

Astronomy 309R - Fall 2013
GALAXIES, QUASARS, AND THE UNIVERSE
TTh 00:00 – 00:00 · WEL 3.502 ·
Instructor: Staff

Course Web Page

Course information including important announcements, reading and homework assignments, homework solutions, lecture notes, and study guides will be made available within the University's Blackboard Learning System: <https://courses.utexas.edu>

COURSE OBJECTIVES

This course provides an introduction into our basic understanding of the formation, structure, and evolution of the universe. Where do the light and the matter permeating space come from? What do we really mean when we say that "the universe is expanding"? How do we know that it was hot and dense at the beginning? What was the Big Bang, and what are the residual traces of this event? How did the intricate cosmic structure, evident in vast astronomical surveys, come into existence? Why are there billions upon billions of stars in every galaxy, and billions of galaxies in the observable universe? What are black holes and what is their unique role in the transformation of galaxies? Where are the boundaries of the present understanding? What are the missing pieces, and what are the scientists doing to complete the picture? Along with a review of modern cosmology, we will briefly discuss the historical emergence of the discipline from its pre-scientific precursors. While tracing the evolution of the universe to its beginnings, we will review recent and future experiments and missions, conducted on Earth and in space, to explore and measure the universe. We will use these examples to illustrate the mechanisms of scientific discovery that set science apart from other endeavors.

AST 309R is intended to meet the requirements for Core Component Area "Natural Science and Technology" and may be combined with AST 301 for a six-hour Core sequence. This course will include work designed to develop skills in critical thinking, communication, quantitative analysis, and teamwork. This may involve such activities as peer-to-peer discussions and critical analysis of key concepts, written or oral presentations on current discoveries, and quantitative problem solving. The course material will emphasize the synthesis of observation and theory to gain insight into the operation of the natural world, drawing on other fields such as physics, chemistry, geophysics, or biology.

PREREQUISITES, LECTURES, HELP SESSIONS, OFFICE HOURS, AND STUDENTS WITH DISABILITIES

Prerequisites

To take Astronomy 309R, you should have taken a descriptive introduction to astronomy, such as Astronomy 301, 302, or 303, or have obtained consent of the instructor.

Help Sessions

Review help sessions will be scheduled prior to exams or homework assignment due dates.

Study Guides

Study guides outlining the material to be covered on each exam will be made available about one week prior to the exam.

Office Hours

TBD

Students with Disabilities

Students with disabilities may request appropriate academic accommodations from the Division of Diversity and Community Engagement, Services for Students with Disabilities, 471-6259.

TEXTBOOKS AND REQUIRED READING

Required Textbooks

Foundations of Modern Cosmology, 2nd Edition, by John F. Hawley and Katherine A. Holcomb (Oxford University Press)

Black Holes and Time Warps: Einstein's Outrageous Legacy, by Kip S. Thorne (W. W. Norton)

Required Course Packet

An excerpt from the book *Lakatos: An Introduction* by Brendan Larvor, available the University Co-op (about \$1).

Additional required reading accessible electronically through the University of Texas Research Tools will be assigned on the course web page in the Blackboard.

Great Books to Read for this Course

Cosmology, The Science of the Universe, 2nd Edition, by Edward Harrison (Cambridge University Press)

The First Three Minutes: A Modern View of the Origin of the Universe, 2nd Updated Edition, by Steven Weinberg *The Big Bang: 3rd Edition*, by Joseph Silk (Times Books)

In Search of Dark Matter, by Ken Freeman and Geoff McNamara (Springer Praxis Books)

Space-Time, Relativity, and Cosmology, by Jose Wudka (Cambridge University Press)

The Edge of Infinity: Supermassive Black Holes in the Universe, by Fulvio Melia (Cambridge University Press)

Dark Cosmos: In Search of Our Universe's Missing Mass and Energy, by Dan Hooper (Collins)

The Extravagant Universe: Exploding Stars, Dark Energy, and the Accelerating Cosmos, by Robert P. Kirshner (Princeton University Press)

Dark Side of the Universe: Dark Matter, Dark Energy, and the Fate of the Cosmos, by Iain Nicolson (Johns Hopkins University Press)

Calibrating the Cosmos: How Cosmology Explains Our Big Bang Universe, by Frank Levin (Springer)

EXAMS AND GRADING

Exams

There will be 5 multiple-choice, 20-question exams. The lowest exam score will be dropped, and the remaining 4 scores will be added toward the grade. Since each exam will contribute 20 points toward the final grade, the 4 exams will contribute a total of 80 points toward the final grade.

There will be make-up exams for students with valid excuses. The reasons for absence must be presented and acknowledged in advance of examination.

Homework

There will be several homework assignments. The cumulative homework assignment grade will count 72 points toward the final grade. Each assignment will be a set of essay questions, based on the material covered in class and/or available in resources that will be specified in the assignment. Your answers of the essay questions should be submitted in typewritten form, about two to three pages in length (to be specified in the assignment), double-spaced, in 12-point font. ***Please staple the pages and write your name on your assignment!***

University of Texas policy stipulates that in answering homework essay questions, you can paraphrase but not cite or copy material from any source. Distinction between paraphrasing and citing or copying is clearly explained in:

<http://projects.uwc.utexas.edu/handouts/files/Paraphrasing.pdf>

You are encouraged to discuss and work on the homework assignments in groups, **but you must write the final answers on your own**. Essays containing identical or nearly identical text fragments will be returned ungraded, and may be referred to the Office of the Dean of Students for adjudication.

Calculation of the grade

Component	Maximum Score
4 best-scoring out of 5 exams (missed exams count as 0 score)	4 x 20 = 80
6 homework assignments 12 points each	6 x 12 = 72
Total	152

Score Range	Grade
130-152	A
110-129	B
90-109	C
70-89	D
0-69	F

Attendance

Since many concepts covered in the course are not covered in the textbook, please do attend the lecture. Please do arrive on time and do not leave the lecture room until lecture ends, to avoid distracting other students.

You are strongly encouraged to raise your hand to ask questions during lecture. If I do not notice that you have raised your hand, please call my name, and ask your question.