

Astronomy Research Paper

Monday April 18th is the last day to seek research paper topic approval.
Monday May 2ⁿ is the last day to turn in the paper.

The purpose of this paper is to have you dig deeper than we can in class into some area related to astronomy.

Topic Choice and Approval

Each student will have a different topic. You may choose virtually any aspect of the science, history, philosophy, education and even business of space/astronomy as a topic with my approval. All paper topics must be approved by me in advance of doing the paper. Topics are approved on a first come first served basis.

Some topics are suggested below. For each topic I have listed a number of questions that your paper may address. These questions are meant to help guide your thinking and research. They can help give you an idea of the depth and sorts of issues your paper may address. Your paper should not try to simply answer the questions in order. Instead, it should address the issue in a coherent manner.

Your proposal should include a few sentences describing what the topic is and at least two or three questions that you plan to address. You can submit proposals via email. I am happy to help you develop questions for a particular subject. I strongly suggest checking on available resources when developing your proposal.

If you are using this paper as part of the work for any other course, you must get approval from both me and the other instructor, otherwise it is an academic conduct policy violation.

Format and Grading

The paper should be from 4 to 5 pages in normal 12 pt. type, double spaced text. Figures, tables or pictures may add to the overall length.

With my approval, you have the option of presenting the paper in another format, such as a set of web pages.

You will probably find that doing a good job in only 4-6 pages is hard. Your writing will need to be concise and economical, while still being clear and complete. I strongly suggest writing several drafts. I would be happy to read one of your drafts and provide feedback. I also urge you to use the writing center. The paper will be graded on content, analysis, clarity, organization and style.

Your paper should contain citations which refer to at least 4 different references. References to material on the web are welcome, but at least two of your references should be non-web sources. The particular citation style you use is up to you. Just make sure the critical information is included. Papers must be your own individual work.

Extended Paper Option.

You can do a longer paper, 9 to 10 pages, and have it count as two grades to replace either the Observing Project or the Night Sky Quiz. If you want to do this, indicate that in your topic proposal.

Sample Topics – These are just ideas, you are free to choose something else.

Topic 1 : What are the chances that life exists beyond the earth?

- What is meant by "life?" What characteristics and behaviors must an entity demonstrate to be "living?" What other life forms could life take besides those we know on earth?
- Where are we looking for life? Have we found life elsewhere in our solar system? Elsewhere in the universe?
- What are the principle arguments for and against life existing outside of earth?
- How could you estimate approximately how many planets there are in the universe that have conditions appropriate for life to exist?
- What is your own response to the topic question? Justify your response.

Topic 2: What are the possible connections between astronomy and the extinction of the dinosaurs?

- What is the evidence for a sudden extinction of the dinosaurs and for the number of years ago the extinction occurred?
- What is the main evidence that an asteroid impact may have caused the extinction?
- Who were the major researchers who developed the asteroid theory and what is the story of their research?
- What other possible theories have been suggested for the extinction?

Topic 3: Cosomology/The Big Bang

- What evidence is there that the universe is expanding? Explain the "red shift" and how it relates to this evidence.
- What does it mean to say that the "universe is expanding?" What is the universe expanding into?
- How did the universe evolve from the big bang to the present day. Give a little chronology of important events along the way. When did stars first form? Galaxies?
- How long ago does the theory hold that the "bang" occurred and what is the evidence for this age? Does the Big Bang theory hold that the "bang" was a one-time event? Explain.
- For a challenge, you can research the new idea of dark energy: What evidence about the expansion suggests dark energy exists? What does the dark energy seem to do? What are the implications for the future of the universe?

Topic 4: Planets around other Stars

- What evidence do we have for planets around other Stars? How are the observations made? How many candidates are there right now? Where is the research being done?
- What are the properties of the planets found so far?
- In what ways do these planets support the condensation theory of solar system formation? In what ways are they at odds with our present interpretation of the condensation theory of solar system formation?

Topic 5: Is Pluto a Planet?

- What characteristics make an object a planet? What distinguishes asteroids, comets, or meteoroids from planets?
- What are the properties of Pluto?
- In what ways does Pluto qualify as a planet? In what ways doesn't it qualify as a planet? If Pluto isn't a planet, what is it? Is it likely that there's a 10th planet orbiting somewhere beyond Pluto?
- Do you think Pluto should be regarded as a planet? Make an argument supporting your view.

Topic 6: Astronomies of other cultures

Pick one or more cultures other than Greek/Roman/Western European, and research their astronomy. Compare and contrast the work of each culture with each other and with the Greek/Roman/Western European tradition. Some things you might consider:

- What constellations did they have?
- How did they use astronomical observations? To guide planting of crops? To mark religious holidays? Something else?
- Did they distinguish planets from stars? Did they observe comets?
- Are there major pieces of knowledge that some other culture worked out that the Greeks didn't?
- Be creative and think of other ways to compare the astronomies of different cultures.

Topic 7: Exploring Mars

There are currently two robot explorers on Mars, and more on the way. Why is there so much interest in Mars? Do you think it's worth it?

- Briefly describe the current missions to Mars
- What are the research goals of these missions? Why are these important?
- What are some of the results and their implications?
- How much do the present missions cost?
- Do you think exploration of Mars is worth the cost? Why or why not?

Topic 8: Economics of Spaceflight

- Why go to space? What is the payoff?
- What are the current roles of governments and the private sector? Are those roles changing?
- Is there profit potential? Should there be?