as part of a sentence with appropriate punctuation?
◊ Where appropriate, integrate good pictures and graphs in your paper.
◊ Do your tables and figures have a paragraph in the text that clearly explain what they mean?
◊ Do your tables and graphs appear on the same page where they are discussed whenever possible? Does your paper have the appropriate length?

Before Turning in Your Final Copy
◊ Did you carefully proofread your final copy for grammar and punctuation errors?
◊ Did you spell-check your paper?
◊ Did a fellow 222 classmate review the paper before you turned in the final copy?
Did you read the paper aloud?

References:

You need to reference where you get your information in each paragraph or more often, not just for quotes, so that anyone wanting to read further about your statement can know where to go.

Include endnote references to your sources within your paper. Each endnote should be listed in the order that it first appears in the paper. Each reference should only be referred to by one number or abbreviation. Reference the same number again for multiple citings (don’t use “ibid,” etc.) Any data, information, or figure which comes from another work should be properly referenced. A figure, table, etc., which is copied from another work should include the phrase “reproduced from [x]” in the caption, and x should be a reference to an endnote entry.

Reference guidelines from American Physical Society (condensed

Superscripts: references\textsuperscript{[type (2)]} are noted in text by the insertion of numerals as either a superscript or on line in this manner:

Smith\textsuperscript{2} does not agree with the original values given in Ref. 1.
When that use could possibly cause confusion (i.e., Pb\textsuperscript{4}), an in-line form should be used
[Pb (Ref. 4)]. In the footnote listing at the end of the paper use only the superscript form. *Or, you can use in-line brackets:* Arabic numerals in square brackets in this manner:

Smith and Jones [3] also measured ....

Reference indicators should be at least one full space from words (not closed up to them as with superscripts). Multiple reference indicators should be set closed up within a single set of brackets: Smith and Jones [1,3,5--8] performed .... Reference indicators should be set inside punctuation: The work of Smith [3], that of Jones [4], and our previous work [5--8] disagree with that of Doe and Roe [13]. When the word "reference" is used in specifying a reference, use the abbreviation (unless at the beginning of a sentence) with the indicator in brackets: ... as was shown in Ref. [4]. Note that use of the following form is also acceptable: ... as was shown in [4].

<table>
<thead>
<tr>
<th>(a) How to list authors</th>
<th>(b) How to list sources</th>
<th>(c) How to list same author, same source, different volume and page</th>
<th>(d) How to list same author, same source, same volume number, same year, and different page numbers</th>
<th>(e) How to list different authors and</th>
</tr>
</thead>
<tbody>
<tr>
<td>Three or four authors:</td>
<td>Three or more sources:</td>
<td>J. M. Smith, R. Brown, and C. Green, Phys. Rev. B 26, 1 (1982).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Five or more authors (et al. optional; use of et al. journal specific; note that Phys. Rev. C requires that 10 or fewer authors be listed and et al. not be used in such cases)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------------------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>(f) How to list different authors, same sources</em></td>
<td>J. M. Smith, Phys. Rev. B 26, 1 (1982); R. Brown, <em>ibid.</em> 24, 3 (1981); C. Green, <em>ibid.</em> 24, 22 (1981). [Note that <em>ibid.</em> is used instead of repeating the journal name.]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>J. M. Smith, Phys. Rev. D (to be published). [accepted for publication]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Category</td>
<td>Reference</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------------------</td>
<td>---------------------------------------------------------------------------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(l) Preprints (journal specific)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(m) Theses</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Writing Guidelines  
Physics 222

Content:
This part of your evaluation is a measure of the quality of the information in your paper. I will begin by looking at the amount of physics/history you have included. Your sources should include books, review articles and research journal articles, not websites. Use websites only to provide you with tutorial help and to guide you to the primary sources. Review articles such as in Scientific American, or Physics Today are very helpful. Use and cite three or more sources per person in your group. Do not cite the textbook. There should be enough depth that the reader can understand your topic and enough breadth to make the paper significant. The physics should be correct. I will also consider whether you have used good judgment in your choice of ideas to include and exclude. An especially important element is how interesting you can make the physics to your reader. Hopefully, you chose a topic that interested you. I will note how well you have conveyed that same interest to your audience.

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. In particular in the second paper you should make conclusions about the significance or veracity of your information. I will judge how well you discriminated between 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. You will do well in this section if I find your paper convincing and persuasive.

Expression and organization:
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. It should have a well developed focus that ties the entire paper together. Each paragraph should play a role in developing the focus. Paragraphs should be well-connected, with good transitions. They should each deal with a single idea, developing it logically, completely, and concisely. Your style should be appropriate to your audience (fellow 222 students) and topic. Don’t include humor, unless it comes from the scientists you write about.

Format:
The paper’s format and attention to mechanical details will help the reader get information from the paper easily, and will not distract from the flow of the paper. As a minimum, it will include:

◊ Title page with title, authors, and abstract
◊ Abstract: give a summary of what your paper accomplishes
◊ Headings that guide the reader
◊ Figures or tables that have titles and captions. These are referred to by number in the text. They appear with the text close to where they are cited, not all at the end.
◊ Doubled spaced with 1” margins, 12 point font.
◊ References follow the guidelines below.
Grading Sheet

Group_________________ Name___________________________________________

Content (18 pts)
depth / breadth
correctness
judgment
interest
appropriate sources
overall impact

Reasoning (12 pts)
conclusions
discrimination
understanding
logic
persuasiveness

Expression and organization (10 pts)
graham / spelling
appearance
focus / conciseness
flow
style
organization

Format (10 pts)
General Guidelines for the Term Papers:

Any paper handed in (whether for peer review, review by the writing fellows, or to be read by the professor) should be your very best work. The papers should be typed, grammatically correct, spell checked, and well polished.

The target audience for this assignment is your classmates. As such, you should not spend time covering background material which a typical 222 student should already know. Concepts which go beyond the course, however, should be adequately explained.

If you are confused, you are generally safe when you follow the AIP style guidelines, which can be found at [http://www.aip.org/pubservs/style/4thed/toc.html](http://www.aip.org/pubservs/style/4thed/toc.html).

Writing Suggestions for Physics 222

While Researching Your Topic

◊ Remember that the topic you cover should go well beyond what is covered in the textbook.
◊ Make sure you are using current sources.
◊ Use both review-type articles and cutting edge research reports. If you have a long list of cutting-edge hard to understand references and one book or review article, I'll know that you pretty much followed one source, and threw the other references in for looks.
◊ The web is a good resource for getting ideas, but... you can't believe something just because it's on the web. Do not cite web pages. Use review articles, peer-reviewed journal articles and books as your sources.
◊ Use and cite more three or more sources per person in your group.

While Writing the Paper

◊ Read your paper out loud --- you will find many mistakes and get a better feel for how the paper flows this way.
◊ Make a detailed outline and follow it --- one of the biggest problems I see on papers for this course is poor organization and lack of a natural flow!
◊ Don't repeat the same information. This can be avoided by good organization.
◊ Don't include every fact that you've discovered. You will learn more while you research the paper than will fit within the focus of your paper. Have the courage to focus your paper and leave out irrelevant discussions.
◊ Try to write a good, solid paper that conveys information in an easy to read manner.
◊ You need to reference where you get your information in each paragraph or more often, not just for quotes, so that anyone wanting to read further about your statement can know where to go.
◊ Beware of using quotes to say something you don't want to explain. In general, quotes should be used only where you want the author's personality to show through.

Abstract

◊ Does your abstract appear on the title page just under the title?
In your abstract do you clearly identify all of the major topics that will be discussed in your paper?

It is best to write the abstract after the paper is in its final form. An abstract is not an introduction, a soundbite, or a commercial for your paper. An abstract should tell us what the paper accomplishes.

**Introduction**

In the first paragraph or two do you define the subject matter that will be discussed in the paper?

**Is there a thesis statement early in the introduction?**

Are you comfortable with the scope of your paper? Is your paper broad enough to be significant? Is it narrow enough to be adequately covered within the time and space allotted?

- If you include a section of background information in your paper, do you explain clearly how it relates to the main topic you are exploring?
- The introduction is usually best written after the main body of the paper is complete.
- Do you lay out the organization of the paper so the reader can follow the flow of what you are going to say?
- The introduction is not a commercial. For example, something like... "Is the universe going to expand forever? Stay tuned and we'll answer this exciting question and thrill you with..." is not appropriate. "Our story begins with..." is also a bad way to start a scientific paper. I want this paper to be training for real research papers which you will some day be submitting to respectable journals.

**Main Body**

- Is your choice of words consistent with scientific writing?
- Eliminate meaningless words such as "basically", "obviously", "naturally", "of course", etc.
- Does the tone of your paper portray you, the authors, as physicists, as opposed to outsiders to the physics community, as in the following sentence: "Scientists have shown that black holes exist?"
- All this does not mean to make your papers sound as dry as possible. It requires you to write very clearly, making your paper flow from one idea to the next.
- If you are not sure exactly what an equation or a concept means, are you honest with the reader?
- Avoid creating the illusion that you know everything.
- Have you eliminated footnotes and parenthetical statements? There are cases where footnotes and parenthetical statements are appropriate; however, if what you say is important enough to include in the paper in the first place it probably should be included in the main body.
- Do your transitions lead the reader from one concept to the next without confusion? A good way to test this is to ask a person who is not in the class to read your paper. If he or she has a hard time understanding what you mean, then you need to revise.
- When you let someone read your paper, let them use this guide so they can respond more effectively to your paper.
- Do your figures have captions (when needed).

**Conclusion**

- Does your conclusion restate the main points you discussed in the main body of the paper?
- Do you actually make a conclusion (decision, judgment) about what you have learned? Do not overstate the significance.
◊ Be sure not to introduce new information in your conclusion.

Documentation
◊ Have you followed the reference guidelines at the end of this document?
◊ Have you given credit where credit is due, including paraphrases as well as direct quotes?
◊ Did you give credit in figure captions for "borrowed" figures by including a reference. For example, at the end of a figure caption you should write something like... Figure reproduced from [Spe 97].
◊ Is each referenced work listed only once in the Bibliography, regardless of how many times it is cited?

Miscellaneous
◊ Did you insert page numbers?
◊ Did your paper use only the present tense except when treating historical events?
◊ Did you treat mathematical expressions as part of a sentence with appropriate punctuation?
◊ Where appropriate, integrate good pictures and graphs in your paper.
◊ Do your tables and figures have a paragraph in the text that clearly explain what they mean?
◊ Do your tables and graphs appear on the same page where they are discussed whenever possible? Does your paper have the appropriate length?

Before Turning in Your Final Copy
◊ Did you carefully proofread your final copy for grammar and punctuation errors?
◊ Did you spell-check your paper?
◊ Did a fellow 222 classmate review the paper before you turned in the final copy?
Did you read the paper aloud?

References:

You need to reference where you get your information in each paragraph or more often, not just for quotes, so that anyone wanting to read further about your statement can know where to go.

Include endnote references to your sources within your paper. Each endnote should be listed in the order that it first appears in the paper. Each reference should only be referred to by one number or abbreviation. Reference the same number again for multiple citings (don’t use “ibid,” etc.) Any data, information, or figure which comes from another work should be properly referenced. A figure, table, etc., which is copied from another work should include the phrase “reproduced from [x]” in the caption, and x should be a reference to an endnote entry.

Reference guidelines from American Physical Society (condensed)

Superscripts: references[type (2)] are noted in text by the insertion of numerals as either a superscript or on line in this manner:
   Smith\textsuperscript{2} does not agree with the original values given in Ref. 1.
   When that use could possibly cause confusion (i.e., Pb\textsuperscript{4}), an in-line form should be used.
[Pb (Ref. 4)]. In the footnote listing at the end of the paper use only the superscript form. 

*Or, you can use in-line brackets:* Arabic numerals in square brackets in this manner:

Smith and Jones [3] also measured ....

Reference indicators should be at least one full space from words (not closed up to them as with superscripts). Multiple reference indicators should be set closed up within a single set of brackets: Smith and Jones [1,3,5--8] performed .... Reference indicators should be set inside punctuation: The work of Smith [3], that of Jones [4], and our previous work [5--8] disagree with that of Doe and Roe [13]. When the word "reference" is used in specifying a reference, use the abbreviation (unless at the beginning of a sentence) with the indicator in brackets: ... as was shown in Ref. [4]. Note that use of the following form is also acceptable: ... as was shown in [4].

| (a) How to list authors | J. M. Smith, Phys. Rev B 26, 1 (1982).  
| Five or more authors (*et al.* optional; use of *et al.* journal specific; note that Phys. Rev. C requires that 10 or fewer authors be listed and *et al.* not be used in such cases) |  
| Three or more sources: |  
| (c) How to list same author, same source, different volume and page | J. M. Smith, Phys. Rev. B 24, 3 (1981); 26, 1 (1982).  
| (d) How to list same author, same source, same volume number, same year, and different page numbers | J. M. Smith, Phys. Rev. B 26, 1 (1982); 26, 6 (1982).  
<table>
<thead>
<tr>
<th>(e) How to list different authors and</th>
<th>J. M. Smith, Phys. Rev. B. 26, 1 (1982); R. Brown, <em>Heavy Ions</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>(f) How to list different authors, same sources</td>
<td>J. M. Smith, Phys. Rev. B 26, 1 (1982); R. Brown, <em>ibid.</em> 24, 3 (1981); C. Green, <em>ibid.</em> 24, 22 (1981). [Note that <em>ibid.</em> is used instead of repeating the journal name.]</td>
</tr>
</tbody>
</table>
J. M. Smith, Phys. Rev. D (to be published). *accepted for publication*  
[published, use italic title; additional information (Vol., Chap., Sec., p., etc.) as appropriate]  
<table>
<thead>
<tr>
<th>Categories</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>(l) Preprints (journal specific)</td>
<td></td>
</tr>
<tr>
<td>(m) Theses</td>
<td></td>
</tr>
</tbody>
</table>
Writing Guidelines
Physics 222

Content:
This part of your evaluation is a measure of the quality of the information in your paper. I will begin by looking at the amount of physics/history you have included. Your sources should include books, review articles and research journal articles, not websites. Use websites only to provide you with tutorial help and to guide you to the primary sources. Review articles such as in Scientific American, or Physics Today are very helpful. Use and cite three or more sources per person in your group. Do not cite the textbook. There should be enough depth that the reader can understand your topic and enough breadth to make the paper significant. The physics should be correct. I will also consider whether you have used good judgment in your choice of ideas to include and exclude. An especially important element is how interesting you can make the physics to your reader. Hopefully, you chose a topic that interested you. I will note how well you have conveyed that same interest to your audience.

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. In particular in the second paper you should make conclusions about the significance or veracity of your information. I will judge how well you discriminated between 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. You will do well in this section if I find your paper convincing and persuasive.

Expression and organization:
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. It should have a well developed focus that ties the entire paper together. Each paragraph should play a role in developing the focus. Paragraphs should be well-connected, with good transitions. They should each deal with a single idea, developing it logically, completely, and concisely. Your style should be appropriate to your audience (fellow 222 students) and topic. Don’t include humor, unless it comes from the scientists you write about.

Format:
The paper’s format and attention to mechanical details will help the reader get information from the paper easily, and will not distract from the flow of the paper. As a minimum, it will include:
◊ Title page with title, authors, and abstract
◊ Abstract: give a summary of what your paper accomplishes
◊ Headings that guide the reader
◊ Figures or tables that have titles and captions. These are referred to by number in the text. They appear with the text close to where they are cited, not all at the end.
◊ Doubled spaced with 1”margins, 12 point font.
◊ References follow the guidelines below.
Grading Sheet

Group_________________ Name___________________________________________

Content (18 pts)
depth / breadth
correctness
judgment
interest
appropriate sources
overall impact

Reasoning (12 pts)
conclusions
discrimination
understanding
logic
persuasiveness

Expression and organization (10 pts)
grammar / spelling
appearance
focus / conciseness
flow
style
organization

Format (10 pts)
General Guidelines for the Term Papers:

Any paper handed in (whether for peer review, review by the writing fellows, or to be read by the professor) should be your very best work. The papers should be typed, grammatically correct, spell checked, and well polished.

The target audience for this assignment is your classmates. As such, you should not spend time covering background material which a typical 222 student should already know. Concepts which go beyond the course, however, should be adequately explained.

If you are confused, you are generally safe when you follow the AIP style guidelines, which can be found at [http://www.aip.org/pubservs/style/4thed/toc.html](http://www.aip.org/pubservs/style/4thed/toc.html).

Writing Suggestions for Physics 222

While Researching Your Topic
◊ Remember that the topic you cover should go well beyond what is covered in the textbook.
◊ Make sure you are using current sources.
◊ Use both review-type articles and cutting edge research reports. If you have a long list of cutting-edge hard to understand references and one book or review article, I'll know that you pretty much followed one source, and threw the other references in for looks.
◊ The web is a good resource for getting ideas, but... you can't believe something just because it's on the web. Do not cite web pages. Use review articles, peer-reviewed journal articles and books as your sources.
◊ Use and cite more three or more sources per person in your group.

While Writing the Paper
◊ Read your paper out loud --- you will find many mistakes and get a better feel for how the paper flows this way.
◊ Make a detailed outline and follow it --- one of the biggest problems I see on papers for this course is poor organization and lack of a natural flow!
◊ Don't repeat the same information. This can be avoided by good organization.
◊ Don't include every fact that you've discovered. You will learn more while you research the paper than will fit within the focus of your paper. Have the courage to focus your paper and leave out irrelevant discussions.
◊ Try to write a good, solid paper that conveys information in an easy to read manner.
◊ You need to reference where you get your information in each paragraph or more often, not just for quotes, so that anyone wanting to read further about your statement can know where to go.
◊ Beware of using quotes to say something you don't want to explain. In general, quotes should be used only where you want the author's personality to show through.

Abstract
◊ Does your abstract appear on the title page just under the title?
In your abstract do you clearly identify all of the major topics that will be discussed in your paper?
◊ It is best to write the abstract after the paper is in its final form. An abstract is not an introduction, a soundbite, or a commercial for your paper. An abstract should tell us what the paper accomplishes.

Introduction
In the first paragraph or two do you define the subject matter that will be discussed in the paper?
Is there a thesis statement early in the introduction?
Are you comfortable with the scope of your paper? Is your paper broad enough to be significant? Is it narrow enough to be adequately covered within the time and space allotted?
◊ If you include a section of background information in your paper, do you explain clearly how it relates to the main topic you are exploring?
◊ The introduction is usually best written after the main body of the paper is complete.
◊ Do you lay out the organization of the paper so the reader can follow the flow of what you are going to say?
◊ The introduction is not a commercial. For example, something like... "Is the universe going to expand forever? Stay tuned and we'll answer this exciting question and thrill you with..." is not appropriate. "Our story begins with..." is also a bad way to start a scientific paper. I want this paper to be training for real research papers which you will some day be submitting to respectable journals.

Main Body
◊ Is your choice of words consistent with scientific writing?
◊ Eliminate meaningless words such as "basically", "obviously", "naturally", "of course", etc.
◊ Does the tone of your paper portray you, the authors, as physicists, as opposed to outsiders to the physics community, as in the following sentence: "Scientists have shown that black holes exist?"
◊ All this does not mean to make your papers sound as dry as possible. It requires you to write very clearly, making your paper flow from one idea to the next.
◊ If you are not sure exactly what an equation or a concept means, are you honest with the reader?
◊ Avoid creating the illusion that you know everything.
◊ Have you eliminated footnotes and parenthetical statements? There are cases where footnotes and parenthetical statements are appropriate; however, if what you say is important enough to include in the paper in the first place it probably should be included in the main body.
◊ Do your transitions lead the reader from one concept to the next without confusion? A good way to test this is to ask a person who is not in the class to read your paper. If he or she has a hard time understanding what you mean, then you need to revise.
◊ When you let someone read your paper, let them use this guide so they can respond more effectively to your paper.
◊ Do your figures have captions (when needed).

Conclusion
◊ Does your conclusion restate the main points you discussed in the main body of the paper?
◊ Do you actually make a conclusion (decision, judgment) about what you have learned? Do not overstate the significance.
◊ Be sure not to introduce new information in your conclusion.

Documentation

◊ Have you followed the reference guidelines at the end of this document?
◊ Have you given credit where credit is due, including paraphrases as well as direct quotes?
◊ Did you give credit in figure captions for "borrowed" figures by including a reference. For example, at the end of a figure caption you should write something like... Figure reproduced from [Spe 97].
◊ Is each referenced work listed only once in the Bibliography, regardless of how many times it is cited?

Miscellaneous

◊ Did you insert page numbers?
◊ Did your paper use only the present tense except when treating historical events?
◊ Did you treat mathematical expressions as part of a sentence with appropriate punctuation?
◊ Where appropriate, integrate good pictures and graphs in your paper.
◊ Do your tables and figures have a paragraph in the text that clearly explain what they mean?
◊ Do your tables and graphs appear on the same page where they are discussed whenever possible? Does your paper have the appropriate length?

Before Turning in Your Final Copy

◊ Did you carefully proofread your final copy for grammar and punctuation errors?
◊ Did you spell-check your paper?
◊ Did a fellow 222 classmate review the paper before you turned in the final copy?
Did you read the paper aloud?

References:

You need to reference where you get your information in each paragraph or more often, not just for quotes, so that anyone wanting to read further about your statement can know where to go.

Include endnote references to your sources within your paper. Each endnote should be listed in the order that it first appears in the paper. Each reference should only be referred to by one number or abbreviation. Reference the same number again for multiple citings (don’t use “ibid,” etc.) Any data, information, or figure which comes from another work should be properly referenced. A figure, table, etc., which is copied from another work should include the phrase “reproduced from [x]” in the caption, and x should be a reference to an endnote entry.

Reference guidelines from American Physical Society (condensed)

Superscripts: references[type (2)] are noted in text by the insertion of numerals as either a superscript or on line in this manner:
Smith$^2$ does not agree with the original values given in Ref. 1.
When that use could possibly cause confusion (i.e., Pb$^4$), an in-line form should be used
[Pb (Ref. 4)]. In the footnote listing at the end of the paper use only the superscript form. 

*Or, you can use in-line brackets:* Arabic numerals in square brackets in this manner:

Smith and Jones [3] also measured ....

Reference indicators should be at least one full space from words (not closed up to them as with superscripts). Multiple reference indicators should be set closed up within a single set of brackets: Smith and Jones [1,3,5--8] performed .... Reference indicators should be set inside punctuation: The work of Smith [3], that of Jones [4], and our previous work [5--8] disagree with that of Doe and Roe [13]. When the word "reference" is used in specifying a reference, use the abbreviation (unless at the beginning of a sentence) with the indicator in brackets: ... as was shown in Ref. [4]. Note that use of the following form is also acceptable: ... as was shown in [4].

<table>
<thead>
<tr>
<th>(a) How to list authors</th>
<th>J. M. Smith, Phys. Rev B 26, 1 (1982).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Five or more authors (<em>et al.</em> optional; use of <em>et al.</em> journal specific; note that Phys. Rev. C requires that 10 or fewer authors be listed and <em>et al.</em> not be used in such cases)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Two sources:</td>
<td>[Note that a semicolon is used between sources.]</td>
</tr>
</tbody>
</table>

| (c) How to list same author, same source, different volume and page | J. M. Smith, Phys. Rev. B 24, 3 (1981); 26, 1 (1982). |

| (d) How to list same author, same source, same volume number, same year, and different page numbers | J. M. Smith, Phys. Rev. B 26, 1 (1982); 26, 6 (1982). [Note that both page numbers are listed separately.] |

| (e) How to list different authors and | J. M. Smith, Phys. Rev. B, 26, 1 (1982); R. Brown, *Heavy Ions* |
| (f) How to list different authors, same sources | J. M. Smith, Phys. Rev. B 26, 1 (1982); R. Brown, *ibid.* 24, 3 (1981); C. Green, *ibid.* 24, 22 (1981). [Note that *ibid.* is used instead of repeating the journal name.] |
J. M. Smith, Phys. Rev. D (to be published). [accepted for publication]  
(k) Reports

| [Most reports are considered to be unpublished. Those reports considered as full publications should be designated without the parenthetical unpublished at the end of the reference.] |

(l) Preprints (journal specific)

(m) Theses

(n) Others

| J. M. Smith (private communication). |
| [cited in another paper] |
Writing Guidelines
Physics 222

Content:
This part of your evaluation is a measure of the quality of the information in your paper. I will begin by looking at the amount of physics/history you have included. Your sources should include books, review articles and research journal articles, not websites. Use websites only to provide you with tutorial help and to guide you to the primary sources. Review articles such as in Scientific American, or Physics Today are very helpful. Use and cite three or more sources per person in your group. Do not cite the textbook. There should be enough depth that the reader can understand your topic and enough breadth to make the paper significant. The physics should be correct. I will also consider whether you have used good judgment in your choice of ideas to include and exclude. An especially important element is how interesting you can make the physics to your reader. Hopefully, you chose a topic that interested you. I will note how well you have conveyed that same interest to your audience.

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. In particular in the second paper you should make conclusions about the significance or veracity of your information. I will judge how well you discriminated between 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. You will do well in this section if I find your paper convincing and persuasive.

Expression and organization:
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. It should have a well developed focus that ties the entire paper together. Each paragraph should play a role in developing the focus. Paragraphs should be well-connected, with good transitions. They should each deal with a single idea, developing it logically, completely, and concisely. Your style should be appropriate to your audience (fellow 222 students) and topic. Don’t include humor, unless it comes from the scientists you write about.

Format:
The paper’s format and attention to mechanical details will help the reader get information from the paper easily, and will not distract from the flow of the paper. As a minimum, it will include:

◊ Title page with title, authors, and abstract
◊ Abstract: give a summary of what your paper accomplishes
◊ Headings that guide the reader
◊ Figures or tables that have titles and captions. These are referred to by number in the text. They appear with the text close to where they are cited, not all at the end.
◊ Doubled spaced with 1” margins, 12 point font.
◊ References follow the guidelines below.
Grading Sheet

Group_________________ Name___________________________________________

Content (18 pts)
depth / breadth
correctness
judgment
interest
appropriate sources
overall impact

Reasoning (12 pts)
conclusions
discrimination
understanding
logic
persuasiveness

Expression and organization (10 pts)
graham / spelling
appearance
focus / conciseness
flow
style
organization

Format (10 pts)
General Guidelines for the Term Papers:

Any paper handed in (whether for peer review, review by the writing fellows, or to be read by the professor) should be your very best work. The papers should be typed, grammatically correct, spell checked, and well polished.

The target audience for this assignment is your classmates. As such, you should not spend time covering background material which a typical 222 student should already know. Concepts which go beyond the course, however, should be adequately explained.

If you are confused, you are generally safe when you follow the AIP style guidelines, which can be found at http://www.aip.org/pubservs/style/4thed/toc.html.

Writing Suggestions for Physics 222

While Researching Your Topic
◊ Remember that the topic you cover should go well beyond what is covered in the textbook.
◊ Make sure you are using current sources.
◊ Use both review-type articles and cutting edge research reports. If you have a long list of cutting-edge hard to understand references and one book or review article, I'll know that you pretty much followed one source, and threw the other references in for looks.
◊ The web is a good resource for getting ideas, but... you can't believe something just because it's on the web. Do not cite web pages. Use review articles, peer-reviewed journal articles and books as your sources.
◊ Use and cite more three or more sources per person in your group.

While Writing the Paper
◊ Read your paper out loud --- you will find many mistakes and get a better feel for how the paper flows this way.
◊ Make a detailed outline and follow it --- one of the biggest problems I see on papers for this course is poor organization and lack of a natural flow!
◊ Don't repeat the same information. This can be avoided by good organization.
◊ Don't include every fact that you've discovered. You will learn more while you research the paper than will fit within the focus of your paper. Have the courage to focus your paper and leave out irrelevant discussions.
◊ Try to write a good, solid paper that conveys information in an easy to read manner.
◊ You need to reference where you get your information in each paragraph or more often, not just for quotes, so that anyone wanting to read further about your statement can know where to go.
◊ Beware of using quotes to say something you don't want to explain. In general, quotes should be used only where you want the author's personality to show through.

Abstract
◊ Does your abstract appear on the title page just under the title?
◊ In your abstract do you clearly identify all of the major topics that will be discussed in your paper?
◊ It is best to write the abstract after the paper is in its final form. An abstract is not an introduction, a soundbite, or a commercial for your paper. An abstract should tell us what the paper accomplishes.

Introduction
In the first paragraph or two do you define the subject matter that will be discussed in the paper?
Is there a thesis statement early in the introduction?
Are you comfortable with the scope of your paper? Is your paper broad enough to be significant? Is it narrow enough to be adequately covered within the time and space allotted?
◊ If you include a section of background information in your paper, do you explain clearly how it relates to the main topic you are exploring?
◊ The introduction is usually best written after the main body of the paper is complete.
◊ Do you lay out the organization of the paper so the reader can follow the flow of what you are going to say?
◊ The introduction is not a commercial. For example, something like... "Is the universe going to expand forever? Stay tuned and we'll answer this exciting question and thrill you with..." is not appropriate. "Our story begins with..." is also a bad way to start a scientific paper. I want this paper to be training for real research papers which you will some day be submitting to respectable journals.

Main Body
◊ Is your choice of words consistent with scientific writing?
◊ Eliminate meaningless words such as "basically", "obviously", "naturally", "of course", etc.
◊ Does the tone of your paper portray you, the authors, as physicists, as opposed to outsiders to the physics community, as in the following sentence: "Scientists have shown that black holes exist?"
◊ All this does not mean to make your papers sound as dry as possible. It requires you to write very clearly, making your paper flow from one idea to the next.
◊ If you are not sure exactly what an equation or a concept means, are you honest with the reader?
◊ Avoid creating the illusion that you know everything.
◊ Have you eliminated footnotes and parenthetical statements? There are cases where footnotes and parenthetical statements are appropriate; however, if what you say is important enough to include in the paper in the first place it probably should be included in the main body.
◊ Do your transitions lead the reader from one concept to the next without confusion? A good way to test this is to ask a person who is not in the class to read your paper. If he or she has a hard time understanding what you mean, then you need to revise.
◊ When you let someone read your paper, let them use this guide so they can respond more effectively to your paper.
◊ Do your figures have captions (when needed).

Conclusion
◊ Does your conclusion restate the main points you discussed in the main body of the paper?
◊ Do you actually make a conclusion (decision, judgment) about what you have learned? Do not overstate the significance.
◊ Be sure not to introduce new information in your conclusion.

Documentation
◊ Have you followed the reference guidelines at the end of this document?
◊ Have you given credit where credit is due, including paraphrases as well as direct quotes?
◊ Did you give credit in figure captions for "borrowed" figures by including a reference. For example, at the end of a figure caption you should write something like... Figure reproduced from [Spe 97].
◊ Is each referenced work listed only once in the Bibliography, regardless of how many times it is cited?

Miscellaneous
◊ Did you insert page numbers?
◊ Did your paper use only the present tense except when treating historical events?
◊ Did you treat mathematical expressions as part of a sentence with appropriate punctuation?
◊ Where appropriate, integrate good pictures and graphs in your paper.
◊ Do your tables and figures have a paragraph in the text that clearly explain what they mean?
◊ Do your tables and graphs appear on the same page where they are discussed whenever possible? Does your paper have the appropriate length?

Before Turning in Your Final Copy
◊ Did you carefully proofread your final copy for grammar and punctuation errors?
◊ Did you spell-check your paper?
◊ Did a fellow 222 classmate review the paper before you turned in the final copy?
Did you read the paper aloud?

References:

You need to reference where you get your information in each paragraph or more often, not just for quotes, so that anyone wanting to read further about your statement can know where to go.

Include endnote references to your sources within your paper. Each endnote should be listed in the order that it first appears in the paper. Each reference should only be referred to by one number or abbreviation. Reference the same number again for multiple citings (don’t use “ibid,” etc.) Any data, information, or figure which comes from another work should be properly referenced. A figure, table, etc., which is copied from another work should include the phrase “reproduced from [x]” in the caption, and x should be a reference to an endnote entry.

Reference guidelines from American Physical Society (condensed

Superscripts: references[type (2)] are noted in text by the insertion of numerals as either a superscript or on line in this manner:

Smith\textsuperscript{2} does not agree with the original values given in Ref. 1.
When that use could possibly cause confusion (i.e., Pb\textsuperscript{4}), an in-line form should be used
In the footnote listing at the end of the paper use only the superscript form.

*Or, you can use in-line brackets:* Arabic numerals in square brackets in this manner:

Smith and Jones [3] also measured ....

Reference indicators should be at least one full space from words (not closed up to them as with superscripts). Multiple reference indicators should be set closed up within a single set of brackets: Smith and Jones [1,3,5--8] performed .... Reference indicators should be set inside punctuation: The work of Smith [3], that of Jones [4], and our previous work [5--8] disagree with that of Doe and Roe [13]. When the word "reference" is used in specifying a reference, use the abbreviation (unless at the beginning of a sentence) with the indicator in brackets: ... as was shown in Ref. [4]. Note that use of the following form is also acceptable: ... as was shown in [4].

<table>
<thead>
<tr>
<th>(a) How to list authors</th>
<th>J. M. Smith, Phys. Rev B 26, 1 (1982).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Five or more authors (<em>et al.</em> optional; use of <em>et al.</em> journal specific; note that Phys. Rev. C requires that 10 or fewer authors be listed and <em>et al.</em> not be used in such cases)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Two sources:</td>
<td>[Note that a semicolon is used between sources.]</td>
</tr>
</tbody>
</table>

| (c) How to list same author, same source, different volume and page | J. M. Smith, Phys. Rev. B 24, 3 (1981); 26, 1 (1982). |

| (d) How to list same author, same source, same volume number, same year, and different page numbers | J. M. Smith, Phys. Rev. B 26, 1 (1982); 26, 6 (1982). [Note that both page numbers are listed separately.] |

<table>
<thead>
<tr>
<th>(e) How to list different authors and</th>
<th>J. M. Smith, Phys. Rev. B. 26, 1 (1982); R. Brown, <em>Heavy Ions</em></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>(f) How to list different authors, same sources</strong></td>
<td>J. M. Smith, Phys. Rev. B 26, 1 (1982); R. Brown, <em>ibid.</em> 24, 3 (1981); C. Green, <em>ibid.</em> 24, 22 (1981). [Note that <em>ibid.</em> is used instead of repeating the journal name.]</td>
</tr>
</tbody>
</table>
J. M. Smith, Phys. Rev. D (to be published). [accepted for publication]  
| (l) Preprints (journal specific)                 |                                                                                                                                   |
| (m) Theses                                       |                                                                                                                                   |
Writing Guidelines
Physics 222

Content:
This part of your evaluation is a measure of the quality of the information in your paper. I will begin by looking at the amount of physics/history you have included. Your sources should include books, review articles and research journal articles, not websites. Use websites only to provide you with tutorial help and to guide you to the primary sources. Review articles such as in Scientific American, or Physics Today are very helpful. Use and cite three or more sources per person in your group. Do not cite the textbook. There should be enough depth that the reader can understand your topic and enough breadth to make the paper significant. The physics should be correct. I will also consider whether you have used good judgment in your choice of ideas to include and exclude. An especially important element is how interesting you can make the physics to your reader. Hopefully, you chose a topic that interested you. I will note how well you have conveyed that same interest to your audience.

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. In particular in the second paper you should make conclusions about the significance or veracity of your information. I will judge how well you discriminated between 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. You will do well in this section if I find your paper convincing and persuasive.

Expression and organization:
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. It should have a well developed focus that ties the entire paper together. Each paragraph should play a role in developing the focus. Paragraphs should be well-connected, with good transitions. They should each deal with a single idea, developing it logically, completely, and concisely. Your style should be appropriate to your audience (fellow 222 students) and topic. Don’t include humor, unless it comes from the scientists you write about.

Format:
The paper’s format and attention to mechanical details will help the reader get information from the paper easily, and will not distract from the flow of the paper. As a minimum, it will include:
☆ Title page with title, authors, and abstract
☆ Abstract: give a summary of what your paper accomplishes
☆ Headings that guide the reader
☆ Figures or tables that have titles and captions. These are referred to by number in the text. They appear with the text close to where they are cited, not all at the end.
☆ Doubled spaced with 1” margins, 12 point font.
☆ References follow the guidelines below.
Grading Sheet

Group_________________ Name___________________________________________

Content (18 pts)
depth / breadth
correctness
judgment
interest
appropriate sources
overall impact

Reasoning (12 pts)
conclusions
discrimination
understanding
logic
persuasiveness

Expression and organization (10 pts)
grammar / spelling
appearance
focus / conciseness
flow
style
organization

Format (10 pts)
General Guidelines for the Term Papers:

Any paper handed in (whether for peer review, review by the writing fellows, or to be read by the professor) should be your very best work. The papers should be typed, grammatically correct, spell checked, and well polished.

The target audience for this assignment is your classmates. As such, you should not spend time covering background material which a typical 222 student should already know. Concepts which go beyond the course, however, should be adequately explained.

If you are confused, you are generally safe when you follow the AIP style guidelines, which can be found at http://www.aip.org/pubservs/style/4thed/toc.html.

Writing Suggestions for Physics 222

While Researching Your Topic
◊ Remember that the topic you cover should go well beyond what is covered in the textbook.
◊ Make sure you are using current sources.
◊ Use both review-type articles and cutting edge research reports. If you have a long list of cutting-edge hard to understand references and one book or review article, I'll know that you pretty much followed one source, and threw the other references in for looks.
◊ The web is a good resource for getting ideas, but... you can't believe something just because it's on the web. Do not cite web pages. Use review articles, peer-reviewed journal articles and books as your sources.
◊ Use and cite more three or more sources per person in your group.

While Writing the Paper
◊ Read your paper out loud --- you will find many mistakes and get a better feel for how the paper flows this way.
◊ Make a detailed outline and follow it --- one of the biggest problems I see on papers for this course is poor organization and lack of a natural flow!
◊ Don't repeat the same information. This can be avoided by good organization.
◊ Don't include every fact that you've discovered. You will learn more while you research the paper than will fit within the focus of your paper. Have the courage to focus your paper and leave out irrelevant discussions.
◊ Try to write a good, solid paper that conveys information in an easy to read manner.
◊ You need to reference where you get your information in each paragraph or more often, not just for quotes, so that anyone wanting to read further about your statement can know where to go.
◊ Beware of using quotes to say something you don't want to explain. In general, quotes should be used only where you want the author's personality to show through.

Abstract
◊ Does your abstract appear on the title page just under the title?
◊ In your abstract do you clearly identify all of the major topics that will be discussed in your paper?
◊ It is best to write the abstract after the paper is in its final form. An abstract is not an introduction, a soundbite, or a commercial for your paper. An abstract should tell us what the paper accomplishes.

**Introduction**

In the first paragraph or two do you define the subject matter that will be discussed in the paper?

**Is there a thesis statement early in the introduction?**

Are you comfortable with the scope of your paper? Is your paper broad enough to be significant? Is it narrow enough to be adequately covered within the time and space allotted?

◊ If you include a section of background information in your paper, do you explain clearly how it relates to the main topic you are exploring?
◊ The introduction is usually best written after the main body of the paper is complete.
◊ Do you lay out the organization of the paper so the reader can follow the flow of what you are going to say?
◊ The introduction is not a commercial. For example, something like... "Is the universe going to expand forever? Stay tuned and we'll answer this exciting question and thrill you with..." is not appropriate. "Our story begins with..." is also a bad way to start a scientific paper. I want this paper to be training for real research papers which you will some day be submitting to respectable journals.

**Main Body**

◊ Is your choice of words consistent with scientific writing?
◊ Eliminate meaningless words such as "basically", "obviously", "naturally", "of course", etc.
◊ Does the tone of your paper portray you, the authors, as physicists, as opposed to outsiders to the physics community, as in the following sentence: "Scientists have shown that black holes exist?"
◊ All this does not mean to make your papers sound as dry as possible. It requires you to write very clearly, making your paper flow from one idea to the next.
◊ If you are not sure exactly what an equation or a concept means, are you honest with the reader?
◊ Avoid creating the illusion that you know everything.
◊ Have you eliminated footnotes and parenthetical statements? There are cases where footnotes and parenthetical statements are appropriate; however, if what you say is important enough to include in the paper in the first place it probably should be included in the main body.
◊ Do your transitions lead the reader from one concept to the next without confusion? A good way to test this is to ask a person who is not in the class to read your paper. If he or she has a hard time understanding what you mean, then you need to revise.
◊ When you let someone read your paper, let them use this guide so they can respond more effectively to your paper.
◊ Do your figures have captions (when needed).

**Conclusion**

◊ Does your conclusion restate the main points you discussed in the main body of the paper?
◊ Do you actually make a conclusion (decision, judgment) about what you have learned? Do not overstate the significance.
Be sure not to introduce new information in your conclusion.

Documentation
- Have you followed the reference guidelines at the end of this document?
- Have you given credit where credit is due, including paraphrases as well as direct quotes?
- Did you give credit in figure captions for "borrowed" figures by including a reference. For example, at the end of a figure caption you should write something like... Figure reproduced from [Spe 97].
- Is each referenced work listed only once in the Bibliography, regardless of how many times it is cited?

Miscellaneous
- Did you insert page numbers?
- Did your paper use only the present tense except when treating historical events?
- Did you treat mathematical expressions as part of a sentence with appropriate punctuation?
- Where appropriate, integrate good pictures and graphs in your paper.
- Do your tables and figures have a paragraph in the text that clearly explain what they mean?
- Do your tables and graphs appear on the same page where they are discussed whenever possible? Does your paper have the appropriate length?

Before Turning in Your Final Copy
- Did you carefully proofread your final copy for grammar and punctuation errors?
- Did you spell-check your paper?
- Did a fellow 222 classmate review the paper before you turned in the final copy?
- Did you read the paper aloud?

References:
You need to reference where you get your information in each paragraph or more often, not just for quotes, so that anyone wanting to read further about your statement can know where to go.

Include endnote references to your sources within your paper. Each endnote should be listed in the order that it first appears in the paper. Each reference should only be referred to by one number or abbreviation. Reference the same number again for multiple citings (don’t use “ibid,” etc.) Any data, information, or figure which comes from another work should be properly referenced. A figure, table, etc., which is copied from another work should include the phrase “reproduced from [x]” in the caption, and x should be a reference to an endnote entry.

Reference guidelines from American Physical Society (condensed)

Superscripts: references[type (2)] are noted in text by the insertion of numerals as either a superscript or on line in this manner:
- Smith\(^2\) does not agree with the original values given in Ref. 1.
- When that use could possibly cause confusion (i.e., Pb\(^4\)), an in-line form should be used
[Pb (Ref. 4)]. In the footnote listing at the end of the paper use only the superscript form.

Or, you can use in-line brackets: Arabic numerals in square brackets in this manner:

Smith and Jones [3] also measured ....

Reference indicators should be at least one full space from words (not closed up to them as with superscripts). Multiple reference indicators should be set closed up within a single set of brackets: Smith and Jones [1,3,5--8] performed .... Reference indicators should be set inside punctuation: The work of Smith [3], that of Jones [4], and our previous work [5--8] disagree with that of Doe and Roe [13]. When the word "reference" is used in specifying a reference, use the abbreviation (unless at the beginning of a sentence) with the indicator in brackets: ... as was shown in Ref. [4]. Note that use of the following form is also acceptable: ... as was shown in [4].

| (a) How to list authors | J. M. Smith, Phys. Rev B 26, 1 (1982). |
| Five or more authors (et al. optional; use of et al. journal specific; note that Phys. Rev. C requires that 10 or fewer authors be listed and et al. not be used in such cases) | J. M. Smith, R. Brown, C. Green, and A. White, Phys. Rev. B 26, 1 (1982). |

<table>
<thead>
<tr>
<th>One source:</th>
<th>J. M. Smith, Phys. Rev. B 26, 1 (1982); 26, 6 (1982). [Note that both page numbers are listed separately.]</th>
</tr>
</thead>
<tbody>
<tr>
<td>(f) How to list different authors, same sources</td>
<td>J. M. Smith, Phys. Rev. B 26, 1 (1982); R. Brown, <em>ibid.</em> 24, 3 (1981); C. Green, <em>ibid.</em> 24, 22 (1981). [Note that <em>ibid.</em> is used instead of repeating the journal name.]</td>
</tr>
<tr>
<td></td>
<td>J. M. Smith, Phys. Rev. D (to be published). [accepted for publication]</td>
</tr>
</tbody>
</table>
|                                                                                               | [Most reports are considered to be unpublished. Those reports considered as full publications should be designated without the  
|                                                                                               | parenthetical unpublished at the end of the reference.]  
| (l) Preprints (journal specific)                                                               |                                                                                           |
| (m) Theses                                                                                     |                                                                                           |
| (n) Others                                                                                    | J. M. Smith (private communication).  
Writing Guidelines  
Physics 222

Content:
This part of your evaluation is a measure of the quality of the information in your paper. I will begin by looking at the amount of physics/history you have included. Your sources should include books, review articles and research journal articles, not websites. Use websites only to provide you with tutorial help and to guide you to the primary sources. Review articles such as in Scientific American, or Physics Today are very helpful. Use and cite three or more sources per person in your group. Do not cite the textbook. There should be enough depth that the reader can understand your topic and enough breadth to make the paper significant. The physics should be correct. I will also consider whether you have used good judgment in your choice of ideas to include and exclude. An especially important element is how interesting you can make the physics to your reader. Hopefully, you chose a topic that interested you. I will note how well you have conveyed that same interest to your audience.

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. In particular in the second paper you should make conclusions about the significance or veracity of your information. I will judge how well you discriminated between 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. You will do well in this section if I find your paper convincing and persuasive.

Expression and organization:
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. It should have a well developed focus that ties the entire paper together. Each paragraph should play a role in developing the focus. Paragraphs should be well-connected, with good transitions. They should each deal with a single idea, developing it logically, completely, and concisely. Your style should be appropriate to your audience (fellow 222 students) and topic. Don’t include humor, unless it comes from the scientists you write about.

Format:
The paper’s format and attention to mechanical details will help the reader get information from the paper easily, and will not distract from the flow of the paper. As a minimum, it will include:
- Title page with title, authors, and abstract
- Abstract: give a summary of what your paper accomplishes
- Headings that guide the reader
- Figures or tables that have titles and captions. These are referred to by number in the text. They appear with the text close to where they are cited, not all at the end.
- Doubled spaced with 1”margins, 12 point font.
- References follow the guidelines below.
Grading Sheet

Group_________________ Name___________________________________________

Content (18 pts)
depth / breadth
correctness
judgment
interest
appropriate sources
overall impact

Reasoning (12 pts)
conclusions
discrimination
understanding
logic
persuasiveness

Expression and organization (10 pts)
grammar / spelling
appearance
focus / conciseness
flow
style
organization

Format (10 pts)
General Guidelines for the Term Papers:

Any paper handed in (whether for peer review, review by the writing fellows, or to be read by the professor) should be your very best work. The papers should be typed, grammatically correct, spell checked, and well polished.

The target audience for this assignment is your classmates. As such, you should not spend time covering background material which a typical 222 student should already know. Concepts which go beyond the course, however, should be adequately explained.

If you are confused, you are generally safe when you follow the AIP style guidelines, which can be found at [http://www.aip.org/pubservs/style/4thed/toc.html](http://www.aip.org/pubservs/style/4thed/toc.html).

Writing Suggestions for Physics 222

While Researching Your Topic

◊ Remember that the topic you cover should go well beyond what is covered in the textbook.
◊ Make sure you are using current sources.
◊ Use both review-type articles and cutting edge research reports. If you have a long list of cutting-edge hard to understand references and one book or review article, I'll know that you pretty much followed one source, and threw the other references in for looks.
◊ The web is a good resource for getting ideas, but... you can't believe something just because it's on the web. Do not cite web pages. Use review articles, peer-reviewed journal articles and books as your sources.
◊ Use and cite more three or more sources per person in your group.

While Writing the Paper

◊ Read your paper out loud --- you will find many mistakes and get a better feel for how the paper flows this way.
◊ Make a detailed outline and follow it --- one of the biggest problems I see on papers for this course is poor organization and lack of a natural flow!
◊ Don't repeat the same information. This can be avoided by good organization.
◊ Don't include every fact that you've discovered. You will learn more while you research the paper than will fit within the focus of your paper. Have the courage to focus your paper and leave out irrelevant discussions.
◊ Try to write a good, solid paper that conveys information in an easy to read manner.
◊ You need to reference where you get your information in each paragraph or more often, not just for quotes, so that anyone wanting to read further about your statement can know where to go.
◊ Beware of using quotes to say something you don't want to explain. In general, quotes should be used only where you want the author's personality to show through.

Abstract

◊ Does your abstract appear on the title page just under the title?
◊ In your abstract do you clearly identify all of the major topics that will be discussed in your paper?
◊ It is best to write the abstract after the paper is in its final form. An abstract is not an introduction, a soundbite, or a commercial for your paper. An abstract should tell us what the paper accomplishes.

Introduction
In the first paragraph or two do you define the subject matter that will be discussed in the paper?
Is there a thesis statement early in the introduction?
Are you comfortable with the scope of your paper? Is your paper broad enough to be significant? Is it narrow enough to be adequately covered within the time and space allotted?
◊ If you include a section of background information in your paper, do you explain clearly how it relates to the main topic you are exploring?
◊ The introduction is usually best written after the main body of the paper is complete.
◊ Do you lay out the organization of the paper so the reader can follow the flow of what you are going to say?
◊ The introduction is not a commercial. For example, something like... "Is the universe going to expand forever? Stay tuned and we'll answer this exciting question and thrill you with..." is not appropriate. "Our story begins with..." is also a bad way to start a scientific paper. I want this paper to be training for real research papers which you will some day be submitting to respectable journals.

Main Body
◊ Is your choice of words consistent with scientific writing?
◊ Eliminate meaningless words such as "basically", "obviously", "naturally", "of course", etc.
◊ Does the tone of your paper portray you, the authors, as physicists, as opposed to outsiders to the physics community, as in the following sentence: "Scientists have shown that black holes exist?"
◊ All this does not mean to make your papers sound as dry as possible. It requires you to write very clearly, making your paper flow from one idea to the next.
◊ If you are not sure exactly what an equation or a concept means, are you honest with the reader?
◊ Avoid creating the illusion that you know everything.
◊ Have you eliminated footnotes and parenthetical statements? There are cases where footnotes and parenthetical statements are appropriate; however, if what you say is important enough to include in the paper in the first place it probably should be included in the main body.
◊ Do your transitions lead the reader from one concept to the next without confusion? A good way to test this is to ask a person who is not in the class to read your paper. If he or she has a hard time understanding what you mean, then you need to revise.
◊ When you let someone read your paper, let them use this guide so they can respond more effectively to your paper.
◊ Do your figures have captions (when needed).

Conclusion
◊ Does your conclusion restate the main points you discussed in the main body of the paper?
◊ Do you actually make a conclusion (decision, judgment) about what you have learned? Do not overstate the significance.
Be sure not to introduce new information in your conclusion.

Documentation
◊ Have you followed the reference guidelines at the end of this document?
◊ Have you given credit where credit is due, including paraphrases as well as direct quotes?
◊ Did you give credit in figure captions for "borrowed" figures by including a reference. For example, at the end of a figure caption you should write something like... Figure reproduced from [Spe 97].
◊ Is each referenced work listed only once in the Bibliography, regardless of how many times it is cited?

Miscellaneous
◊ Did you insert page numbers?
◊ Did your paper use only the present tense except when treating historical events?
◊ Did you treat mathematical expressions as part of a sentence with appropriate punctuation?
◊ Where appropriate, integrate good pictures and graphs in your paper.
◊ Do your tables and figures have a paragraph in the text that clearly explain what they mean?
◊ Do your tables and graphs appear on the same page where they are discussed whenever possible? Does your paper have the appropriate length?

Before Turning in Your Final Copy
◊ Did you carefully proofread your final copy for grammar and punctuation errors?
◊ Did you spell-check your paper?
◊ Did a fellow 222 classmate review the paper before you turned in the final copy?
Did you read the paper aloud?

References:

You need to reference where you get your information in each paragraph or more often, not just for quotes, so that anyone wanting to read further about your statement can know where to go.

Include endnote references to your sources within your paper. Each endnote should be listed in the order that it first appears in the paper. Each reference should only be referred to by one number or abbreviation. Reference the same number again for multiple citings (don’t use “ibid,” etc.) Any data, information, or figure which comes from another work should be properly referenced. A figure, table, etc., which is copied from another work should include the phrase “reproduced from [x]” in the caption, and x should be a reference to an endnote entry.

Reference guidelines from American Physical Society (condensed)

Superscripts: references[type (2)] are noted in text by the insertion of numerals as either a superscript or on line in this manner:

Smith\(^2\) does not agree with the original values given in Ref. 1.
When that use could possibly cause confusion (i.e., Pb\(^4\)), an in-line form should be used
[Pb (Ref. 4)]. In the footnote listing at the end of the paper use only the superscript form.

*Or, you can use in-line brackets:* Arabic numerals in square brackets in this manner:

-Smith and Jones [3] also measured ....

Reference indicators should be at least one full space from words (not closed up to them as with superscripts). Multiple reference indicators should be set closed up within a single set of brackets:

-Smith and Jones [1,3,5--8] performed .... Reference indicators should be set inside punctuation: The work of Smith [3], that of Jones [4], and our previous work [5--8] disagree with that of Doe and Roe [13]. When the word "reference" is used in specifying a reference, use the abbreviation (unless at the beginning of a sentence) with the indicator in brackets: ... as was shown in Ref. [4]. Note that use of the following form is also acceptable: ... as was shown in [4].

<table>
<thead>
<tr>
<th>(a) How to list authors</th>
<th>(b) How to list sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>One author:</td>
<td>One source:</td>
</tr>
<tr>
<td>Two authors:</td>
<td>Two sources:</td>
</tr>
<tr>
<td>Three or four authors:</td>
<td>Three or more sources:</td>
</tr>
<tr>
<td>Five or more authors (<em>et al.</em> optional; use of <em>et al.</em> journal specific; note that Phys. Rev. C requires that 10 or fewer authors be listed and <em>et al.</em> not be used in such cases)</td>
<td></td>
</tr>
</tbody>
</table>


| [Note that a semicolon is used between sources.] |


| J. M. Smith, Phys. Rev. B 26, 1 (1982); 26, 6 (1982). [Note that both page numbers are listed separately.] |

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>(f) How to list different authors, same sources</td>
<td>J. M. Smith, Phys. Rev. B 26, 1 (1982); R. Brown, <em>ibid.</em> 24, 3 (1981); C. Green, <em>ibid.</em> 24, 22 (1981). [Note that <em>ibid.</em> is used instead of repeating the journal name.]</td>
</tr>
<tr>
<td>Type</td>
<td>Reference</td>
</tr>
<tr>
<td>--------------</td>
<td>-----------------------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
              | [Most reports are considered to be unpublished. Those reports considered as full publications should be designated without the parenthetical unpublished at the end of the reference.]  
| (l) Preprints (journal specific) |                                                                                               |
| (m) Theses   |                                                                                               |
| (n) Others   | J. M. Smith (private communication).  
              | [cited in another paper]  
Writing Guidelines
Physics 222

Content:
This part of your evaluation is a measure of the quality of the information in your paper. I will begin by looking at the amount of physics/history you have included. Your sources should include books, review articles and research journal articles, not websites. Use websites only to provide you with tutorial help and to guide you to the primary sources. Review articles such as in Scientific American, or Physics Today are very helpful. Use and cite three or more sources per person in your group. Do not cite the textbook. There should be enough depth that the reader can understand your topic and enough breadth to make the paper significant. The physics should be correct. I will also consider whether you have used good judgment in your choice of ideas to include and exclude. An especially important element is how interesting you can make the physics to your reader. Hopefully, you chose a topic that interested you. I will note how well you have conveyed that same interest to your audience.

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. In particular in the second paper you should make conclusions about the significance or veracity of your information. I will judge how well you discriminated between 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. You will do well in this section if I find your paper convincing and persuasive.

Expression and organization:
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. It should have a well developed focus that ties the entire paper together. Each paragraph should play a role in developing the focus. Paragraphs should be well-connected, with good transitions. They should each deal with a single idea, developing it logically, completely, and concisely. Your style should be appropriate to your audience (fellow 222 students) and topic. Don’t include humor, unless it comes from the scientists you write about.

Format:
The paper’s format and attention to mechanical details will help the reader get information from the paper easily, and will not distract from the flow of the paper. As a minimum, it will include:
◊ Title page with title, authors, and abstract
◊ Abstract: give a summary of what your paper accomplishes
◊ Headings that guide the reader
◊ Figures or tables that have titles and captions. These are referred to by number in the text. They appear with the text close to where they are cited, not all at the end.
◊ Doubled spaced with 1” margins, 12 point font.
◊ References follow the guidelines below.
Grading Sheet

Group_________________ Name___________________________________________

Content (18 pts)
depth / breadth
correctness
judgment
interest
appropriate sources
overall impact

Reasoning (12 pts)
conclusions
discrimination
understanding
logic
persuasiveness

Expression and organization (10 pts)
grammar / spelling
appearance
focus / conciseness
flow
style
organization

Format (10 pts)
General Guidelines for the Term Papers:

Any paper handed in (whether for peer review, review by the writing fellows, or to be read by the professor) should be your very best work. The papers should be typed, grammatically correct, spell checked, and well polished.

The target audience for this assignment is your classmates. As such, you should not spend time covering background material which a typical 222 student should already know. Concepts which go beyond the course, however, should be adequately explained.

If you are confused, you are generally safe when you follow the AIP style guidelines, which can be found at http://www.aip.org/pubservs/style/4thed/toc.html.

Writing Suggestions for Physics 222

While Researching Your Topic

◊ Remember that the topic you cover should go well beyond what is covered in the textbook.
◊ Make sure you are using current sources.
◊ Use both review-type articles and cutting edge research reports. If you have a long list of cutting-edge hard to understand references and one book or review article, I'll know that you pretty much followed one source, and threw the other references in for looks.
◊ The web is a good resource for getting ideas, but... you can't believe something just because it's on the web. Do not cite web pages. Use review articles, peer-reviewed journal articles and books as your sources.
◊ Use and cite more three or more sources per person in your group.

While Writing the Paper

◊ Read your paper out loud --- you will find many mistakes and get a better feel for how the paper flows this way.
◊ Make a detailed outline and follow it --- one of the biggest problems I see on papers for this course is poor organization and lack of a natural flow!
◊ Don't repeat the same information. This can be avoided by good organization.
◊ Don't include every fact that you've discovered. You will learn more while you research the paper than will fit within the focus of your paper. Have the courage to focus your paper and leave out irrelevant discussions.
◊ Try to write a good, solid paper that conveys information in an easy to read manner.
◊ You need to reference where you get your information in each paragraph or more often, not just for quotes, so that anyone wanting to read further about your statement can know where to go.
◊ Beware of using quotes to say something you don't want to explain. In general, quotes should be used only where you want the author's personality to show through.

Abstract

◊ Does your abstract appear on the title page just under the title?
In your abstract do you clearly identify all of the major topics that will be discussed in your paper?

It is best to write the abstract after the paper is in its final form. An abstract is not an introduction, a soundbite, or a commercial for your paper. An abstract should tell us what the paper accomplishes.

**Introduction**

In the first paragraph or two do you define the subject matter that will be discussed in the paper?

**Is there a thesis statement early in the introduction?**

Are you comfortable with the scope of your paper? Is your paper broad enough to be significant? Is it narrow enough to be adequately covered within the time and space allotted?

- If you include a section of background information in your paper, do you explain clearly how it relates to the main topic you are exploring?
- The introduction is usually best written after the main body of the paper is complete.
- Do you lay out the organization of the paper so the reader can follow the flow of what you are going to say?
- The introduction is not a commercial. For example, something like... "Is the universe going to expand forever? Stay tuned and we'll answer this exciting question and thrill you with..." is not appropriate. "Our story begins with..." is also a bad way to start a scientific paper. I want this paper to be training for real research papers which you will some day be submitting to respectable journals.

**Main Body**

- Is your choice of words consistent with scientific writing?
- Eliminate meaningless words such as "basically", "obviously", "naturally", "of course", etc.
- Does the tone of your paper portray you, the authors, as physicists, as opposed to outsiders to the physics community, as in the following sentence: "Scientists have shown that black holes exist?"
- All this does not mean to make your papers sound as dry as possible. It requires you to write very clearly, making your paper flow from one idea to the next.
- If you are not sure exactly what an equation or a concept means, are you honest with the reader?
- Avoid creating the illusion that you know everything.
- Have you eliminated footnotes and parenthetical statements? There are cases where footnotes and parenthetical statements are appropriate; however, if what you say is important enough to include in the paper in the first place it probably should be included in the main body.
- Do your transitions lead the reader from one concept to the next without confusion? A good way to test this is to ask a person who is not in the class to read your paper. If he or she has a hard time understanding what you mean, then you need to revise.
- When you let someone read your paper, let them use this guide so they can respond more effectively to your paper.
- Do your figures have captions (when needed).

**Conclusion**

- Does your conclusion restate the main points you discussed in the main body of the paper?
- Do you actually make a conclusion (decision, judgment) about what you have learned? Do not overstate the significance.
◊ Be sure not to introduce new information in your conclusion.

Documentation
◊ Have you followed the reference guidelines at the end of this document?
◊ Have you given credit where credit is due, including paraphrases as well as direct quotes?
◊ Did you give credit in figure captions for "borrowed" figures by including a reference. For example, at the end of a figure caption you should write something like... Figure reproduced from [Spe 97].
◊ Is each referenced work listed only once in the Bibliography, regardless of how many times it is cited?

Miscellaneous
◊ Did you insert page numbers?
◊ Did your paper use only the present tense except when treating historical events?
◊ Did you treat mathematical expressions as part of a sentence with appropriate punctuation?
◊ Where appropriate, integrate good pictures and graphs in your paper.
◊ Do your tables and figures have a paragraph in the text that clearly explain what they mean?
◊ Do your tables and graphs appear on the same page where they are discussed whenever possible? Does your paper have the appropriate length?

Before Turning in Your Final Copy
◊ Did you carefully proofread your final copy for grammar and punctuation errors?
◊ Did you spell-check your paper?
◊ Did a fellow 222 classmate review the paper before you turned in the final copy?
Did you read the paper aloud?

References:
You need to reference where you get your information in each paragraph or more often, not just for quotes, so that anyone wanting to read further about your statement can know where to go.

Include endnote references to your sources within your paper. Each endnote should be listed in the order that it first appears in the paper. Each reference should only be referred to by one number or abbreviation. Reference the same number again for multiple citings (don’t use “ibid,” etc.) Any data, information, or figure which comes from another work should be properly referenced. A figure, table, etc., which is copied from another work should include the phrase “reproduced from [x]” in the caption, and x should be a reference to an endnote entry.

Reference guidelines from American Physical Society (condensed)

Superscripts: references[type (2)] are noted in text by the insertion of numerals as either a superscript or on line in this manner:
Smith² does not agree with the original values given in Ref. 1.
When that use could possibly cause confusion (i.e., Pb⁴), an in-line form should be used
[Pb (Ref. 4)]. In the footnote listing at the end of the paper use only the superscript form. Or, you can use in-line brackets: Arabic numerals in square brackets in this manner:

Smith and Jones [3] also measured ....

Reference indicators should be at least one full space from words (not closed up to them as with superscripts). Multiple reference indicators should be set closed up within a single set of brackets: Smith and Jones [1,3,5--8] performed .... Reference indicators should be set inside punctuation: The work of Smith [3], that of Jones [4], and our previous work [5--8] disagree with that of Doe and Roe [13]. When the word "reference" is used in specifying a reference, use the abbreviation (unless at the beginning of a sentence) with the indicator in brackets: ... as was shown in Ref. [4]. Note that use of the following form is also acceptable: ... as was shown in [4].

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Five or more authors (et al. optional; use of et al. journal specific; note that Phys. Rev. C requires that 10 or fewer authors be listed and et al. not be used in such cases)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Three or more sources:</td>
<td></td>
</tr>
</tbody>
</table>


| (d) How to list same author, same source, same volume number, same year, and different page numbers | J. M. Smith, Phys. Rev. B **26**, 1 (1982); **26**, 6 (1982). [Note that both page numbers are listed separately.] |

<p>| (e) How to list different authors and | J. M. Smith, Phys. Rev. B. <strong>26</strong>, 1 (1982); R. Brown, <em>Heavy Ions</em> |</p>
<table>
<thead>
<tr>
<th>entries</th>
<th>examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>(f) How to list different authors, same sources</td>
<td>J. M. Smith, Phys. Rev. B 26, 1 (1982); R. Brown, <em>ibid.</em> 24, 3 (1981); C. Green, <em>ibid.</em> 24, 22 (1981). [Note that <em>ibid.</em> is used instead of repeating the journal name.]</td>
</tr>
</tbody>
</table>
J. M. Smith, Phys. Rev. D (to be published). [accepted for publication]  
[published, use italic title; additional information (Vol., Chap., Sec., p., etc.) as appropriate]  
[Most reports are considered to be unpublished. Those reports considered as full publications should be designated without the parenthetical unpublished at the end of the reference.]  
| (l) Preprints (journal specific) | |
| (m) Theses | |
| (n) Others | J. M. Smith (private communication).  
[cited in another paper]  
Writing Guidelines
Physics 222

Content:
This part of your evaluation is a measure of the quality of the information in your paper. I will begin by looking at the amount of physics/history you have included. Your sources should include books, review articles and research journal articles, not websites. Use websites only to provide you with tutorial help and to guide you to the primary sources. Review articles such as in Scientific American, or Physics Today are very helpful. Use and cite three or more sources per person in your group. Do not cite the textbook. There should be enough depth that the reader can understand your topic and enough breadth to make the paper significant. The physics should be correct. I will also consider whether you have used good judgment in your choice of ideas to include and exclude. An especially important element is how interesting you can make the physics to your reader. Hopefully, you chose a topic that interested you. I will note how well you have conveyed that same interest to your audience.

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. In particular in the second paper you should make conclusions about the significance or veracity of your information. I will judge how well you discriminated between 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. You will do well in this section if I find your paper convincing and persuasive.

Expression and organization:
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. It should have a well developed focus that ties the entire paper together. Each paragraph should play a role in developing the focus. Paragraphs should be well-connected, with good transitions. They should each deal with a single idea, developing it logically, completely, and concisely. Your style should be appropriate to your audience (fellow 222 students) and topic. Don’t include humor, unless it comes from the scientists you write about.

Format:
The paper’s format and attention to mechanical details will help the reader get information from the paper easily, and will not distract from the flow of the paper. As a minimum, it will include:
◊ Title page with title, authors, and abstract
◊ Abstract: give a summary of what your paper accomplishes
◊ Headings that guide the reader
◊ Figures or tables that have titles and captions. These are referred to by number in the text. They appear with the text close to where they are cited, not all at the end.
◊ Doubled spaced with 1”margins, 12 point font.
◊ References follow the guidelines below.
Grading Sheet

**Group_________________ Name___________________________________________**

**Content (18 pts)**
- depth / breadth
- correctness
- judgment
- interest
- appropriate sources
- overall impact

**Reasoning (12 pts)**
- conclusions
- discrimination
- understanding
- logic
- persuasiveness

**Expression and organization (10 pts)**
- grammar / spelling
- appearance
- focus / conciseness
- flow
- style
- organization

**Format (10 pts)**
General Guidelines for the Term Papers:

Any paper handed in (whether for peer review, review by the writing fellows, or to be read by the professor) should be your very best work. The papers should be typed, grammatically correct, spell checked, and well polished.

The target audience for this assignment is your classmates. As such, you should not spend time covering background material which a typical 222 student should already know. Concepts which go beyond the course, however, should be adequately explained.

If you are confused, you are generally safe when you follow the AIP style guidelines, which can be found at http://www.aip.org/pubservs/style/4thed/toc.html.

Writing Suggestions for Physics 222

While Researching Your Topic

◊ Remember that the topic you cover should go well beyond what is covered in the textbook.
◊ Make sure you are using current sources.
◊ Use both review-type articles and cutting edge research reports. If you have a long list of cutting-edge hard to understand references and one book or review article, I'll know that you pretty much followed one source, and threw the other references in for looks.
◊ The web is a good resource for getting ideas, but... you can't believe something just because it's on the web. Do not cite web pages. Use review articles, peer-reviewed journal articles and books as your sources.
◊ Use and cite more three or more sources per person in your group.

While Writing the Paper

◊ Read your paper out loud --- you will find many mistakes and get a better feel for how the paper flows this way.
◊ Make a detailed outline and follow it --- one of the biggest problems I see on papers for this course is poor organization and lack of a natural flow!
◊ Don't repeat the same information. This can be avoided by good organization.
◊ Don't include every fact that you've discovered. You will learn more while you research the paper than will fit within the focus of your paper. Have the courage to focus your paper and leave out irrelevant discussions.
◊ Try to write a good, solid paper that conveys information in an easy to read manner.
◊ You need to reference where you get your information in each paragraph or more often, not just for quotes, so that anyone wanting to read further about your statement can know where to go.
◊ Beware of using quotes to say something you don't want to explain. In general, quotes should be used only where you want the author's personality to show through.

Abstract

◊ Does your abstract appear on the title page just under the title?
◊ In your abstract do you clearly identify all of the major topics that will be discussed in your paper?
◊ It is best to write the abstract after the paper is in its final form. **An abstract is not an introduction, a soundbite, or a commercial for your paper.** An abstract should tell us what the paper **accomplishes.**

**Introduction**
In the first paragraph or two do you define the subject matter that will be discussed in the paper?

**Is there a thesis statement early in the introduction?**
Are you comfortable with the scope of your paper? Is your paper broad enough to be significant? Is it narrow enough to be adequately covered within the time and space allotted?

◊ If you include a section of background information in your paper, do you explain clearly how it relates to the main topic you are exploring?
◊ The introduction is usually best written after the main body of the paper is complete.
◊ Do you lay out the organization of the paper so the reader can follow the flow of what you are going to say?
◊ The introduction is not a commercial. For example, something like... "Is the universe going to expand forever? Stay tuned and we'll answer this exciting question and thrill you with..." is not appropriate. "Our story begins with..." is also a bad way to start a scientific paper. I want this paper to be training for real research papers which you will some day be submitting to respectable journals.

**Main Body**

◊ Is your choice of words consistent with scientific writing?
◊ Eliminate meaningless words such as "basically", "obviously", "naturally", "of course", etc.
◊ Does the tone of your paper portray you, the authors, as physicists, as opposed to outsiders to the physics community, as in the following sentence: "Scientists have shown that black holes exist?"
◊ All this does not mean to make your papers sound as dry as possible. It requires you to write very clearly, making your paper flow from one idea to the next.
◊ If you are not sure exactly what an equation or a concept means, are you honest with the reader?
◊ Avoid creating the illusion that you know everything.
◊ Have you eliminated footnotes and parenthetical statements? There are cases where footnotes and parenthetical statements are appropriate; however, if what you say is important enough to include in the paper in the first place it probably should be included in the main body.
◊ Do your transitions lead the reader from one concept to the next without confusion? A good way to test this is to ask a person who is not in the class to read your paper. If he or she has a hard time understanding what you mean, then you need to revise.
◊ When you let someone read your paper, let them use this guide so they can respond more effectively to your paper.
◊ Do your figures have captions (when needed).

**Conclusion**

◊ Does your conclusion restate the main points you discussed in the main body of the paper?
◊ Do you actually make a conclusion (decision, judgment) about what you have learned? Do not overstate the significance.
◊ Be sure not to introduce new information in your conclusion.

Documentation
◊ Have you followed the reference guidelines at the end of this document?
◊ Have you given credit where credit is due, including paraphrases as well as direct quotes?
◊ Did you give credit in figure captions for "borrowed" figures by including a reference. For example, at the end of a figure caption you should write something like... Figure reproduced from [Spe 97].
◊ Is each referenced work listed only once in the Bibliography, regardless of how many times it is cited?

Miscellaneous
◊ Did you insert page numbers?
◊ Did your paper use only the present tense except when treating historical events?
◊ Did you treat mathematical expressions as part of a sentence with appropriate punctuation?
◊ Where appropriate, integrate good pictures and graphs in your paper.
◊ Do your tables and figures have a paragraph in the text that clearly explain what they mean?
◊ Do your tables and graphs appear on the same page where they are discussed whenever possible? Does your paper have the appropriate length?

Before Turning in Your Final Copy
◊ Did you carefully proofread your final copy for grammar and punctuation errors?
◊ Did you spell-check your paper?
◊ Did a fellow 222 classmate review the paper before you turned in the final copy?
Did you read the paper aloud?

References:

You need to reference where you get your information in each paragraph or more often, not just for quotes, so that anyone wanting to read further about your statement can know where to go.

Include endnote references to your sources within your paper. Each endnote should be listed in the order that it first appears in the paper. Each reference should only be referred to by one number or abbreviation. Reference the same number again for multiple citings (don’t use “ibid,” etc.) Any data, information, or figure which comes from another work should be properly referenced. A figure, table, etc., which is copied from another work should include the phrase “reproduced from [x]” in the caption, and x should be a reference to an endnote entry.

Reference guidelines from American Physical Society (condensed)

Superscripts: references[type (2)] are noted in text by the insertion of numerals as either a superscript or on line in this manner:

Smith\textsuperscript{2} does not agree with the original values given in Ref. 1.
When that use could possibly cause confusion (i.e., Pb\textsuperscript{4}), an in-line form should be used
In the footnote listing at the end of the paper use only the superscript form. *Or, you can use in-line brackets:* Arabic numerals in square brackets in this manner:

Smith and Jones [3] also measured ....

Reference indicators should be at least one full space from words (not closed up to them as with superscripts). Multiple reference indicators should be set closed up within a single set of brackets:

Smith and Jones [1,3,5--8] performed .... Reference indicators should be set inside punctuation: The work of Smith [3], that of Jones [4], and our previous work [5--8] disagree with that of Doe and Roe [13]. When the word "reference" is used in specifying a reference, use the abbreviation (unless at the beginning of a sentence) with the indicator in brackets: ... as was shown in Ref. [4]. Note that use of the following form is also acceptable: ... as was shown in [4].

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Five or more authors (<em>et al.</em> optional; use of <em>et al.</em> journal specific; note that Phys. Rev. C requires that 10 or fewer authors be listed and <em>et al.</em> not be used in such cases)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Two sources:</td>
<td>[Note that a semicolon is used between sources.]</td>
</tr>
</tbody>
</table>


| (d) How to list same author, same source, same volume number, same year, and different page numbers | J. M. Smith, Phys. Rev. B **26**, 1 (1982); **26**, 6 (1982). [Note that both page numbers are listed separately.] |

<table>
<thead>
<tr>
<th>(e) How to list different authors and</th>
<th>J. M. Smith, Phys. Rev. B. <strong>26</strong>, 1 (1982); R. Brown, <em>Heavy Ions</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Source Type</td>
<td>Examples</td>
</tr>
<tr>
<td>------------------------------------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td>J. M. Smith, Phys. Rev. D (to be published). [accepted for publication]</td>
</tr>
<tr>
<td></td>
<td>[Russian journal reference with English journal translation]</td>
</tr>
</tbody>
</table>
[Most reports are considered to be unpublished. Those reports considered as full publications should be designated without the parenthetical unpublished at the end of the reference.]  
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>(l) Preprints (journal specific)</td>
<td></td>
</tr>
<tr>
<td>(m) Theses</td>
<td></td>
</tr>
</tbody>
</table>
| (n) Others                      | J. M. Smith (private communication).  
[cited in another paper]  
Writing Guidelines  
Physics 222

Content:
This part of your evaluation is a measure of the quality of the information in your paper. I will begin by looking at the amount of physics/history you have included. Your sources should include books, review articles and research journal articles, not websites. Use websites only to provide you with tutorial help and to guide you to the primary sources. Review articles such as in Scientific American, or Physics Today are very helpful. Use and cite three or more sources per person in your group. Do not cite the textbook. There should be enough depth that the reader can understand your topic and enough breadth to make the paper significant. The physics should be correct. I will also consider whether you have used good judgment in your choice of ideas to include and exclude. An especially important element is how interesting you can make the physics to your reader. Hopefully, you chose a topic that interested you. I will note how well you have conveyed that same interest to your audience.

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. In particular in the second paper you should make conclusions about the significance or veracity of your information. I will judge how well you discriminated between 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. You will do well in this section if I find your paper convincing and persuasive.

Expression and organization:
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. It should have a well developed focus that ties the entire paper together. Each paragraph should play a role in developing the focus. Paragraphs should be well-connected, with good transitions. They should each deal with a single idea, developing it logically, completely, and concisely. Your style should be appropriate to your audience (fellow 222 students) and topic. Don’t include humor, unless it comes from the scientists you write about.

Format:
The paper’s format and attention to mechanical details will help the reader get information from the paper easily, and will not distract from the flow of the paper. As a minimum, it will include:
◊ Title page with title, authors, and abstract
◊ Abstract: give a summary of what your paper accomplishes
◊ Headings that guide the reader
◊ Figures or tables that have titles and captions. These are referred to by number in the text. They appear with the text close to where they are cited, not all at the end.
◊ Doubled spaced with 1”margins, 12 point font.
◊ References follow the guidelines below.
Grading Sheet

Group_________________ Name___________________________________________

Content (18 pts)
dept / breadth
correctness
judgment
interest
appropriate sources
overall impact

Reasoning (12 pts)
conclusions
discrimination
understanding
logic
persuasiveness

Expression and organization (10 pts)
grammar / spelling
appearance
focus / conciseness
flow
style
organization

Format (10 pts)
General Guidelines for the Term Papers:

Any paper handed in (whether for peer review, review by the writing fellows, or to be read by the professor) should be your very best work. The papers should be typed, grammatically correct, spell checked, and well polished.

The target audience for this assignment is your classmates. As such, you should not spend time covering background material which a typical 222 student should already know. Concepts which go beyond the course, however, should be adequately explained.

If you are confused, you are generally safe when you follow the AIP style guidelines, which can be found at http://www.aip.org/pubservs/style/4thed/toc.html.

Writing Suggestions for Physics 222

While Researching Your Topic

◊ Remember that the topic you cover should go well beyond what is covered in the textbook.
◊ Make sure you are using current sources.
◊ Use both review-type articles and cutting edge research reports. If you have a long list of cutting-edge hard to understand references and one book or review article, I'll know that you pretty much followed one source, and threw the other references in for looks.
◊ The web is a good resource for getting ideas, but... you can't believe something just because it's on the web. Do not cite web pages. Use review articles, peer-reviewed journal articles and books as your sources.
◊ Use and cite more three or more sources per person in your group.

While Writing the Paper

◊ Read your paper out loud --- you will find many mistakes and get a better feel for how the paper flows this way.
◊ Make a detailed outline and follow it --- one of the biggest problems I see on papers for this course is poor organization and lack of a natural flow!
◊ Don't repeat the same information. This can be avoided by good organization.
◊ Don't include every fact that you've discovered. You will learn more while you research the paper than will fit within the focus of your paper. Have the courage to focus your paper and leave out irrelevant discussions.
◊ Try to write a good, solid paper that conveys information in an easy to read manner.
◊ You need to reference where you get your information in each paragraph or more often, not just for quotes, so that anyone wanting to read further about your statement can know where to go.
◊ Beware of using quotes to say something you don't want to explain. In general, quotes should be used only where you want the author's personality to show through.

Abstract

◊ Does your abstract appear on the title page just under the title?
◊ In your abstract do you clearly identify all of the major topics that will be discussed in your paper?
◊ It is best to write the abstract after the paper is in its final form. An abstract is not an introduction, a soundbite, or a commercial for your paper. An abstract should tell us what the paper accomplishes.

Introduction
In the first paragraph or two do you define the subject matter that will be discussed in the paper?
Is there a thesis statement early in the introduction?
Are you comfortable with the scope of your paper? Is your paper broad enough to be significant? Is it narrow enough to be adequately covered within the time and space allotted?
◊ If you include a section of background information in your paper, do you explain clearly how it relates to the main topic you are exploring?
◊ The introduction is usually best written after the main body of the paper is complete.
◊ Do you lay out the organization of the paper so the reader can follow the flow of what you are going to say?
◊ The introduction is not a commercial. For example, something like... "Is the universe going to expand forever? Stay tuned and we'll answer this exciting question and thrill you with..." is not appropriate. "Our story begins with..." is also a bad way to start a scientific paper. I want this paper to be training for real research papers which you will some day be submitting to respectable journals.

Main Body
◊ Is your choice of words consistent with scientific writing?
◊ Eliminate meaningless words such as "basically", "obviously", "naturally", "of course", etc.
◊ Does the tone of your paper portray you, the authors, as physicists, as opposed to outsiders to the physics community, as in the following sentence: "Scientists have shown that black holes exist?"
◊ All this does not mean to make your papers sound as dry as possible. It requires you to write very clearly, making your paper flow from one idea to the next.
◊ If you are not sure exactly what an equation or a concept means, are you honest with the reader?
◊ Avoid creating the illusion that you know everything.
◊ Have you eliminated footnotes and parenthetical statements? There are cases where footnotes and parenthetical statements are appropriate; however, if what you say is important enough to include in the paper in the first place it probably should be included in the main body.
◊ Do your transitions lead the reader from one concept to the next without confusion? A good way to test this is to ask a person who is not in the class to read your paper. If he or she has a hard time understanding what you mean, then you need to revise.
◊ When you let someone read your paper, let them use this guide so they can respond more effectively to your paper.
◊ Do your figures have captions (when needed).

Conclusion
◊ Does your conclusion restate the main points you discussed in the main body of the paper?
◊ Do you actually make a conclusion (decision, judgment) about what you have learned? Do not overstate the significance.
◊ Be sure not to introduce new information in your conclusion.

**Documentation**

◊ Have you followed the reference guidelines at the end of this document?
◊ Have you given credit where credit is due, including paraphrases as well as direct quotes?
◊ Did you give credit in figure captions for "borrowed" figures by including a reference. For example, at the end of a figure caption you should write something like... Figure reproduced from [Spe 97].
◊ Is each referenced work listed only once in the Bibliography, regardless of how many times it is cited?

**Miscellaneous**

◊ Did you insert page numbers?
◊ Did your paper use only the present tense except when treating historical events?
◊ Did you treat mathematical expressions as part of a sentence with appropriate punctuation?
◊ Where appropriate, integrate good pictures and graphs in your paper.
◊ Do your tables and figures have a paragraph in the text that clearly explain what they mean?
◊ Do your tables and graphs appear on the same page where they are discussed whenever possible? Does your paper have the appropriate length?

**Before Turning in Your Final Copy**

◊ Did you carefully proofread your final copy for grammar and punctuation errors?
◊ Did you spell-check your paper?
◊ Did a fellow 222 classmate review the paper before you turned in the final copy?
Did you read the paper aloud?

**References:**

You need to reference where you get your information in each paragraph or more often, not just for quotes, so that anyone wanting to read further about your statement can know where to go.

Include endnote references to your sources within your paper. Each endnote should be listed in the order that it first appears in the paper. Each reference should only be referred to by one number or abbreviation. Reference the same number again for multiple citings (don’t use “ibid,” etc.) Any data, information, or figure which comes from another work should be properly referenced. A figure, table, etc., which is copied from another work should include the phrase “reproduced from [x]” in the caption, and x should be a reference to an endnote entry.

Reference guidelines from American Physical Society (condensed)

**Superscripts:** references[type (2)] are noted in text by the insertion of numerals as either a superscript or on line in this manner:

Smith\(^2\) does not agree with the original values given in Ref. 1.
When that use could possibly cause confusion (i.e., Pb\(^4\)), an in-line form should be used
[Pb (Ref. 4)]. In the footnote listing at the end of the paper use only the superscript form. Or, you can use in-line brackets: Arabic numerals in square brackets in this manner:
Smith and Jones [3] also measured ....

Reference indicators should be at least one full space from words (not closed up to them as with superscripts). Multiple reference indicators should be set closed up within a single set of brackets: Smith and Jones [1,3,5--8] performed .... Reference indicators should be set inside punctuation: The work of Smith [3], that of Jones [4], and our previous work [5--8] disagree with that of Doe and Roe [13]. When the word "reference" is used in specifying a reference, use the abbreviation (unless at the beginning of a sentence) with the indicator in brackets: ... as was shown in Ref. [4]. Note that use of the following form is also acceptable: ... as was shown in [4].

| (a) How to list authors                     | J. M. Smith, Phys. Rev B 26, 1 (1982). |
| Five or more authors (et al. optional; use of et al. journal specific; note that Phys. Rev. C requires that 10 or fewer authors be listed and et al. not be used in such cases) | |

| Two sources:                                | [Note that a semicolon is used between sources.] |

| (c) How to list same author, same source, different volume and page | J. M. Smith, Phys. Rev. B 24, 3 (1981); 26, 1 (1982). |

| (d) How to list same author, same source, same volume number, same year, and different page numbers | J. M. Smith, Phys. Rev. B 26, 1 (1982); 26, 6 (1982). [Note that both page numbers are listed separately.] |

<p>| (e) How to list different authors and       | J. M. Smith, Phys. Rev. B, 26, 1 (1982); R. Brown, Heavy Ions |
| (f) How to list different authors, same sources | J. M. Smith, Phys. Rev. B 26, 1 (1982); R. Brown, <em>ibid.</em> 24, 3 (1981); C. Green, <em>ibid.</em> 24, 22 (1981). [Note that <em>ibid.</em> is used instead of repeating the journal name.] |</p>
<table>
<thead>
<tr>
<th>Type</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>[Most reports are considered to be unpublished. Those reports considered as full publications should be designated without the parenthetical unpublished at the end of the reference.]</td>
</tr>
<tr>
<td>(l) Preprints (journal specific)</td>
<td></td>
</tr>
<tr>
<td>(m) Theses</td>
<td></td>
</tr>
<tr>
<td>(n) Others</td>
<td>J. M. Smith (private communication).</td>
</tr>
<tr>
<td></td>
<td>[cited in another paper]</td>
</tr>
</tbody>
</table>
Writing Guidelines
Physics 222

Content:
This part of your evaluation is a measure of the quality of the information in your paper. I will begin by looking at the amount of physics/history you have included. Your sources should include books, review articles and research journal articles, not websites. Use websites only to provide you with tutorial help and to guide you to the primary sources. Review articles such as in Scientific American, or Physics Today are very helpful. Use and cite three or more sources per person in your group. Do not cite the textbook. There should be enough depth that the reader can understand your topic and enough breadth to make the paper significant. The physics should be correct. I will also consider whether you have used good judgment in your choice of ideas to include and exclude. An especially important element is how interesting you can make the physics to your reader. Hopefully, you chose a topic that interested you. I will note how well you have conveyed that same interest to your audience.

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. In particular in the second paper you should make conclusions about the significance or veracity of your information. I will judge how well you discriminated between 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. You will do well in this section if I find your paper convincing and persuasive.

Expression and organization:
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. It should have a well developed focus that ties the entire paper together. Each paragraph should play a role in developing the focus. Paragraphs should be well-connected, with good transitions. They should each deal with a single idea, developing it logically, completely, and concisely. Your style should be appropriate to your audience (fellow 222 students) and topic. Don’t include humor, unless it comes from the scientists you write about.

Format:
The paper’s format and attention to mechanical details will help the reader get information from the paper easily, and will not distract from the flow of the paper. As a minimum, it will include:
◊ Title page with title, authors, and abstract
◊ Abstract: give a summary of what your paper accomplishes
◊ Headings that guide the reader
◊ Figures or tables that have titles and captions. These are referred to by number in the text. They appear with the text close to where they are cited, not all at the end.
◊ Doubled spaced with 1”margins, 12 point font.
◊ References follow the guidelines below.
Grading Sheet

Group_________________ Name___________________________________________

Content (18 pts)
depth / breadth
correctness
judgment
interest
appropriate sources
overall impact

Reasoning (12 pts)
conclusions
discrimination
understanding
logic
persuasiveness

Expression and organization (10 pts)
grammar / spelling
appearance
focus / conciseness
flow
style
organization

Format (10 pts)
**General Guidelines for the Term Papers:**

Any paper handed in (whether for peer review, review by the writing fellows, or to be read by the professor) should be your very best work. The papers should be typed, grammatically correct, spell checked, and well polished.

The target audience for this assignment is your classmates. As such, you should not spend time covering background material which a typical 222 student should already know. Concepts which go beyond the course, however, should be adequately explained.

If you are confused, you are generally safe when you follow the AIP style guidelines, which can be found at [http://www.aip.org/pubservs/style/4thed/toc.html](http://www.aip.org/pubservs/style/4thed/toc.html).

**Writing Suggestions for Physics 222**

**While Researching Your Topic**
- Remember that the topic you cover should go well beyond what is covered in the textbook.
- Make sure you are using current sources.
- Use both review-type articles and cutting edge research reports. If you have a long list of cutting-edge hard to understand references and one book or review article, I'll know that you pretty much followed one source, and threw the other references in for looks.
- The web is a good resource for getting ideas, but... you can't believe something just because it's on the web. Do not cite web pages. Use review articles, peer-reviewed journal articles and books as your sources.
- Use and cite more three or more sources per person in your group.

**While Writing the Paper**
- Read your paper out loud --- you will find many mistakes and get a better feel for how the paper flows this way.
- Make a detailed outline and follow it --- one of the biggest problems I see on papers for this course is poor organization and lack of a natural flow!
- Don't repeat the same information. This can be avoided by good organization.
- Don't include every fact that you've discovered. You will learn more while you research the paper than will fit within the focus of your paper. Have the courage to focus your paper and leave out irrelevant discussions.
- Try to write a good, solid paper that conveys information in an easy to read manner.
- You need to reference where you get your information in each paragraph or more often, not just for quotes, so that anyone wanting to read further about your statement can know where to go.
- Beware of using quotes to say something you don't want to explain. In general, quotes should be used only where you want the author's personality to show through.

**Abstract**
- Does your abstract appear on the title page just under the title?
◊ In your abstract do you clearly identify all of the major topics that will be discussed in your paper?
◊ It is best to write the abstract after the paper is in its final form. An abstract is not an introduction, a soundbite, or a commercial for your paper. An abstract should tell us what the paper accomplishes.

**Introduction**

In the first paragraph or two do you define the subject matter that will be discussed in the paper?

**Is there a thesis statement early in the introduction?**

Are you comfortable with the scope of your paper? Is your paper broad enough to be significant? Is it narrow enough to be adequately covered within the time and space allotted?

◊ If you include a section of background information in your paper, do you explain clearly how it relates to the main topic you are exploring?
◊ The introduction is usually best written after the main body of the paper is complete.
◊ Do you lay out the organization of the paper so the reader can follow the flow of what you are going to say?
◊ The introduction is not a commercial. For example, something like... "Is the universe going to expand forever? Stay tuned and we'll answer this exciting question and thrill you with..." is not appropriate. "Our story begins with..." is also a bad way to start a scientific paper. I want this paper to be training for real research papers which you will some day be submitting to respectable journals.

**Main Body**

◊ Is your choice of words consistent with scientific writing?
◊ Eliminate meaningless words such as "basically", "obviously", "naturally", "of course", etc.
◊ Does the tone of your paper portray you, the authors, as physicists, as opposed to outsiders to the physics community, as in the following sentence: "Scientists have shown that black holes exist?"
◊ All this does not mean to make your papers sound as dry as possible. It requires you to write very clearly, making your paper flow from one idea to the next.
◊ If you are not sure exactly what an equation or a concept means, are you honest with the reader?
◊ Avoid creating the illusion that you know everything.
◊ Have you eliminated footnotes and parenthetical statements? There are cases where footnotes and parenthetical statements are appropriate; however, if what you say is important enough to include in the paper in the first place it probably should be included in the main body.
◊ Do your transitions lead the reader from one concept to the next without confusion? A good way to test this is to ask a person who is not in the class to read your paper. If he or she has a hard time understanding what you mean, then you need to revise.
◊ When you let someone read your paper, let them use this guide so they can respond more effectively to your paper.
◊ Do your figures have captions (when needed).

**Conclusion**

◊ Does your conclusion restate the main points you discussed in the main body of the paper?
◊ Do you actually make a conclusion (decision, judgment) about what you have learned? Do not overstate the significance.
◊ Be sure not to introduce new information in your conclusion.

**Documentation**
◊ Have you followed the reference guidelines at the end of this document?
◊ Have you given credit where credit is due, including paraphrases as well as direct quotes?
◊ Did you give credit in figure captions for "borrowed" figures by including a reference. For example, at the end of a figure caption you should write something like... Figure reproduced from [Spe 97].
◊ Is each referenced work listed only once in the Bibliography, regardless of how many times it is cited?

**Miscellaneous**
◊ Did you insert page numbers?
◊ Did your paper use only the present tense except when treating historical events?
◊ Did you treat mathematical expressions as part of a sentence with appropriate punctuation?
◊ Where appropriate, integrate good pictures and graphs in your paper.
◊ Do your tables and figures have a paragraph in the text that clearly explain what they mean?
◊ Do your tables and graphs appear on the same page where they are discussed whenever possible? Does your paper have the appropriate length?

**Before Turning in Your Final Copy**
◊ Did you carefully proofread your final copy for grammar and punctuation errors?
◊ Did you spell-check your paper?
◊ Did a fellow 222 classmate review the paper before you turned in the final copy?
Did you read the paper aloud?

**References:**

You need to reference where you get your information in each paragraph or more often, not just for quotes, so that anyone wanting to read further about your statement can know where to go.

Include endnote references to your sources within your paper. Each endnote should be listed in the order that it first appears in the paper. Each reference should only be referred to by one number or abbreviation. Reference the same number again for multiple citings (don’t use “ibid,” etc.) Any data, information, or figure which comes from another work should be properly referenced. A figure, table, etc., which is copied from another work should include the phrase “reproduced from [x]” in the caption, and x should be a reference to an endnote entry.

**Reference guidelines from American Physical Society (condensed)**

*Superscripts*: references[type (2)] are noted in text by the insertion of numerals as either a superscript or on line in this manner:

Smith$^2$ does not agree with the original values given in Ref. 1.

When that use could possibly cause confusion (i.e., Pb$^4$), an in-line form should be used
In the footnote listing at the end of the paper use only the superscript form. Or, you can use in-line brackets: Arabic numerals in square brackets in this manner:

Smith and Jones [3] also measured ....

Reference indicators should be at least one full space from words (not closed up to them as with superscripts). Multiple reference indicators should be set closed up within a single set of brackets: Smith and Jones [1,3,5--8] performed .... Reference indicators should be set inside punctuation: The work of Smith [3], that of Jones [4], and our previous work [5--8] disagree with that of Doe and Roe [13]. When the word "reference" is used in specifying a reference, use the abbreviation (unless at the beginning of a sentence) with the indicator in brackets: ... as was shown in Ref. [4]. Note that use of the following form is also acceptable: ... as was shown in [4].

| (a) How to list authors | J. M. Smith, Phys. Rev B 26, 1 (1982).
 | Five or more authors (et al. optional; use of et al. journal specific; note that Phys. Rev. C requires that 10 or fewer authors be listed and et al. not be used in such cases) | |

 | Two sources: | [Note that a semicolon is used between sources.] |

| (c) How to list same author, same source, different volume and page | J. M. Smith, Phys. Rev. B 24, 3 (1981); 26, 1 (1982). |

| (d) How to list same author, same source, same volume number, same year, and different page numbers | J. M. Smith, Phys. Rev. B 26, 1 (1982); 26, 6 (1982). [Note that both page numbers are listed separately.] |

<table>
<thead>
<tr>
<th>(e) How to list different authors and</th>
<th>J. M. Smith, Phys. Rev. B, 26, 1 (1982); R. Brown, Heavy Ions</th>
</tr>
</thead>
<tbody>
<tr>
<td>(f) How to list different authors, same sources</td>
<td>J. M. Smith, Phys. Rev. B 26, 1 (1982); R. Brown, ibid. 24, 3 (1981); C. Green, ibid. 24, 22 (1981). [Note that <em>ibid.</em> is used instead of repeating the journal name.]</td>
</tr>
</tbody>
</table>
J. M. Smith, Phys. Rev. D (to be published). [accepted for publication]  
[published, use italic title; additional information (Vol., Chap., Sec., p., etc.) as appropriate]  
[published, use italic title; for edited works use form "in" and "by"]  
[in the process of being published, use italic title and the form "in press"] |
[published, use italic title; edited form as above]  
[not published, use roman title; edited form as above]  
[shortened published title, use italic title with descriptive information following; edited form as above] |
| (l) Preprints (journal specific)                |                                                                                                         |
| (m) Theses                                      |                                                                                                         |
Writing Guidelines
Physics 222

Content:
This part of your evaluation is a measure of the quality of the information in your paper. I will begin by looking at the amount of physics/history you have included. Your sources should include books, review articles and research journal articles, not websites. Use websites only to provide you with tutorial help and to guide you to the primary sources. Review articles such as in Scientific American, or Physics Today are very helpful. Use and cite three or more sources per person in your group. Do not cite the textbook. There should be enough depth that the reader can understand your topic and enough breadth to make the paper significant. The physics should be correct. I will also consider whether you have used good judgment in your choice of ideas to include and exclude. An especially important element is how interesting you can make the physics to your reader. Hopefully, you chose a topic that interested you. I will note how well you have conveyed that same interest to your audience.

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. In particular in the second paper you should make conclusions about the significance or veracity of your information. I will judge how well you discriminated between 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. You will do well in this section if I find your paper convincing and persuasive.

Expression and organization:
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. It should have a well developed focus that ties the entire paper together. Each paragraph should play a role in developing the focus. Paragraphs should be well-connected, with good transitions. They should each deal with a single idea, developing it logically, completely, and concisely. Your style should be appropriate to your audience (fellow 222 students) and topic. Don’t include humor, unless it comes from the scientists you write about.

Format:
The paper’s format and attention to mechanical details will help the reader get information from the paper easily, and will not distract from the flow of the paper. As a minimum, it will include:
◊ Title page with title, authors, and abstract
◊ Abstract: give a summary of what your paper accomplishes
◊ Headings that guide the reader
◊ Figures or tables that have titles and captions. These are referred to by number in the text. They appear with the text close to where they are cited, not all at the end.
◊ Doubled spaced with 1”margins, 12 point font.
◊ References follow the guidelines below.
Grading Sheet

Group_________________ Name___________________________________________

Content (18 pts)
depth / breadth
correctness
judgment
interest
appropriate sources
overall impact

Reasoning (12 pts)
conclusions
discrimination
understanding
logic
persuasiveness

Expression and organization (10 pts)
grammar / spelling
appearance
focus / conciseness
flow
style
organization

Format (10 pts)
General Guidelines for the Term Papers:

Any paper handed in (whether for peer review, review by the writing fellows, or to be read by the professor) should be your very best work. The papers should be typed, grammatically correct, spell checked, and well polished.

The target audience for this assignment is your classmates. As such, you should not spend time covering background material which a typical 222 student should already know. Concepts which go beyond the course, however, should be adequately explained.

If you are confused, you are generally safe when you follow the AIP style guidelines, which can be found at http://www.aip.org/pubservs/style/4thed/toc.html.

Writing Suggestions for Physics 222

While Researching Your Topic
◊ Remember that the topic you cover should go well beyond what is covered in the textbook.
◊ Make sure you are using current sources.
◊ Use both review-type articles and cutting edge research reports. If you have a long list of cutting-edge hard to understand references and one book or review article, I'll know that you pretty much followed one source, and threw the other references in for looks.
◊ The web is a good resource for getting ideas, but... you can't believe something just because it's on the web. Do not cite web pages. Use review articles, peer-reviewed journal articles and books as your sources.
◊ Use and cite more three or more sources per person in your group.

While Writing the Paper
◊ Read your paper out loud --- you will find many mistakes and get a better feel for how the paper flows this way.
◊ Make a detailed outline and follow it --- one of the biggest problems I see on papers for this course is poor organization and lack of a natural flow!
◊ Don't repeat the same information. This can be avoided by good organization.
◊ Don't include every fact that you've discovered. You will learn more while you research the paper than will fit within the focus of your paper. Have the courage to focus your paper and leave out irrelevant discussions.
◊ Try to write a good, solid paper that conveys information in an easy to read manner.
◊ You need to reference where you get your information in each paragraph or more often, not just for quotes, so that anyone wanting to read further about your statement can know where to go.
◊ Beware of using quotes to say something you don't want to explain. In general, quotes should be used only where you want the author's personality to show through.

Abstract
◊ Does your abstract appear on the title page just under the title?
◊ In your abstract do you clearly identify all of the major topics that will be discussed in your paper?
◊ It is best to write the abstract after the paper is in its final form. An abstract is not an introduction, a soundbite, or a commercial for your paper. An abstract should tell us what the paper accomplishes.

**Introduction**
In the first paragraph or two do you define the subject matter that will be discussed in the paper?

**Is there a thesis statement early in the introduction?**
Are you comfortable with the scope of your paper? Is your paper broad enough to be significant? Is it narrow enough to be adequately covered within the time and space allotted?

◊ If you include a section of background information in your paper, do you explain clearly how it relates to the main topic you are exploring?
◊ The introduction is usually best written after the main body of the paper is complete.
◊ Do you lay out the organization of the paper so the reader can follow the flow of what you are going to say?
◊ The introduction is not a commercial. For example, something like... "Is the universe going to expand forever? Stay tuned and we'll answer this exciting question and thrill you with..." is not appropriate. "Our story begins with..." is also a bad way to start a scientific paper. I want this paper to be training for real research papers which you will some day be submitting to respectable journals.

**Main Body**

◊ Is your choice of words consistent with scientific writing?
◊ Eliminate meaningless words such as "basically", "obviously", "naturally", "of course", etc.
◊ Does the tone of your paper portray you, the authors, as physicists, as opposed to outsiders to the physics community, as in the following sentence: "Scientists have shown that black holes exist?"
◊ All this does not mean to make your papers sound as dry as possible. It requires you to write very clearly, making your paper flow from one idea to the next.
◊ If you are not sure exactly what an equation or a concept means, are you honest with the reader?
◊ Avoid creating the illusion that you know everything.
◊ Have you eliminated footnotes and parenthetical statements? There are cases where footnotes and parenthetical statements are appropriate; however, if what you say is important enough to include in the paper in the first place it probably should be included in the main body.
◊ Do your transitions lead the reader from one concept to the next without confusion? A good way to test this is to ask a person who is not in the class to read your paper. If he or she has a hard time understanding what you mean, then you need to revise.
◊ When you let someone read your paper, let them use this guide so they can respond more effectively to your paper.
◊ Do your figures have captions (when needed).

**Conclusion**

◊ Does your conclusion restate the main points you discussed in the main body of the paper?
◊ Do you actually make a conclusion (decision, judgment) about what you have learned? Do not overstate the significance.
◊ Be sure not to introduce new information in your conclusion.

Documentation
◊ Have you followed the reference guidelines at the end of this document?
◊ Have you given credit where credit is due, including paraphrases as well as direct quotes?
◊ Did you give credit in figure captions for "borrowed" figures by including a reference.
   For example, at the end of a figure caption you should write something like... Figure reproduced from [Spe 97].
◊ Is each referenced work listed only once in the Bibliography, regardless of how many times it is cited?

Miscellaneous
◊ Did you insert page numbers?
◊ Did your paper use only the present tense except when treating historical events?
◊ Did you treat mathematical expressions as part of a sentence with appropriate punctuation?
◊ Where appropriate, integrate good pictures and graphs in your paper.
◊ Do your tables and figures have a paragraph in the text that clearly explain what they mean?
◊ Do your tables and graphs appear on the same page where they are discussed whenever possible? Does your paper have the appropriate length?

Before Turning in Your Final Copy
◊ Did you carefully proofread your final copy for grammar and punctuation errors?
◊ Did you spell-check your paper?
◊ Did a fellow 222 classmate review the paper before you turned in the final copy?
Did you read the paper aloud?

References:

You need to reference where you get your information in each paragraph or more often, not just for quotes, so that anyone wanting to read further about your statement can know where to go.

Include endnote references to your sources within your paper. Each endnote should be listed in the order that it first appears in the paper. Each reference should only be referred to by one number or abbreviation. Reference the same number again for multiple citings (don’t use “ibid,” etc.) Any data, information, or figure which comes from another work should be properly referenced. A figure, table, etc., which is copied from another work should include the phrase “reproduced from [x]” in the caption, and x should be a reference to an endnote entry.

Reference guidelines from American Physical Society (condensed)

Superscripts: references[type (2)] are noted in text by the insertion of numerals as either a superscript or on line in this manner:

Smith\(^2\) does not agree with the original values given in Ref. 1.
When that use could possibly cause confusion (i.e., Pb\(^4\)), an in-line form should be used
In the footnote listing at the end of the paper use only the superscript form. Or, you can use in-line brackets: Arabic numerals in square brackets in this manner:

Smith and Jones [3] also measured ....

Reference indicators should be at least one full space from words (not closed up to them as with superscripts). Multiple reference indicators should be set closed up within a single set of brackets: Smith and Jones [1,3,5--8] performed .... Reference indicators should be set inside punctuation: The work of Smith [3], that of Jones [4], and our previous work [5--8] disagree with that of Doe and Roe [13]. When the word "reference" is used in specifying a reference, use the abbreviation (unless at the beginning of a sentence) with the indicator in brackets: ... as was shown in Ref. [4]. Note that use of the following form is also acceptable: ... as was shown in [4].

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Five or more authors (<em>et al.</em> optional; use of <em>et al.</em> journal specific; note that Phys. Rev. C requires that 10 or fewer authors be listed and <em>et al.</em> not be used in such cases)</td>
<td></td>
</tr>
</tbody>
</table>

|-------------------------|-------------------------------------------|

<table>
<thead>
<tr>
<th>(c) How to list same author, same source, different volume and page</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>(d) How to list same author, same source, same volume number, same year, and different page numbers</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>(e) How to list different authors and</th>
</tr>
</thead>
<tbody>
<tr>
<td>(f) How to list different authors, same sources</td>
</tr>
</tbody>
</table>
J. M. Smith, Phys. Rev. D (to be published). [accepted for publication]  
                                      [Most reports are considered to be unpublished. Those reports  
                                      considered as full publications should be designated without the  
                                      parenthetical unpublished at the end of the reference.]  
                                      J. M. Smith, Brookhaven National Laboratory Report No. 110,  
                                      1992 (to be published).  
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>(l) Preprints (journal specific)</td>
<td></td>
</tr>
<tr>
<td>(m) Theses</td>
<td></td>
</tr>
</tbody>
</table>
| (n) Others                        | J. M. Smith (private communication).  
                                      [cited in another paper]  
                                      J. M. Smith, computer code CRUX, Bell Laboratories, Murray Hill, NJ,  
                                      1972.                     |
Writing Guidelines
Physics 222

Content:
This part of your evaluation is a measure of the quality of the information in your paper. I will begin by looking at the amount of physics/history you have included. Your sources should include books, review articles and research journal articles, not websites. Use websites only to provide you with tutorial help and to guide you to the primary sources. Review articles such as in Scientific American, or Physics Today are very helpful. Use and cite three or more sources per person in your group. Do not cite the textbook. There should be enough depth that the reader can understand your topic and enough breadth to make the paper significant. The physics should be correct. I will also consider whether you have used good judgment in your choice of ideas to include and exclude. An especially important element is how interesting you can make the physics to your reader. Hopefully, you chose a topic that interested you. I will note how well you have conveyed that same interest to your audience.

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. In particular in the second paper you should make conclusions about the significance or veracity of your information. I will judge how well you discriminated between 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. You will do well in this section if I find your paper convincing and persuasive.

Expression and organization:
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. It should have a well developed focus that ties the entire paper together. Each paragraph should play a role in developing the focus. Paragraphs should be well-connected, with good transitions. They should each deal with a single idea, developing it logically, completely, and concisely. Your style should be appropriate to your audience (fellow 222 students) and topic. Don’t include humor, unless it comes from the scientists you write about.

Format:
The paper’s format and attention to mechanical details will help the reader get information from the paper easily, and will not distract from the flow of the paper. As a minimum, it will include:
◊ Title page with title, authors, and abstract
◊ Abstract: give a summary of what your paper accomplishes
◊ Headings that guide the reader
◊ Figures or tables that have titles and captions. These are referred to by number in the text. They appear with the text close to where they are cited, not all at the end.
◊ Doubled spaced with 1”margins, 12 point font.
◊ References follow the guidelines below.
Grading Sheet

Group_________________ Name___________________________________________

**Content (18 pts)**
depth / breadth
correctness
judgment
interest
appropriate sources
overall impact

**Reasoning (12 pts)**
conclusions
discrimination
understanding
logic
persuasiveness

**Expression and organization (10 pts)**
grammar / spelling
appearance
focus / conciseness
flow
style
organization

**Format (10 pts)**
General Guidelines for the Term Papers:

Any paper handed in (whether for peer review, review by the writing fellows, or to be read by the professor) should be your very best work. The papers should be typed, grammatically correct, spell checked, and well polished.

The target audience for this assignment is your classmates. As such, you should not spend time covering background material which a typical 222 student should already know. Concepts which go beyond the course, however, should be adequately explained.

If you are confused, you are generally safe when you follow the AIP style guidelines, which can be found at [http://www.aip.org/pubservs/style/4thed/toc.html](http://www.aip.org/pubservs/style/4thed/toc.html).

Writing Suggestions for Physics 222

While Researching Your Topic

◊ Remember that the topic you cover should go well beyond what is covered in the textbook.
◊ Make sure you are using current sources.
◊ Use both review-type articles and cutting edge research reports. If you have a long list of cutting-edge hard to understand references and one book or review article, I'll know that you pretty much followed one source, and threw the other references in for looks.
◊ The web is a good resource for getting ideas, but... you can't believe something just because it's on the web. Do not cite web pages. Use review articles, peer-reviewed journal articles and books as your sources.
◊ Use and cite more three or more sources per person in your group.

While Writing the Paper

◊ Read your paper out loud --- you will find many mistakes and get a better feel for how the paper flows this way.
◊ Make a detailed outline and follow it --- one of the biggest problems I see on papers for this course is poor organization and lack of a natural flow!
◊ Don't repeat the same information. This can be avoided by good organization.
◊ Don't include every fact that you've discovered. You will learn more while you research the paper than will fit within the focus of your paper. Have the courage to focus your paper and leave out irrelevant discussions.
◊ Try to write a good, solid paper that conveys information in an easy to read manner.
◊ You need to reference where you get your information in each paragraph or more often, not just for quotes, so that anyone wanting to read further about your statement can know where to go.
◊ Beware of using quotes to say something you don't want to explain. In general, quotes should be used only where you want the author's personality to show through.

Abstract

◊ Does your abstract appear on the title page just under the title?
In your abstract do you clearly identify all of the major topics that will be discussed in your paper?

It is best to write the abstract after the paper is in its final form. **An abstract is not an introduction, a soundbite, or a commercial for your paper.** An abstract should tell us what the paper accomplishes.

**Introduction**

In the first paragraph or two do you define the subject matter that will be discussed in the paper?

**Is there a thesis statement early in the introduction?**

Are you comfortable with the scope of your paper? Is your paper broad enough to be significant? Is it narrow enough to be adequately covered within the time and space allotted?

- If you include a section of background information in your paper, do you explain clearly how it relates to the main topic you are exploring?
- The introduction is usually best written after the main body of the paper is complete.
- Do you lay out the organization of the paper so the reader can follow the flow of what you are going to say?
- The introduction is not a commercial. For example, something like... "Is the universe going to expand forever? Stay tuned and we'll answer this exciting question and thrill you with..." is not appropriate. "Our story begins with..." is also a bad way to start a scientific paper. I want this paper to be training for real research papers which you will some day be submitting to respectable journals.

**Main Body**

- Is your choice of words consistent with scientific writing?
- Eliminate meaningless words such as "basically", "obviously", "naturally", "of course", etc.
- Does the tone of your paper portray you, the authors, as physicists, as opposed to outsiders to the physics community, as in the following sentence: "Scientists have shown that black holes exist?"
- All this does not mean to make your papers sound as dry as possible. It requires you to write very clearly, making your paper flow from one idea to the next.
- If you are not sure exactly what an equation or a concept means, are you honest with the reader?
- Avoid creating the illusion that you know everything.
- Have you eliminated footnotes and parenthetical statements? There are cases where footnotes and parenthetical statements are appropriate; however, if what you say is important enough to include in the paper in the first place it probably should be included in the main body.
- Do your transitions lead the reader from one concept to the next without confusion? A good way to test this is to ask a person who is not in the class to read your paper. If he or she has a hard time understanding what you mean, then you need to revise.
- When you let someone read your paper, let them use this guide so they can respond more effectively to your paper.
- Do your figures have captions (when needed).

**Conclusion**

- Does your conclusion restate the main points you discussed in the main body of the paper?
- Do you actually make a conclusion (decision, judgment) about what you have learned? Do not overstate the significance.
◊ Be sure not to introduce new information in your conclusion.

Documentation
◊ Have you followed the reference guidelines at the end of this document?
◊ Have you given credit where credit is due, including paraphrases as well as direct quotes?
◊ Did you give credit in figure captions for "borrowed" figures by including a reference. For example, at the end of a figure caption you should write something like... Figure reproduced from [Spe 97].
◊ Is each referenced work listed only once in the Bibliography, regardless of how many times it is cited?

Miscellaneous
◊ Did you insert page numbers?
◊ Did your paper use only the present tense except when treating historical events?
◊ Did you treat mathematical expressions as part of a sentence with appropriate punctuation?
◊ Where appropriate, integrate good pictures and graphs in your paper.
◊ Do your tables and figures have a paragraph in the text that clearly explain what they mean?
◊ Do your tables and graphs appear on the same page where they are discussed whenever possible? Does your paper have the appropriate length?

Before Turning in Your Final Copy
◊ Did you carefully proofread your final copy for grammar and punctuation errors?
◊ Did you spell-check your paper?
◊ Did a fellow 222 classmate review the paper before you turned in the final copy?
Did you read the paper aloud?

References:

You need to reference where you get your information in each paragraph or more often, not just for quotes, so that anyone wanting to read further about your statement can know where to go.

Include endnote references to your sources within your paper. Each endnote should be listed in the order that it first appears in the paper. Each reference should only be referred to by one number or abbreviation. Reference the same number again for multiple citings (don’t use “ibid,” etc.) Any data, information, or figure which comes from another work should be properly referenced. A figure, table, etc., which is copied from another work should include the phrase “reproduced from [x]” in the caption, and x should be a reference to an endnote entry.

Reference guidelines from American Physical Society (condensed)

Superscripts: references[type (2)] are noted in text by the insertion of numerals as either a superscript or on line in this manner:

Smith\(^2\) does not agree with the original values given in Ref. 1.
When that use could possibly cause confusion (i.e., Pb\(^4\)), an in-line form should be used
[Pb (Ref. 4)]. In the footnote listing at the end of the paper use only the superscript form.  

*Or, you can use in-line brackets:* Arabic numerals in square brackets in this manner:

Smith and Jones [3] also measured ....

Reference indicators should be at least one full space from words (not closed up to them as with superscripts). Multiple reference indicators should be set closed up within a single set of brackets: Smith and Jones [1,3,5--8] performed .... Reference indicators should be set inside punctuation: The work of Smith [3], that of Jones [4], and our previous work [5--8] disagree with that of Doe and Roe [13]. When the word "reference" is used in specifying a reference, use the abbreviation (unless at the beginning of a sentence) with the indicator in brackets: ... as was shown in Ref. [4]. Note that use of the following form is also acceptable: ... as was shown in [4].

| (a) How to list authors | J. M. Smith, Phys. Rev B 26, 1 (1982).  
| Five or more authors (*et al.* optional; use of *et al.* journal specific; note that Phys. Rev. C requires that 10 or fewer authors be listed and *et al.* not be used in such cases) |

| Three or more sources: | [Note that a semicolon is used between sources.]  

| (c) How to list same author, same source, different volume and page | J. M. Smith, Phys. Rev. B 24, 3 (1981); 26, 1 (1982). |

| (d) How to list same author, same source, same volume number, same year, and different page numbers | J. M. Smith, Phys. Rev. B 26, 1 (1982); 26, 6 (1982). [Note that both page numbers are listed separately.] |

<table>
<thead>
<tr>
<th>(e) How to list different authors and</th>
<th>J. M. Smith, Phys. Rev. B, 26, 1 (1982); R. Brown, <em>Heavy Ions</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>(f) How to list different authors, same sources</td>
<td>J. M. Smith, Phys. Rev. B 26, 1 (1982); R. Brown, <em>ibid.</em> 24, 3 (1981); C. Green, <em>ibid.</em> 24, 22 (1981). [Note that <em>ibid.</em> is used instead of repeating the journal name.]</td>
</tr>
<tr>
<td></td>
<td>[accepted for publication]</td>
</tr>
<tr>
<td></td>
<td>[erratum]</td>
</tr>
<tr>
<td></td>
<td>[published, use italic title; additional information (Vol., Chap., Sec., p., etc.) as appropriate]</td>
</tr>
<tr>
<td></td>
<td>[published, use italic title; for edited works use form &quot;in&quot; and &quot;by&quot;]</td>
</tr>
<tr>
<td></td>
<td>[in the process of being published, use italic title and the form &quot;in press&quot;]</td>
</tr>
<tr>
<td></td>
<td>[published, use italic title; edited form as above]</td>
</tr>
<tr>
<td></td>
<td>[not published, use roman title; edited form as above]</td>
</tr>
<tr>
<td></td>
<td>[shortened published title, use italic title with descriptive information following; edited form as above]</td>
</tr>
<tr>
<td></td>
<td>[Most reports are considered to be unpublished. Those reports considered as full publications should be designated without the parenthetical unpublished at the end of the reference.]</td>
</tr>
<tr>
<td>(l) Preprints (journal specific)</td>
<td></td>
</tr>
<tr>
<td>(m) Theses</td>
<td></td>
</tr>
<tr>
<td>(n) Others</td>
<td>J. M. Smith (private communication).</td>
</tr>
<tr>
<td></td>
<td>[cited in another paper]</td>
</tr>
</tbody>
</table>
Writing Guidelines  
Physics 222  

Content:  
This part of your evaluation is a measure of the quality of the information in your paper. I will begin by looking at the amount of physics/history you have included. Your sources should include books, review articles and research journal articles, not websites. Use websites only to provide you with tutorial help and to guide you to the primary sources. Review articles such as in Scientific American, or Physics Today are very helpful. Use and cite three or more sources per person in your group. Do not cite the textbook. There should be enough depth that the reader can understand your topic and enough breadth to make the paper significant. The physics should be correct. I will also consider whether you have used good judgment in your choice of ideas to include and exclude. An especially important element is how interesting you can make the physics to your reader. Hopefully, you chose a topic that interested you. I will note how well you have conveyed that same interest to your audience.  

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. In particular in the second paper you should make conclusions about the significance or veracity of your information. I will judge how well you discriminated between 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. You will do well in this section if I find your paper convincing and persuasive.  

Expression and organization:  
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. It should have a well developed focus that ties the entire paper together. Each paragraph should play a role in developing the focus. Paragraphs should be well-connected, with good transitions. They should each deal with a single idea, developing it logically, completely, and concisely. Your style should be appropriate to your audience (fellow 222 students) and topic. Don't include humor, unless it comes from the scientists you write about.  

Format:  
The paper’s format and attention to mechanical details will help the reader get information from the paper easily, and will not distract from the flow of the paper. As a minimum, it will include:  
◊ Title page with title, authors, and abstract  
◊ Abstract: give a summary of what your paper accomplishes  
◊ Headings that guide the reader  
◊ Figures or tables that have titles and captions. These are referred to by number in the text. They appear with the text close to where they are cited, not all at the end.  
◊ Doubled spaced with 1”margins, 12 point font.  
◊ References follow the guidelines below.
Grading Sheet

Group_________________ Name___________________________________________

Content (18 pts)
depth / breadth
correctness
judgment
interest
appropriate sources
overall impact

Reasoning (12 pts)
conclusions
discrimination
understanding
logic
persuasiveness

Expression and organization (10 pts)
grammar / spelling
appearance
focus / conciseness
flow
style
organization

Format (10 pts)
General Guidelines for the Term Papers:

Any paper handed in (whether for peer review, review by the writing fellows, or to be read by the professor) should be your very best work. The papers should be typed, grammatically correct, spell checked, and well polished.

The target audience for this assignment is your classmates. As such, you should not spend time covering background material which a typical 222 student should already know. Concepts which go beyond the course, however, should be adequately explained.

If you are confused, you are generally safe when you follow the AIP style guidelines, which can be found at http://www.aip.org/pubservs/style/4thed/toc.html.

Writing Suggestions for Physics 222

While Researching Your Topic

◊ Remember that the topic you cover should go well beyond what is covered in the textbook.
◊ Make sure you are using current sources.
◊ Use both review-type articles and cutting edge research reports. If you have a long list of cutting-edge hard to understand references and one book or review article, I'll know that you pretty much followed one source, and threw the other references in for looks.
◊ The web is a good resource for getting ideas, but... you can't believe something just because it's on the web. Do not cite web pages. Use review articles, peer-reviewed journal articles and books as your sources.
◊ Use and cite more three or more sources per person in your group.

While Writing the Paper

◊ Read your paper out loud --- you will find many mistakes and get a better feel for how the paper flows this way.
◊ Make a detailed outline and follow it --- one of the biggest problems I see on papers for this course is poor organization and lack of a natural flow!
◊ Don't repeat the same information. This can be avoided by good organization.
◊ Don't include every fact that you've discovered. You will learn more while you research the paper than will fit within the focus of your paper. Have the courage to focus your paper and leave out irrelevant discussions.
◊ Try to write a good, solid paper that conveys information in an easy to read manner.
◊ You need to reference where you get your information in each paragraph or more often, not just for quotes, so that anyone wanting to read further about your statement can know where to go.
◊ Beware of using quotes to say something you don't want to explain. In general, quotes should be used only where you want the author's personality to show through.

Abstract

◊ Does your abstract appear on the title page just under the title?
In your abstract do you clearly identify all of the major topics that will be discussed in your paper?

It is best to write the abstract after the paper is in its final form. **An abstract is not an introduction, a soundbite, or a commercial for your paper.** An abstract should tell us what the paper **accomplishes.**

**Introduction**

In the first paragraph or two do you define the subject matter that will be discussed in the paper?

Is there a thesis statement early in the introduction?

Are you comfortable with the scope of your paper? Is your paper broad enough to be significant? Is it narrow enough to be adequately covered within the time and space allotted?

- If you include a section of background information in your paper, do you explain clearly how it relates to the main topic you are exploring?
- The introduction is usually best written after the main body of the paper is complete.
- Do you lay out the organization of the paper so the reader can follow the flow of what you are going to say?
- The introduction is not a commercial. For example, something like... "Is the universe going to expand forever? Stay tuned and we'll answer this exciting question and thrill you with..." is not appropriate. "Our story begins with..." is also a bad way to start a scientific paper. I want this paper to be training for real research papers which you will some day be submitting to respectable journals.

**Main Body**

- Is your choice of words consistent with scientific writing?
- Eliminate meaningless words such as "basically", "obviously", "naturally", "of course", etc.
- Does the tone of your paper portray you, the authors, as physicists, as opposed to outsiders to the physics community, as in the following sentence: "Scientists have shown that black holes exist?"
- All this does not mean to make your papers sound as dry as possible. It requires you to write very clearly, making your paper flow from one idea to the next.
- If you are not sure exactly what an equation or a concept means, are you honest with the reader?
- Avoid creating the illusion that you know everything.
- Have you eliminated footnotes and parenthetical statements? There are cases where footnotes and parenthetical statements are appropriate; however, if what you say is important enough to include in the paper in the first place it probably should be included in the main body.
- Do your transitions lead the reader from one concept to the next without confusion? A good way to test this is to ask a person who is not in the class to read your paper. If he or she has a hard time understanding what you mean, then you need to revise.
- When you let someone read your paper, let them use this guide so they can respond more effectively to your paper.
- Do your figures have captions (when needed).

**Conclusion**

- Does your conclusion restate the main points you discussed in the main body of the paper?
- Do you actually make a conclusion (decision, judgment) about what you have learned?
- Do not overstate the significance.
◊ Be sure not to introduce new information in your conclusion.

**Documentation**
◊ Have you followed the reference guidelines at the end of this document?
◊ Have you given credit where credit is due, including paraphrases as well as direct quotes?
◊ Did you give credit in figure captions for "borrowed" figures by including a reference. For example, at the end of a figure caption you should write something like... Figure reproduced from [Spe 97].
◊ Is each referenced work listed only once in the Bibliography, regardless of how many times it is cited?

**Miscellaneous**
◊ Did you insert page numbers?
◊ Did your paper use only the present tense except when treating historical events?
◊ Did you treat mathematical expressions as part of a sentence with appropriate punctuation?
◊ Where appropriate, integrate good pictures and graphs in your paper.
◊ Do your tables and figures have a paragraph in the text that clearly explain what they mean?
◊ Do your tables and graphs appear on the same page where they are discussed whenever possible? Does your paper have the appropriate length?

**Before Turning in Your Final Copy**
◊ Did you carefully proofread your final copy for grammar and punctuation errors?
◊ Did you spell-check your paper?
◊ Did a fellow 222 classmate review the paper before you turned in the final copy?
Did you read the paper aloud?

**References :**

You need to reference where you get your information in each paragraph or more often, not just for quotes, so that anyone wanting to read further about your statement can know where to go.

Include endnote references to your sources within your paper. Each endnote should be listed in the order that it first appears in the paper. Each reference should only be referred to by one number or abbreviation. Reference the same number again for multiple citings (don’t use “ibid,” etc.) Any data, information, or figure which comes from another work should be properly referenced. A figure, table, etc., which is copied from another work should include the phrase “reproduced from [x]” in the caption, and x should be a reference to an endnote entry.

**Reference guidelines from American Physical Society (condensed)**

*Superscripts:* references[type (2)] are noted in text by the insertion of numerals as either a superscript or on line in this manner:

- Smith\(^2\) does not agree with the original values given in Ref. 1.
- When that use could possibly cause confusion (i.e., Pb\(^4\)), an in-line form should be used
In the footnote listing at the end of the paper use only the superscript form. Or, you can use in-line brackets: Arabic numerals in square brackets in this manner:

Smith and Jones [3] also measured ....

Reference indicators should be at least one full space from words (not closed up to them as with superscripts). Multiple reference indicators should be set closed up within a single set of brackets: Smith and Jones [1,3,5--8] performed .... Reference indicators should be set inside punctuation: The work of Smith [3], that of Jones [4], and our previous work [5--8] disagree with that of Doe and Roe [13]. When the word "reference" is used in specifying a reference, use the abbreviation (unless at the beginning of a sentence) with the indicator in brackets: ... as was shown in Ref. [4]. Note that use of the following form is also acceptable: ... as was shown in [4].

| (a) How to list authors | J. M. Smith, Phys. Rev B 26, 1 (1982).
| Five or more authors (et al. optional; use of et al. journal specific; note that Phys. Rev. C requires that 10 or fewer authors be listed and et al. not be used in such cases) | J. M. Smith, R. Brown, C. Green, and A. White, Phys. Rev. B 26, 1 (1982).

| Two sources: | [Note that a semicolon is used between sources.]

| (c) How to list same author, same source, different volume and page | J. M. Smith, Phys. Rev. B 24, 3 (1981); 26, 1 (1982).

| (d) How to list same author, same source, same volume number, same year, and different page numbers | J. M. Smith, Phys. Rev. B 26, 1 (1982); 26, 6 (1982). [Note that both page numbers are listed separately.]

| (e) How to list different authors and | J. M. Smith, Phys. Rev. B. 26, 1 (1982); R. Brown, *Heavy Ions* |
| (l) Preprints (journal specific) | |
| (m) Theses | |