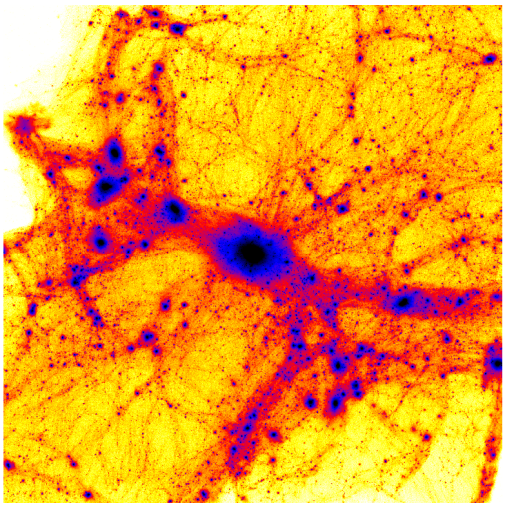
ASTR340: The Origin of the Universe
(Spring 2015; Mushotzky)



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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 is at
http://www.astro.umd.edu/~richard/ASTR340/index_spring2015_edit.html

It will contain 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, trigometry 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 15st March 2012. 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 Thursday 16th May 2012, 10.30am-12.30pm, 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 Maggie (room CSS1104 or 0204) 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 dishonest 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
Lec 14 Size of the Universe	Ch 10
EXAM March 12	
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	