

Syllabus for Astronomy H162: Spring 2009: 9:30 – 10:18 MTWRF

Prof. Kris Stanek: McPherson 4003, Off. Hrs. MW 11:15-12:15; stanek.32@osu.edu
T.A. Brett Andrews: McPherson 4004, Off. Hrs. MT 4:00-5:00; andrews.385@osu.edu

1. Mar. 30 – Apr. 3) Map of the Universe; Distances in the Universe.
2. Apr. 6 – 10) Stars I: Color-Magnitude Diagram; Main-Sequence.
3. Apr. 13 – 17) Stars II: Internal structure; Energy Production.
4. Apr. 20 – 24) Stars III: Stellar Evolution.
5. Apr. 27 – May 1*) Special Relativity; General Relativity; white dwarfs, neutron stars, pulsars, black holes.
6. May 4 – 8) Galaxies I: The Milky Way (size, motions, structure).
7. May 11 – 15) Galaxies II: The Local Group & The Local Supercluster. Expansion of the Universe.
8. May 18 – 22) Looking Back In Time I: Early Galaxies, Quasars, Microwave Background Radiation.
9. May 25 – 29) Looking Back In Time II: Origin of matter and the elements, Origin and structure of the universe.
10. June 1 – 5) Dark Matter, Dark Energy.

* **Midterm:** Friday May 1

Final: Tuesday June 9, 9:30–11:18 am

Grading: Midterm = 15%; Final = 25%; Homework = 25%; Paper = 25%; Participation = 10%; Extra Credit = 10%;

Textbook: 21st Century Astronomy by J. Hester et al.

Course Objectives: Astronomy A162 is a General Education Curriculum (GEC) Physical Science course in the Natural Science category. The goals for this course include:

- * Understanding the basic principles and central facts of astrophysics, and their relation to other ideas in the physical and biological sciences.
- * Understanding how we discovered the important principles and facts of astrophysics, thus understanding key events in the history of science both as events in human history and as case studies in the methods of science.
- * Investigating the relationship between science and technology.
- * Understanding the social and philosophical implications of major scientific discoveries.

Learning Objectives: In Astronomy 162, the specific learning objectives to achieve these course goals are:

- * To investigate the basic facts, principles, theories and methods of modern science as practiced in astrophysics.
- * To learn important events in the history of astrophysics, particularly the discovery of the size and age of the Universe and our place within it.
- * To explain the role of modern technology in the investigation of astrophysical phenomena.

Term Paper

Your term paper can take the form of either:

- 1) Reading a book about astronomy beyond the solar system, and writing a critical review, or
- 2) Researching some topic in astronomy beyond the solar system and seeing how ideas on the topic evolved with time or how the idea is treated in introductory textbooks, or
- 3) Another project of your own design.

Your project should list all sources used; all quotes should be credited to the source and enclosed in quotation marks, etc.

Due Dates:

Apr 13: Hand in short description of your proposed project.

May 11: Hand in first version of term paper.

May 22: Get back first version with comments.

June 3: Hand in final version.

Book Review: If you choose to do a book review, some topics you should include are: What level is the book aimed at? Is it effective at that level? What are the main points the author tries to make and how well does s/he succeed? Are the explanations clear and compelling? Was the writing style appropriate?

There are a very large number of books written on modern astronomical topics that are aimed at non-scientific audiences. Some of these give a general overview of galactic, or extragalactic astronomy. Others cover specific topics like the Big Bang, the Microwave Background, or Dark Matter. Almost any of these would be suitable for a review.

Research on a topic: There are an enormous number of possible topics that you could research relying on several different books and/or articles. Some examples are listed below, but you could choose others.

How was the size of our Galaxy established?

How did the Big Bang theory gain general acceptance?

How was the modern theory of stellar structure figured out?

How did the idea of dark matter gain acceptance?

How did the idea of dark energy gain acceptance?

How did our concept of the largest structures in the universe evolve with time?

How were quasars discovered and how did we figure out what they were?

How were gamma-ray bursts discovered and how did we figure out what they were?

How were supernovae discovered and how did we figure out what they were?

How were pulsars discovered and how did we figure out what they were?

+ Many, many others

Grades for the term paper will be based on: logic displayed, insight displayed, how convincing the writing was, how much work appeared to have gone into it, the significance of the report, the writing style, and how much fun it was to read.