Cowie & Joseph  Astro 380  Term Paper Topics

Please choose a topic from the following list, or one of your own choosing. We would like you to discuss your choice with one or both of us before you prepare an outline, particularly if your topic is not one on the list. This discussion is intended to give you a head start in your research and to make sure that your topic, if self chosen, will lead to a viable paper in the time available. The paper should be 6-9 pages, double-spaced, in a readable 12-point font. **Schedule:** Choose a topic and discuss your choice by 10\textsuperscript{th} April. Prepare a draft outline of the paper by ca. 17\textsuperscript{th} April, and go over it with one or both of us. Submit the completed paper by 26\textsuperscript{th} April. Prepare a 15-minute talk on your paper for the class for 1\textsuperscript{st} May.

1) Compare the accounts of creation in the Babylonian myth, the *Enuma Elish*, with the Biblical accounts of creation in Genesis. What are the similarities and differences, especially in the idea of God, why there was a creation, the relation between Man and God, etc.

2) Trace the development of the idea of space from the Pre-Socratic philosophers through the Middle Ages, the 17\textsuperscript{th} C, to 20\textsuperscript{th} C relativistic cosmology. Is space infinite or finite? Does space have physical properties? How do we learn about space?

3) Why a body falls when dropped from a height and the properties of its motion are a prominent theme in the development of the theory of motion. Trace the evolution of these ideas from Aristotle, through the Middle Ages, to Galileo and to Newton.

4) How were ideas about cosmology related to ideas about God throughout western civilization?

5) Trace the ideas of how Man fits into the cosmological framework of the time from the Babylonians to the 20\textsuperscript{th} C.

6) Compare the clash between Galileo and the Roman Church with the contemporary clash between Creationism and Intelligent Design with the idea of evolution. What are the similarities and what are the differences? Does Galileo’s solution for the 17\textsuperscript{th} C work for the 20\textsuperscript{th} C? If so, how; if not, why?

7) Compare Galileo’s struggle with the authorities of the Roman Church with a contemporary example of the clash between scientific authority and secular power, either government or corporate. (A possible example is recent government censorship of scientific results pertaining to climate change.)

8) Trace the development of the acceptance (or otherwise) of the Copernican proposal in the first 100 years after the publication of *De Revolutionibus*. Who were the “Copernicans” in this period and why did they espouse Copernicanism? Was the Protestant Reformation an important factor in the eventual acceptance of the Copernican cosmology?
9) How has astrology evolved from being an important impetus for cosmological theory into being divorced from, and largely hostile to, science? What were the astrological views and practices of important figures in the history of astronomy, such as Ptolemy, Kepler, and Newton? Why would those views not be compatible with the practice of science today? What has changed in the interim?

10) The classic view of the “scientific revolution” is expressed in Herbert Butterfield’s 1957 book, The Origins of Modern Science. Discuss the view that this paradigm of the history of science is itself a product of intellectual conditions in the 1950s and is no longer tenable. What elements are out of date in Butterfield’s picture, and what would replace them?

11) What is light? How was light understood by Ptolemy, Kepler, Newton, Einstein? What part did the understanding of light and electromagnetic radiation in general play in the 20th C “scientific revolution” and the downfall of the Newtonian mechanical cosmos?

12) The atomic theory, in one guise or another, has had a long and tenacious hold on the human imagination, but for most of its history it has been incompatible with theories of motion, from Aristotle’s rejection of the atomism of Democritus, to the inability of Newtonian mechanics to describe Rutherford’s atom in the early 20th C. Describe this history and its resolution in 20th C physics. What gave way, atoms or the Newtonian explanation? How has the resolution shaped our current ideas of the cosmos?