Natural Science I: Cosmos and the Earth V55.0202
Spring 2005 Meyer 121

Tuesday and Thursday
9:30 – 10:45 a.m.
Instructor: Dr. Andre Adler
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Office hour: Monday, 11:00 am to 12:00 pm in Meyer 605

Course Description

This course is an introduction to modern astronomy. Current research in astronomy deals with many questions like: how do galaxies evolve, what is the Universe made of, what is the fate of the Universe, what does the Universe look like on the largest distance scales? All of these questions will be discussed. Stars, white dwarfs, neutrons stars, black holes, galaxies and quasars populate the universe. Exploding stars make the heavier elements and spread them into space to mix and build new stars, planets, and perhaps life. More than one hundred planets orbiting other stars have been discovered. Some stars evolve into bodies that can distort space to such a degree that it gets cut off from the rest of the universe. The basis of modern cosmology is the Big Bang theory. The evidence for this theory will form an important part of the course.

Course Objectives

- Understand how we try to understand the natural world through observation, experimentation, and theory.
- Connect observations on earth to observations made of stars and other astronomical phenomena.
- Show how light is a messenger carrying information about the cosmos.
- Understand how the sun and other stars generate energy.
- See how stars evolve into white dwarfs, neutron stars and black holes.
- Study the properties of the galaxies.
- Tell the story of how the universe started out with mostly hydrogen and helium and evolved stars to forge the heavier elements necessary for life.
- Look at the evidence for the big bang theory.
- Understand the large-scale structure of the Universe.

Course texts

1. *Astronomy Today, Volume II: Stars and Galaxies*, 5th edition, Chaisson and McMillan, *Lecture-Tutorials for Introductory Astronomy*, 2004 edition, Jeffrey Adams, Edward Prather, Timothy Slater, *Edmund Scientific Star and Planet Locator*. These items are bundled together at the NYU Bookstore:
2. *Cosmos and Earth: Laboratory Manual*, 2004.
3. *Personal Response System Transmitter*. Your package of texts, listed above, includes a coupon that will get you a refund of $20 for the cost of the transmitter.

Lectures

Lectures are to help you learn the material, clarify what you are responsible for and to help you succeed on exams. Questions handed out each lecture and will form the basis of what you are responsible for from our twice-weekly meetings. Some of these questions are answered in your books,

but all will be discussed in class. Multiple-choice questions will also be presented in lecture to help prepare you for the examinations.

Personal Response System (PRS)

In order to promote interaction in lecture you will use your personal response system transmitter to respond to a series of questions each lecture. The results of each question are collected by a computer and displayed on a large screen for all to see. This will gauge the classes understanding of important topics.

Course Examinations

The examinations will be based on (1) the lecture questions, (2) exercises contained in *Lecture-Tutorials for Introductory Astronomy* that you will work on in groups in some laboratory sessions, (3) homework questions from *Astronomy Today: Volume II Stars and Galaxies* that are found at the end of each chapter, and (4) worksheets that are done in laboratory.

You will need to bring a calculator to all exams. The exams will be in the multiple-choice format. This format lets one easily determine the number of students who got each question correct.

After the midterm exam I will put a list of problems on the blackboard that had the greatest number of incorrect responses. The cumulative nature of the final exam will be reflected in concepts from the mid-term exam that were the subject of those questions that had the most incorrect responses. The final exam will be cumulative with a design to testing you on concepts from the mid-term exam that the most students had trouble with.

Examination Schedule and Course Grade

Midterm examination:	25%	**Thursday, March 3**
Laboratory:	40%	
Final examination:	35%	**Thursday, May 5, 8:00 – 9:50 am**

Laboratory Sessions

These weekly sessions are an important part of the course. You must be registered for one lab section. You will have to submit a lab report for each experiment performed. The lab report has to include answers to all questions and any data you may have collected. The lab report will be due in lab *one week* after the experiment has been performed. **The laboratory sessions will be held in Silver 203 and will begin on Thursday, January 29**. The laboratory sessions will be devoted to

1. Doing experiments described in your laboratory manual.
2. Doing exercises from the *Lecture-Tutorials for Introductory Astronomy* volume.
3. Discussing the homework problems.

You must bring the *Lecture-Tutorials for Introductory Astronomy* book to laboratory sessions devoted to those assignments.

Laboratory Schedule					
Section	**Day**	**Time**	**Section**	**Day**	**Time**
2	Tuesday	11:00 – 12:40 p.m.	6	Wednesday	9:00 – 10:40 a.m.
3	Tuesday	1:00 – 2:40 p.m.	7	Wednesday	11:00 – 12:40 p.m.
4	Tuesday	3:00 – 4:40 p.m.	8	Wednesday	1:00 – 2:40 p.m.
5	Tuesday	5:00 – 6:40 p.m.	9	Wednesday	3:00 – 4:40 p.m.

Attendance The lab instructor will deduct points from your lab grade for arriving late or leaving early.

Absence Policy Excused absences will only be given in the case of illness (with a doctor's note) or observation of a religious holiday. You must notify your lab instructor in advance in writing if you miss a lab due to religious reasons. All other absences will be considered unexcused and will result in a lab grade of zero. **You cannot make up a lab by attending a laboratory session that you are not registered for.**

Late Assignments Late assignments will be penalized for each day late (excluding weekends). If you wish to submit a late lab report you must do so only at your laboratory instructor's office.

Lab Instructors Each lab instructor will hold a weekly office hour where you can discuss lecture and laboratory material. Office locations and office hour time and day will be announced during the first laboratory session.

Samuela Pasquali Email: samuela.pasquali@physics.nyu.edu	Sebastian Pueblas Email: sebastian.pueblas@physics.nyu.edu
Hector Crocce Email: hector.crocce@physics.nyu.edu	Mohammad Rakibur Rahman Email: rakibur.rahman@physics.nyu.edu

Homework

Homework assignments will be given out in class. Homework assignments are to help you understand the material and to prepare you for course examinations. They will not be graded, but you will be asked to show your homework to your lab instructor each week to show that you are keeping up with the coursework. Homework problems will be reviewed in laboratory sections.

Missed Exams

There are no make-up exams for students who miss the mid-term exam. If you miss an exam because of illness, you must contact Dr. Adler by phone or email **before** the start of the exam and follow up with a doctor's note. If you miss an examination, for a valid reason (illness, injury or family emergency), your grade will be based on the following allocations:

Laboratory:	40%
Final examination (cumulative):	60%

Final Exam A make-up for the final examination will be given under exceptional circumstances, which must be discussed with Dr. Adler before the examination. A doctor's note must be provided in the case of illness. In this case a grade of incomplete will be assigned and **the make-up will be scheduled for the beginning of the Fall 2005 semester**. Please avoid making travel plans before the date of the final exam. No alternative date for the final examination will be offered before the end of the Spring 2005 semester.

Religious Holidays If you will be absent for a religious holiday during the semester, you must inform your lab instructor and Dr. Adler in advance.

Class Web Site

A web site for this class exists and is accessible through your *NYUHome* account or by going to http://classes.nyu.edu and logging on using your netID and the same password as that of your NYU email account. You must have an active NYU email account to access the site.

Tentative Weekly Schedule of Topics, Readings and Laboratories

Date	***Lecture Topic***	***Reading***	***Weekly Lab***
T Jan 18	Charting the Heavens I	Chapter 1	No Lab
R Jan 20	Charting the Heavens II	Chapter 1	
T Jan 25	The Copernican Revolution	Chapter 2	The Night Sky – Computer Simulations
R Jan 27	Radiation	Chapter 3	
T Feb 1	Spectroscopy	Chapter 4	Young's Experiment/ Lecture Tutorials
R Feb 3	The Sun	Chapter 16	
T Feb 8	The Sun	Chapter 16	Lecture Tutorials
R Feb 10	Red Giants and White Dwarfs	Chapter 17	
T Feb 15	Red Giants and White Dwarfs	Chapter 17	Spectroscopy
R Feb 17	The Interstellar Medium	Chapter 18	
T Feb 22	Star Formation	Chapter 19	Lecture Tutorials
R Feb 24	Stellar Evolution	Chapter 20	
T Mar 1	Stellar Evolution	Chapter 20	Lecture Tutorials
R Mar 3	☹ **Exam** ☹		
T Mar 8	Stellar Explosions	Chapter 21	Polarization of Light
R Mar 10	Stellar Explosions	Chapter 21	
T Mar 15	☺ **Spring Break** ☺		
R Mar 17	☺ **Spring Break** ☺		
T Mar 22	Neutron Stars and Black Holes	Chapter 22	Lecture Tutorials
R Mar 24	Neutron Stars and Black Holes	Chapter 22	
T Mar 29	Galaxies and Cosmology	Chapter 23	Lecture Tutorials
R Mar 31	Galaxies and Cosmology	Chapter 23	
T Apr 5	Normal and Active Galaxies	Chapter 24	Principle of Equivalence
R Apr 7	Galaxies and Dark Matter	Chapter 25	
T Apr 12	Galaxies and Dark Matter	Chapter 25	Lecture Tutorials
R Apr 14	Cosmology: The Big Bang and the Fate of the Universe	Chapter 26	
T Apr 19	Cosmology: The Big Bang and the Fate of the Universe	Chapter 26	Cosmic Redshift
R Apr 21	The Early Universe: Toward the Beginning of Time	Chapter 27	
T Apr 26	The Early Universe: Toward the Beginning of Time	Chapter 27	Hubble's Law
R Apr 28	Review		