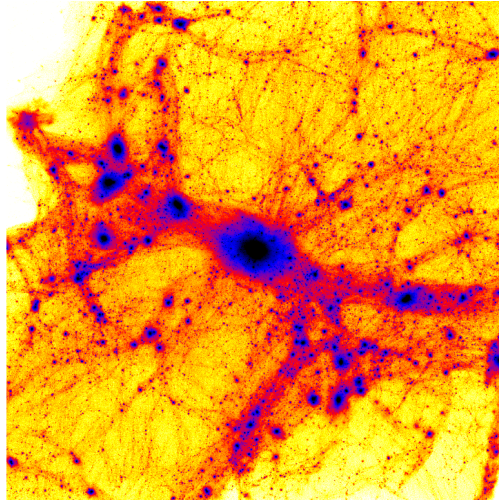


ASTR340: The Origin of the Universe (Spring 2014; Mushotzky)



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Office hours: Monday and Wednesday 10-11am , or by appointment

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Wed 15:00-16:00 and Thur 15:30-16:30

Textbook: Foundations of Modern Cosmology, by Hawley & Holcomb (2nd Ed.)

•Course description

Astronomy 340 is an introduction to modern Cosmology, the scientific study of where our Universe came from and how it is evolving. We start by briefly looking at the history of Cosmology –people have been pondering the nature of the Universe for thousands of years! We then discuss the modern scientific view of the Universe that began with Nicholas Copernicus, was revolutionized by Isaac Newton and Albert Einstein, and is still being worked on by scientists today. In the course of our exploration, we will come across exotic topics such as the Big Bang, curved space and time, and black holes. The course website contains links to course information, homework , additional interesting information and links and lecture notes.

•Course Pre-requisites

It is assumed that you have some knowledge of astronomy at the ASTR100 or ASTR101 level. In addition, some mathematics (high-school level algebra, trigonometry and geometry) will be required for the classes, homeworks and examinations. Simple calculus

will be used in a few of the classes, and may be needed to answer a small number of the homework questions. However, no calculus will be required for the examinations.

•Course expectations

Attendance: In order to successfully complete this course, I expect you to attend class 2 times a week. If you have to miss a lecture, please be sure to obtain a copy of the notes (either from another student, the web-site, or from me) and make sure that you understand what you missed. There will also be times when I will ask for class participation.

Preparation: I expect you to be prepared to work. We will be covering some fascinating *but* very challenging concepts - you will understand this material much more easily if you preview the recommended chapter of the course book ahead of time, as well as giving it a more careful read after the lecture. You also should review your class notes sometime before the next lecture to make sure everything is clear. I encourage you to ask questions in the lectures or during my office hours.

Study Habits: It is better to keep up with the material on a daily basis than cram the night before the exam. I encourage you to chat about problems with your friends and classmates – you will learn a huge amount from trying to explain confusing issues to each other. Please ask for help if you need it.. ***However, all graded materials, including class-assignments and home-works, must be your own thoughts in your own words.***

•Grading

Grades are based on a point scale with different assignments weighted as shown below.

Assignments:

Homework: 30%

Midterm : 30%

Final : 40%

TOTAL : 100%

Class participation is encouraged but not graded

Letter grades will be assigned based upon your cumulative score. The exam grades will be renormalized.

•Midterm exam

There will be one in-class examination on the 13st March 2014. This exam will be closed book and will consist of a section of short answer questions, with essay and problem solving questions. University regulations will apply regarding academic honesty and excused absences. Please see the Schedule of Classes for these policies. If you are not

able to take an exam due to illness or other legitimate reasons, you must contact me on or before the day of the exam either by email or voice mail. In addition, you must document the reason for your absence. A make up exam must be taken promptly.

If, for whatever reason, the University is officially closed on the day of the exam, the exam will be re-scheduled for the next lecture date.

•Final exam

As per the University examination schedule, the final exam for this course will be held on Friday 16th May 2014, 8:00am-10:00pm, in room CSS2400. The final exam is cumulative in the sense that it will cover all material discussed in this course, but stress the second half. The format of the final exam will be the same as the midterm exam, with a section of short answer questions and a section of longer essay or problem solving questions.

•Homeworks

I will aim for a total of 6-7 homeworks in this course. On the due date, homeworks should be handed in at the front of the class. Homeworks will be considered late by the end of class. If you cannot make it to class, you should either ask a friend/classmate to hand it in for you, or make sure that it gets to me or Tiara before the time that it is due. If you have a valid emergency, you should send me an email or voice mail message before the due date telling me the nature of the emergency. Please document all such emergencies.

If, for whatever reason, the University is officially closed on the day of the due date, the due date will be moved to the next lecture.

Academic Integrity

The University's policies and rules on academic integrity are laid out in the Schedule of Classes. You must never engage in acts of academic dishonesty at any time. Acts of academic dishonesty include cheating, fabrication, plagiarism, or helping any other person to do these things. These rules apply to homeworks and quizzes as well as exams. As a part of these rules, you must give credit to any book (including the course textbook!), published article or web-page that you have used to help you with a particular assignment. The University and I take these issues extremely seriously.

To underscore the need for academic integrity, the University asks you to write the following pledge on any assignment or exam:

"I pledge on my honor that I have not given or received any unauthorized assistance on this assignment/examination."

Preliminary Course Outline

Lecture #	TOPIC	
Lec 1	INTRODUCTION	
Lec 2	Early Ideas about Cosmology	Ch 1-2
Lec 3	Cosmology of the Scientific Revolution: Tycho , Galileo, Newton	Ch 2-3
Lecs 4-5	Newtonian Physics	Ch 3
Lec 6-	Principles of Space and Time	Ch 6
Lecs 7-9	Special Relativity	Ch 7
Lec 10-11	General Relativity	Ch 8
Lec 12	General Relativity Black Holes	Ch 9
Lec 13	Expanding Universe	Ch 10
EXAM March 13		
Lec 14	Size of the Universe	Ch 10
Lec 15	Cosmological Principles I	Ch 11
Lec 16	Cosmological Principles II	Ch 11
Lec 17	Microwave Background	Ch 14
Lec 18	Early Universe and Nucleosynthesis	Ch 12
Lec 19	Weighting the Universe and the Need for Dark Matter	Ch 13
Lec 20	Evidence for Dark Energy, Age of the Universe	Ch 13
Lec 21	Galaxy Formation I	Ch 15
Lec 22	Galaxy Formation II	Ch 15
Lec 23	Galaxy Formation III	Ch 15
Lec 24	Four Cosmic Puzzles	Ch 16
Lec 25	Inflation	Ch 16
Lec 26	The End	Ch 17
Lec 27	Review	
Lec 28	Questions and Answers	