

ASTRONOMY 294Z The History of the Universe

Winter Quarter 2008
Tuesday & Thursday, 3:00 – 4:48 pm
Hitchcock 131



“Where Do We Come From? What Are We? Where Are We Going?” – Paul Gauguin, 1897

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Required text: *On the Shores of the Unknown: A Short History of the Universe*, by Joseph Silk (Cambridge University Press, 2005)

Class website: www.astronomy.ohio-state.edu/~ryden/ast294z/
The website will contain the PowerPoint slides for each lecture, the course syllabus, the assigned problem sets, and useful (or at least amusing) astronomy links.

Lectures: Each course period will be broken into a pair of lectures, each roughly 50 minutes long. There will be a 5-minute-long break between the pair of lectures. Please **silence your cellphone** and **turn off any wireless devices** during lecture. (Exceptions will be made for assistive technology for the vision- or hearing-impaired.)

Grading policy: Your course grade will be determined from the results of a midterm exam (30%), a final exam (35%), and seven take-home problem sets (a total of 35%). The midterm exam will be on **Thursday, February 7**, at class time. The final exam will be on **Tuesday, March 11, at 1:30 pm**. Problem sets will be handed out on Tuesdays (Jan 8, Jan 15, Jan 22, Jan 29, Feb 12, Feb 19, & Feb 26), and will be due the following Tuesday, at class time.

The midterm and final exam will be closed-book, closed-notes tests. The final exam will be cumulative, covering the entire course. If you know in advance that you will miss an exam because of attendance at a University-sponsored activity, please contact the professor at least one week prior to the scheduled exam date, in order to arrange a makeup exam. If you miss the midterm due to a sudden illness or other emergency, please contact the professor as soon as possible after the missed exam, in order to schedule a makeup exam. If you miss the **final** exam, you will receive a grade of incomplete (I) for the course; it will be your responsibility to contact the professor as soon as possible to make up the final exam.

To avoid a penalty for lateness, problem sets must be handed in by 5 pm on the Tuesday they are due. If they are handed in between 5 pm Tuesday and 5 pm Wednesday, they will suffer a deduction of 25 points (out of 100). If they are handed in between 5 pm Wednesday and 5 pm Thursday, they will suffer a deduction of 50 points (out of 100). No problem sets will be accepted more than 48 hours after they are due.

General Education Curriculum (GEC) Goals: Astronomy 294z is a GEC Physical Science Course in the Natural Science category. The goals for this course include:

- Understanding the theories and methods of modern cosmology, and their relation to other ideas in the physical sciences.
- Investigating the relation between science and technology.
- Exploring the effects of science and technology on human society.

In Astronomy 294z, the specific learning objectives to achieve these course goals include:

- Investigating the basic facts, principles, theories, and methods of modern science as practiced in cosmology. (We'll ask not only, "What do cosmologists know?" but also, "How do they know it?")

- Learning important events in the history of astronomy (particularly the development of our understanding of planets, stars, and galaxies, and the discovery of the physical laws that govern their motions).
- Explaining the role of modern technology in the investigation of the universe (where “modern technology” embraces everything from Galileo’s telescope to cutting-edge spacecraft).
- Considering how increased knowledge of the size and age of the universe has affected humanity’s philosophical viewpoint.

Academic Misconduct: It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and cheating on examinations. Instructors shall report all instances of alleged misconduct to the committee (Faculty Rule 3335-5-487). For additional information, see the Code of Student Conduct (studentaffairs.osu.edu/info_for_students/csc.asp).

Disability Services: Students with disabilities that have been certified by the Office for Disability Services will be accommodated; please inform the professor as soon as possible of your needs. The Office for Disability Studies is located in 150 Pomerene Hall, 1760 Neil Avenue, telephone 292-3307, TDD 292-0901, www.ods.ohio-state.edu.

Tentative Course Outline

1. (Jan 3) Naked Eye Observations: Early Models of the Universe
Reading: Prologue
2. (Jan 8) From Earth-centered to Sun-centered Models of the Universe
Reading: Chapter 1
3. (Jan 10) Telescopic Observations: The Nature of Stars and Galaxies
Reading: Chapter 2
4. (Jan 15) Spectroscopic Observations: The Expanding Universe
Reading: Chapter 3

5. (Jan 17) Multi-wavelength Observations: The Big Bang Theory
Reading: none
6. (Jan 22) From Alchemy to Chemistry: Atomic Theory
Reading: Chapter 4
7. (Jan 24) Subatomic Particles in the VERY Early Universe
Reading: Chapter 5
8. (Jan 29) Forging Elements in the Not-Quite-So-Early Universe
Reading: Chapter 6
9. (Jan 31) Newton's Cosmology: Gravity and the Expansion of the Universe
Reading: Chapter 7
10. (Feb 5) Einstein's Cosmology: Gravity and the Shape of the Universe
Reading: Chapter 8
11. (Thursday, February 7) **MIDTERM EXAM**
12. (Feb 12) How Old is Our Galaxy? Determining the Ages of Stars
Reading: none
13. (Feb 14) How Old is the Earth? Determining the Ages of Planets
Reading: Chapters 9, 10
14. (Feb 19) Why is the Universe Lumpy? Intergalactic Matter and Gravitational Instability
Reading: Chapter 11
15. (Feb 21) The Biggest Things in the Universe: Large-Scale Structure
Reading: Chapter 12
16. (Feb 26) Formation and Evolution of Galaxies (in particular, the Milky Way)
17. (Feb 28) Formation and Evolution of Stars (in particular, the Sun)
18. (Mar 4) Formation and Evolution of Planets (in particular, the Earth)
19. (Mar 6) A Glimpse of the Future: "Where Are We Going?"