

Astronomy 340 - Spring 2011

“Origin of the Universe”

SYLLABUS

Instructor

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Office hours: Wed 10:00am-11:00am

Class Schedule

Lectures on Tuesday and Thursday from 2:00pm to 3:15pm

Room CSS 2400

No open laptops are allowed during the lectures. If you feel you need to use one please talk to me.

Course Web Page

The web site for this course can be found at

http://www.astro.umd.edu/~ricotti/NEWWEB/teaching/ASTR340_11.html

It will contain links to course information, assignments and schedule of lectures and exams.

Course Description

The course is an introduction to modern Cosmology intended primarily for non-science majors. We will study the progression of our knowledge about the origin and evolution of the universe through history, with particular emphasis on modern cosmological results. Topics include: early cosmological models, geocentric vs. heliocentric theory, curvature of space, Hubble's Law, Big Bang Theory, microwave background radiation, evolution of stars and galaxies, dark matter, active galaxies, quasars and the future of the universe. Modern Cosmology uses the laws of Physics to construct models of the universe that describe how it evolved from simple initial conditions. The current cosmological paradigm has been quite successful at explaining many of the amazing aspects of the Universe around us. In order to do so, however, cosmologists introduced new concepts such as

“dark matter” and “dark energy”. What physics are behind these concepts, and whether such hypotheses will stand the test of time, is the subject of much current research.

Course Prerequisite

The course is intended for non-science majors and assumes high-school-level algebra, and either ASTR 100 or 101 as a prerequisite. *However, expect the homework and exams to be challenging if you have little practice or you are rusty at problem solving.* See also the official UMD info on this course.

Required Texts

- Foundations of Modern Cosmology 2/e, by John F. Hawley and Katherine A. Holcomb. Oxford University Press, ISBN 0-19-853096-X
Authors' website for the textbook: "<http://astsun.astro.virginia.edu/~jh8h/Foundations/>"

See the course web page for lecture notes.

Course Assignments and Grading

Final grades for this course will be computed based on cumulative points in the areas below, according to the weights listed:

- Attendance and participation 10%
- Homework 40%
- Midterm exam 20%
- Final exam 30%

Final letter grades will be curved, based on the total points received. The letter grades are assigned as:

- A 85-100% of total possible points
- B 70-84% of total possible points
- C 55-69% of total possible points
- D 40-54% of total possible points
- F below 40% of total possible points

with +/- within A, B, and C. There will be no extra credit.

Homework will typically be assigned once a week, due the following week, and must be turned in at the beginning of class. You should expect about 7 assignments during the semester.

Homework will be considered late by the end of class and will no longer be accepted. If for some reason you cannot make it to class, you should either ask a friend/classmate to hand in your assignment for you, or make sure that it gets to the instructor beforehand. If, for whatever reason, the University is officially closed on the due date for an assignment, the due date will be moved to the next lecture.

Midterm exam: There will be one in-class examination on March 16 2011 during the normal class time (to be confirmed). This exam will be closed book. The exam will consist of a section of short answer questions, followed by longer essay and problem solving questions.

Final exam: As per the University rules, the final exam for this course will be held on May 16 between 10:30am and 12:30pm in CSS2400. The final exam will cover all material discussed in this course. 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.

Students who are ill or have another valid excuse must explain the circumstances to the instructor before the due date of an assignment or exam, and then complete the work within the following week, in order to get full credit. Any illnesses or emergencies need to be properly documented.

Points will not be given for any extra credit projects. It is important to complete all the regular assignments to get the most you can out of the class!

Students with Special Needs

Students with a documented disability who wish to discuss academic accommodations should contact me as soon as possible.

Academic Integrity

The University of Maryland, College Park has a nationally recognized Code of Academic Integrity, administered by the Student Honor Council. University standards regarding academic integrity apply to all work performed for credit in this course, and as a student you are responsible for upholding these standards. Particulars of the University's Code are printed in the Undergraduate Catalog, and a description of what constitutes academic dishonesty is also given in the on-line Schedule of Classes. In brief, the Code requires that you must never engage in acts of academic dishonesty at any time. Acts of academic dishonesty include cheating, fabrication, plagiarism, or helping another person to do any of these things. Violation of the Code carries very serious consequences; for more information, please visit <http://www.shc.umd.edu>.

The rules regarding academic integrity apply to homework as well as to exams. As a part of these rules, you must give credit to any book, published article, or web page that you have used to help you with a particular assignment. These rules also apply to unpublished sources of information. In particular, students are encouraged to discuss assignments and other class material with each other, but every student must personally think through and write up his or her own answers to the homework questions.

To further exhibit your commitment to academic integrity, remember to sign the Honor Pledge on all examinations and assignments:

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

Tentative Course Outline

Class	Date	Lecture	Reading
Part I: History of Cosmology			
#1	Jan 25	Introduction to the course	Ch.1
#2	Jan 27	Geocentric cosmology and astronomy	Ch.2
#3	Feb 01	Renaissance empiricism and the heliocentric model	Ch.2
#4	Feb 03	The Universe of physical law	Ch.3
#5	Feb 08	The age of the Earth and the Cosmos	Ch.3
Part II: Relativity			
#6	Feb 10	Principles of space and time	Ch.6
#7	Feb 15	Special relativity	Ch.7
#8	Feb 17	Special relativity	Ch.7
#9	Feb 22	Special relativity	Ch.7
#10	Feb 24	General relativity	Ch.8
#11	Mar 01	General relativity	Ch.8
#12	Mar 03	Black Holes	Ch.9
Part III: Modern Cosmology			
#13	Mar 18	The Universe beyond our Galaxy	Ch.10
#14	Mar 10	Cosmological expansion	Ch.10
#15	Mar 15	Geometry and evolution of the Universe	Ch.11
–	Mar 17	<i>Midterm Exam: CSS2400, 2:00pm–3:15pm</i>	–
–	Mar 22	SPRING BREAK	–
–	Mar 24	SPRING BREAK	–
#16	Mar 29	Geometry and evolution of the Universe	Ch.11
#17	Mar 31	The Big Bang and early Universe	Ch.12
#18	Apr 05	The Big Bang and early Universe	Ch.12
#19	Apr 07	The Big Bang and early Universe	Ch.12
Part IV: Contemporary Cosmology			
#20	Apr 12	Measurement of cosmological parameters	Ch.13
#21	Apr 14	Measurement of cosmological parameters	Ch.13
#22	Apr 19	Cosmic background radiation	Ch.14
#23	Apr 21	Cosmic background radiation	Ch.14
#24	Apr 26	Dark matter and cosmic structure formation	Ch.15
#25	Apr 02	Cosmic structure: observations	Ch.15
#26	May 04	Cosmic structure: simulations	Ch.15
#27	May 09	Cosmological inflation	Ch.16
#28	May 11	Review session	–
–	May 16	<i>Final exam: CSS2400, 10:30am–12:30am</i>	–