ASTRONOMY 309R – FALL 2007
GALAXIES, QUASARS, AND THE UNIVERSE

Unique No. 50595

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

Instructor

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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.

CLASSES, PREREQUISITES, AND TEXTBOOK

Hours and Venue

The class meets in Robert A. Welch Hall (WEL) 3.502 on Tuesdays and Thursdays at 12:30 p.m. – 2:00 p.m.

Help Sessions

Review help sessions will be scheduled prior to exams or homework assignment due dates in Robert Lee Moore Hall (RLM) 15.216b on Mondays at 6 – 7 p.m.

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.

Textbook

Title: *Cosmology, The Science of the Universe, 2nd Edition*
Author: Edward Harrison
Publisher: Cambridge University Press

Other Potentially Helpful Reading

The Infinite Cosmos: Questions from the Frontiers of Cosmology, by Joseph Silk (Oxford University Press)

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 State of the Universe: A Primer in Modern Cosmology, by Pedro Ferreira (Cassell)

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 40-minute in-class exams, and no final exam. Please see the course schedule at the end of the syllabus for the dates of exams. The lowest exam score will be dropped, and the remaining 4 scores will be counted toward the grade. Each exam contributes 15 points toward the final grade.

There will be *oral* make-up exams for students with valid excuses. The reasons for absence must be presented and acknowledged in advance of examination. No make-up exams will be arranged for those who did not notify the instructor about their absence in advance.

Homework

There will be about 3 homework assignments, each counting 10 points toward the grade. Each assignment will be a set of simple essay questions, based on the material covered in class and/or available in resources that will be specified in the assignment. Yours 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.

In answering the 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 will be referred to the Office of the Dean of Students for adjudication.

Please number and staple together all pages of your assignment.

Calculation of the grade

Component	Maximum Score
4 best-scoring out of 5 exams	$4 \times 15 = 60$
3 homework assignments	$3 \times 10 = 30$
Total	**90**

Score Range	Grade
75 – 90	A
60 – 74	B
50 – 59	C
40 – 49	D
0 – 39	F

Attendance

Since many concepts covered in the course are not covered in the textbook, please attend the lecture. WEL 3.502 has noisy doors and thus please do arrive on time and do not leave the lecture room until lecture ends, to avoid distracting other students.

Please sit in the front rows – do not sit in the rear of the room! Also, please do let me know if you cannot read the information on the blackboard or on the projector display.

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.

Please do not read newspapers, magazines or books that are unrelated to the course. You may use your laptops to take notes, but do not use the laptop for chat, computer games, etc. during lecture since this is highly distracting to anyone sitting next to you or behind you. For the same reasons, please do not converse during lecture.

SCHEDULE

Lecture	Date	Day	
1	August 30	Th	**Introduction to the Course**
2	September 4	T	
3	September 6	Th	
4	September 11	T	
5	September 13	Th	
6	September 18	T	**First Exam**
7	September 20	Th	
8	September 25	T	**First Homework Due**
9	September 27	Th	
10	October 2	T	
11	October 4	Th	
12	October 9	T	**Second Exam**
13	October 11	Th	
14	October 16	T	
15	October 18	Th	
16	October 23	T	**Second Homework Due**
17	October 25	Th	
18	October 30	T	**Third Exam**
19	November 1	Th	
20	November 6	T	
21	November 8	Th	
22	November 13	T	
23	November 15	Th	**Fourth Exam**
24	November 20	T	
			~ THANKSGIVING ~
25	November 27	T	
26	November 29	Th	**Third Homework Due**
27	December 4	T	
28	December 6	Th	**Fifth Exam**