

Course Writing Project

An extended writing project will form 25% of your course grade.

This paper will require extensive library research. Legitimate research sources include scientific books and journals, as well as popular science magazines (like Discover, or Scientific American) though popular science articles should not be the only sources. *Web sites are not legitimate sources unless you can prove it in writing!!*

Your writing project is intended to show that you are capable of researching a topic of interest, doing some independent learning on that topic, assimilating the information, and analyzing it in order to arrive at an original idea or opinion. If all you do is regurgitate a set of facts, you will get a low grade on the paper.

Audience:

The paper should be written as though you were addressing other members of this class, or people with similar background knowledge. Your goal is to provide new information in a coherent, understandable way. A good approach is to consider yourself to be a scientific consultant to a member of Congress. Pretend you are writing a report for a committee debating funding for NASA. Arguments without sound scientific background are not likely to be well received!

Length:

A target to shoot for is a length of 12-15 pages of double spaced 12 point text, with one inch margins all around. Figures, tables and a list of references are not to be included in the 12-15 page count, but you should include them to highlight your points.

Despite how long 12-15 pages may sound, you will find that it really is not that much to write. It is important, therefore, to focus your thoughts before setting out to write the project. Be concise and focus only on a small portion of the topic. You will find your arguments to be much more persuasive if you do not ramble about everything you can think of.

References:

References are essential. The best ones are original research articles, such as those that appear in periodicals like Science, Nature, The Astronomical Journal, The Astrophysical Journal, The Journal of Geophysical Research (Parts A and D), Planetary & Space Science, Solar System Research, The Monthly Notices Of The Royal Astronomical Society, Astronomy And Astrophysics, Solar Physics, Astrophysics And Space Science, Space Science Reviews.

Not all of these journals are available here at CSUS, but those that are not can most likely be found in the Physical Science Library at UC Davis, or through web links. The reading in these journals will likely be a bit "heavy", since the articles are written for experts in the field. You will be surprised, however, how much you can pick up though. Give it a try! Feel free to come see me if you would like something explained.

Other references, of more of a summary nature, are also useful. These can include articles in publications/periodicals like Annual Reviews Of Astronomy And Astrophysics, Sky & Telescope, Astronomy, Science News, Mercury and Scientific American. Search out these journals/publications at CSUS, UC Davis, the Web, or even your local library (for many, but not all, of those listed above).

Style:

There are certain rules that are the same in all papers, and these must be followed at all costs or your grade will suffer.

- * Rule number 1: Spelling must be correct.
- * Rule number 2: Overall sentence construction must make sense. Do not use partial sentences or sentences that have no end in sight.
- * Rule number 3: Grammar must be correct.

For bibliographic purposes and referencing cited works in your paper, you may use whatever style you've learned for other classes, as long as you use it appropriately. In astronomical research journals we use the style demonstrated below, which you may use if you like.

1. Articles in periodicals:

Single author: e.g.,

Janes, K. A. 1994, Astronomical Journal, 109, 1783.

This bibliography style references a paper by the author "Kenneth A. Janes" in the journal "Astronomical Journal". The paper appeared in 1994, in volume 109, on page 1783. Cite this in the text of your paper as Janes (1994), or (Janes 1994) depending on context.

Two authors: e.g.,

Janes, K. A. & Phelps, R. L. 1994, Astronomical Journal, 110, 1806.

This bibliography style would be used to reference a paper by the authors "Kenneth A. Janes and Randy L. Phelps" in the Astronomical Journal which appeared in 1994 in volume 110 on page 1806. Cite this in the text of your paper as: Janes & Phelps (1994), or as: (Janes & Phelps 1994) depending on context.

Three or more authors: e.g.,

Janes et al. 1996, Astrophysical Journal, 345, 444.

This bibliography style would be used to reference a paper by Kenneth A. Janes, and all of his coauthors, in the 1996 Astrophysical Journal, in volume 345 on page 444. Cite this in the text of your paper as: Janes et al. (1996), or as: (Janes et al. 1996) depending on context.

2. Complete Books:

Author(s): e.g.,
Hartmann, William K., *Moons & Planets* 1998 (4th edition), Wadsworth Publishing
(Belmont, CA)

Cite this in the text of your paper as Hartmann (1998), or as: (Hartmann 1998) depending on context.

Editor(s): e.g.,
Beatty, J. & Chaikin A., editors, *The New Solar System*, 1990 (3rd edition), Sky
Publishing (Cambridge, MA)

Cite this in the text of your paper as Beatty & Chaikin (1990), or as: (Beatty & Chaikin 1990), depending on context.

Note that the rules for one, two or multiple authors/editors or books are the same as those for articles.

3. Articles in Books:

Phelps, R. L. 1993, in "CCDs in Astronomy", A. G. D. Phillip, editor, L. Davis Press
(Schenectady, NY), p. 183

Note the style is similar to that for referencing complete books, with the addition of the author of the article (Phelps, R. L. in this case), the added "in" before the title of the book, and the page reference. Cite this in the text of your paper as described above, using the author of the article you are referring to.

There are going to be circumstances where you may not be able to follow these rules exactly. Feel free to ask me if you have specific questions.

Grading:

Grading will be based on the scientific content of your writing project, the logic you use to argue your points, the style/presentation of the project, and the degree to which it is correct in terms of spelling/grammar/structure.

The specific grading breakdown will be as follows:

10% - Did the paper cover the required topic?

30% - Did the paper have sufficient scientific content, and was it accurate?

20% - Organization/Presentation

20% - Grammar sentence structure, spelling

10% - Number/quality/use of references

10% - Sufficient length/depth

100%

Due Dates:

To help you along the way, and make sure there are no surprises at the end of the semester, you will be turning in parts of your writing project during the semester, according to the following schedule:

February 8: Turn in a piece of paper letting me know which of the topics you have chosen.

March 4: Turn in a list of specific books and articles, complete with author name, publisher (or journal name) and copyright date. Since scientific knowledge is always improving, using newer sources is better than older ones in most cases. You need to submit to me at least 5 different sources at this time, though in your final project you can use as many more as you see fit.

April 3: Turn in a detailed outline of your project, including section titles, and a bibliography.

April 29: Turn in the final version of your project. If you turn it in late, a penalty of 5% per class day late will be applied to the project grade, maximum of 10% penalty. *No papers will be accepted once the final exam has begun.*

Topics:

Choose a topic for your writing project from among the list below.

- 1) Discuss the search for planets around other stars: How are such planets discovered, what are those newly discovered planets like, how will planet searches in the future be different from those done now? This field changes rapidly, so be as complete and up to date as possible!
- 2) The Distance Scale Ladder. Write a description of how astronomers calculate the distances of objects in the sky, from the close objects like the Moon, planets and nearby stars, all the way to the most distant galaxies known. Discuss how the calculation of distance for the most far away objects depends on the methods used for the nearby objects.
- 3) Variable stars. In class we only skim the surface on the topic of variable stars. Research the many different types, beyond the Cepheids and RR Lyraes that we cover in class. Find out what they have in common, and what makes them different from each other. What makes variable stars vary in brightness? How do astronomers use them to learn about the Universe?
- 4) Hubble's Constant. What is Hubble's constant? Describe the various methods astronomers have used to calculate Hubble's constant. How has our understanding of what the numerical value of Hubble's constant is changed since Hubble first discovered Hubble's Law?
- 5) The Steady State theory. What is it? How did it work? Why did astronomers ultimately decide it was not a good theory and abandon it? What makes a scientific theory good or bad. This topic is a combination of science history and science philosophy, using the Steady State theory as an example.
- 6) Dark Energy. What is it? How was it discovered? What role does it play in the Universe? How is it related to dark matter? What is its relationship to the Big Bang Theory?
- 7) Gravitational Waves. What is the history behind gravitational waves? What sorts of objects can generate them.? How can astronomers use them to learn about the Universe?