Prof Robert L. Zimmerman  
Elementary Astronomy, ASTR 123  
Cosmology  
The Evolution of Galaxies and the Universe  
Spring 2006, Lil Room 182 9:00-9:50 M, W, F

Prof Robert L. Zimmerman: Office WJ 448, bcb@zim.uoregon.edu  
Office Hours: 10:30-12:30 M, W, & F  
Web page for the class: http://darkwing.uoregon.edu/~phys600

Graders:  
Timothy M Sweeney Office Hr: To be announced tsweeney@uoregon.edu  
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Web page for the Text http://www.prenhall.com/chaisson

Approximate Outline

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
<th>Reading (chapters)</th>
<th>Assign</th>
<th>Tests</th>
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<tr>
<td>1 (4/3)</td>
<td>Overview and Introduction</td>
<td>23</td>
<td>Assign #1</td>
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<td>2 (4/10)</td>
<td>The Milky Way Galaxy</td>
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<td>Assign #2 TEST #1(4/21,Fri)</td>
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<td>3 (4/17)</td>
<td>Normal Galaxies</td>
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<td>Assign #3</td>
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<td>4 (4/24)</td>
<td>Normal Galaxies</td>
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<td>5 (5/1)</td>
<td>Active Galaxies and Quasars</td>
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<td>6 (5/8)</td>
<td>Active Galaxies and Quasars</td>
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<td>Assign #6</td>
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<td>7 (5/15)</td>
<td>Cosmology</td>
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<td>Assign #7 (due 5/31)</td>
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<td>8 (5/22)</td>
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<td>Monday 5/29-Memorial Day holiday</td>
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<td>9 (5/31)</td>
<td>The Early Universe</td>
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<td>TEST #3 (6/2 Fri)</td>
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<td>10 (6/5)</td>
<td>Dead Week, Life in the Universe</td>
<td>28</td>
<td>(if time permits)</td>
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<tr>
<td>11 Final</td>
<td>Thursday 10:15 (June 15, 2006)</td>
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Midterm Exams: There will be three weekly exams and one final. Each weekly exam is worth 40 points and covers only the material to the previous exam. The test questions come from the lectures and book. There will not be any makeup exams because your grade is based on your two best scores.

Final: The final is worth 80 points and covers the complete term. The questions for the final are comprehensive but are closely related to the questions covered in the three midterm tests and the last week of lectures. You must take the final!

Web Assignments: There will be a "Web Assignment" about once each week. The Web assignments are designed to expand your exposure to astronomy and to the latest findings. There is two parts to the assignment: i. In part one you are asked to explain some basic concepts ii. In part
two you are asked to return various images with brief explanations of the images. All images must be placed in a word processor and under the pictures you must include a brief description of the image and the URL where you located the image. You only get full credit if the assignment is handed in on time and it is complete. You must do your own work and you must personally hand in your own paper. You cannot copy or Xerox another person's report and replace their name with yours even if you do the assignment together! A reduction of points will occur if it is not turned in on time, not done with a word processor, or it is Xeroxed from another paper. The web assignment is worth approximately 6 or so points.

Returned Work: All work will be returned in the basement of Willamette Hall. At the bottom of the stairs there are shelves where your work will be returned.

Attendance: Attendance is REQUIRED. To encourage attendance short questions worth about four points may be asked during the term.

Extra Credit: You may write a report for extra credit. The report must consist of no less than 4 double spaced pages (not including pictures) on any topic covered during the term (The Galaxies, Active Galaxies, Quasars or Cosmology). The material can come from the Web. Add pictures from the Web to your paper. You must cite the web URLs used in your report and images. The report is due the last class lecture of dead week. The extra credit does not give you any additional points but if you are on the borderline it may increase your final grade. The extra credit may increase your grade by changing an F+ to a D-, a D+ to a C-, B+ to A and etc. The extra credit is strongly advised. Grades: Your class score will be determined by throwing away your lowest midterm test and then adding all of your points (All Web Assignments +two midterm tests +Attendance Questions+ Final). Your grade will then be based on a class curve made from the total points.
Astronomy 123
Fall Quarter 2004

Prof. James Schomberg
Office: 461 Willamette, 6-5214
Office Hours: 9-10am MWF (or drop in any blank time on my schedule)
email: js@abyss.uoregon.edu

Course Content:

The past 10 years has seen an explosion in our understanding of the contents, formation and evolution of the Universe. Changes in our fundamental physics, combined with discoveries from space and ground-based telescopes, have led to a radically different model of our place in the Universe and its origins. The field of cosmology is science's newest endeavor into the most basic questions of humankind's existence; where do we come from and what is our fate? Cosmology is the meeting point of observational astronomy, philosophy and particle physics. However, unlike philosophy, cosmology engages Nature providing a foundation based in observation and experience.

The specific goals of this class are to:

- To gain an understanding of basic science that underlies Astronomy (the forum is modern cosmology).
- To explore the properties of the objects that make up our Universe.
- To formulate a coherent philosophy for interpreting the observational evidence of the hot Big Bang and relating this worldview to new areas of research.

This course requires a basic understanding of mathematics. Please read the requirements for this course and if you feel you do not have the appropriate skills, please do *not* take this class.

Course Organization:

All lectures in this course will be delivered electronically. The lecture pages will be on the Web in HTML (hypertext mark-up language) format so that they are accessible from any computer, either at home or on campus. The address for this course is abyss.uoregon.edu/~js/astr123.

We are using the computer network in this class for several reasons:

- Network literacy is a key college skill.
- Since the course material is always available, there is less of a need to scramble to take notes during class. You can focus on paying attention. I recommend printing the week's lectures on Sunday, and bringing those pages to class to jot your own notes in the margins.
- There is lots of material out there on the Internet which is relevant for this class. Each lecture has assigned web reading (Found at the top of each lecture page).

Even though the web notes replace the need for a textbook, they do not replace your need to attend class. A great deal of material is discussed in lecture that is not in the web notes and will appear on the exams. And difficult concepts in the web lectures will be clarified in class. So please attend.
Use the email system. Often professors only hear from students through office hours, and those students are usually the ones having trouble in the course. When you study or review your notes, send me questions by email. Also email me suggestions and comments about the course, particularly in the first few weeks in order to have an impact during the term.

Grading:

Grading will consist of the following:

- Three exams worth 2/3 of your grade (100 points each)
- On-line quizzes for every lecture (26 of them) worth 1/3 of your grade

The three exams are large, difficult multiple choice exams. Each exam covers 1/3 of the course. The exams are designed using material from the quizzes and lectures, so mastery of both is required for a good grade. Not taking an exam will automatically fail you from the course.

It's very useful not to wait till the last minute to study for an exam. If you miss an exam due to illness you must contact me as soon as possible after the exam and before the next exam. Missing an exam for a good reason usually means an oral make-up exam (these are torture, so you want to avoid missing an exam at all costs). You must take the make-up exam *before* the next exam.

Notice there is no final exam during final exam week. The three exams taking during the term consist of all the exams towards your grade.
Your grade will be based on the sum of the quiz and exam scores. Note: you must maintain a score of 35% or better on each exam to pass the course. Above 35%, your grade will be determined by the grading curve shown above. Also, skipping exams without excuse will earn you an 'F'.

After the first few quizzes, a class ranking will be determined and you can estimate your current grade from this ranking. Note that this ranking will change as your scores go up (or down). It is highly unlikely that your ranking in the first couple weeks of the class will reflect your final grade.

**On-line Quizzes:**

In order to get you to engage the lectures, the class has a quiz system at each web lecture. At the bottom of each lecture you will find a "quiz" button. Hit it and take a quiz of 10 questions. You can restart a quiz and any point, take it with open book, notes or web pages.

These quiz questions count the same as an exam question. Your final grade will be based on the exam scores plus quiz scores. Not doing the quizzes will be the same as not taking an exam. You will find that the quiz material comes from the web lectures and things discussed in class.

NOTE, you have only a limited window to take the quiz, the schedule is posted on the class web page (typically you have a few days after the lecture). Miss the date and you will be unable to take the quiz (the point of the quizzes is to get you to study before the night of the exams, hence the deadline). The quiz answers and scores are posted after the deadline. For this reason you cannot submit your quiz answers late. The answers are posted and late submission will not be allowed regardless of the excuse.

Due to the large number of quizzes, it is highly likely that you will miss a quiz deadline or your dog will eat the Internet the night before they are due. Thus, each student will be allowed to drop the three lowest quiz scores for the final grade. If you miss three quizzes, then those three zeros are dropped. If you answer all the quizzes on time, then your three lowest scores will be dropped. If you miss more than six quizzes you will be dropped 1/3 a letter grade (i.e. B+ to B) per group of three that you miss.

To summarize:

1. Quizzes are on-line and mandatory
2. The deadlines are posted on the main web page
3. Answers and scores are posted immediately after the deadline
4. No late quizzes will be accepted, none, zip, zero
5. You can drop your lowest three quiz scores (these might be the three you missed and got zeros)
Optional Textbook:

Some students are uncomfortable with a pure web-based course and would prefer a textbook to study. A good astronomy textbook is available in the bookstore called 'Astronomy Today' by Chaisson and McMillan. If you find the material on the web is insufficient, I recommend this textbook. The following chapters correspond to the class lectures:

<table>
<thead>
<tr>
<th>Lecture</th>
<th>Chapter</th>
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<tbody>
<tr>
<td>Lectures 1-3</td>
<td>Chapter 2</td>
</tr>
<tr>
<td>Lectures 4-6</td>
<td>Chapters 3 and 4</td>
</tr>
<tr>
<td>Lectures 7-9</td>
<td>Chapter 22</td>
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<tr>
<td>Lectures 11-12</td>
<td>Chapter 27</td>
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<tr>
<td>Lectures 13-15</td>
<td>Chapter 24</td>
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<td>Lectures 16-19</td>
<td>Chapters 25 and 26</td>
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<tr>
<td>Lectures 21-28</td>
<td>Chapter 27</td>
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I also recommend a new book, "Cosmology" by Harrison. More in depth, but well worth the read.

Academic Honesty:

A recent survey of UOregon upperclassmen has indicated that 91% admit to cheating on a written assignment or exam. Every effort will be made in this class to deter dishonesty through classroom procedures. You are all welcome to work in groups on Homework assignments, however exams must be based on individual work only (i.e. don't look at someone else's exam). It is degrading to impose draconian security measures to enforce honesty. Instead, we will use the honor system in this course and allow each of you to uphold your personal standards of conduct. For those of you who have failed to develop your own ethics, the University has designed the Student Conduct Program. To also help you down the ethical path, anyone caught cheating will receive an 'F' for the course.

Accommodations:

If you have a documented disability and anticipate needing accommodations in this course, please see me as soon as possible. And please request that the Counselor for Students with Disabilities (H. Gerdes, hgerdes@oregon) send a letter verifying your disability.
Astronomy 123: Galaxies and the Expanding Universe

Administrative:

Syllabus
Frequently Asked Questions about AST123
Schombert's Schedule
Academic Calendar

Math Anxiety
What to Study?
Why Big Lecture#Classes?
Academic Learning Services

Internet Resources:

Solar System Live
Unit Converter

21st Century Science
Astronomy/Physics Glossary
AST121: The Solar System

Astronomy Web Textbook
Temperature Scale

Greek Alphabet
Exponents and Logarithms

AST122: Birth and Death of Stars

Lectures:

Week 01:
1. Ancient Cosmology
2. Medieval Cosmology
3. Newtonian Cosmology
4. Atomic Theory

Week 02:
5. Clockwork Universe
6. Quantum Physics

Week 03:
7. The Big Bang
8. Inflation

Week 04:
10. The Geometry of the Universe
11. Geometry of the Universe
12. Geometry of the Universe

Week 05:
13. Cosmic Evolution
14. Creation

Week 06:
15. Geometry of the Universe

Week 07:
17. Early Universe
18. Inflation

May 18: Exam #2
7. Elementary Particles
8. Relativity

Week 03:
Apr 25: Exam #1

10. Milky Way
11. Hubble Sequence

Week 04:
12. Quasars
13. Distance Scale

19. Anthropic Principle
20. Baryogenesis
21. Nuc.cosynthesis
22. Neutrinos

Week 08:

23. Cosmic Background
24. Large Scale Structure

Week 09:

25. Galaxy Formation
26. Fate of the Universe

Week 10:
Jun 8: Exam #3

Quiz Schedule:

Quiz #01/Lecture#01 - Apr 09
Quiz #02/Lecture#02 - Apr 09
Quiz #03/Lecture#03 - Apr 09
Quiz #04/Lecture#04 - Apr 16
Quiz #05/Lecture#05 - Apr 16
Quiz #06/Lecture#06 - Apr 16
Quiz #07/Lecture#07 - Apr 23
Quiz #08/Lecture#08 - Apr 23
Quiz #09/Lecture#09 - Apr 23
Quiz #10/Lecture#10 - Apr 30
Quiz #11/Lecture#11 - May 07
Quiz #12/Lecture#12 - May 07
Quiz #13/Lecture#13 - May 07

Quiz #14/Lecture#14 - May 14
Quiz #15/Lecture#15 - May 14
Quiz #16/Lecture#16 - May 14
Quiz #17/Lecture#17 - May 17
Quiz #18/Lecture#18 - May 17
Quiz #19/Lecture#19 - May 28
Quiz #20/Lecture#20 - May 28
Quiz #21/Lecture#21 - May 28
Quiz #22/Lecture#22 - Jun 04
Quiz #23/Lecture#23 - Jun 04
Quiz #24/Lecture#24 - Jun 04
Quiz #25/Lecture#25 - Jun 07
Quiz #26/Lecture#26 - Jun 07

All quizzes must be done by midnight of the dates listed above

Scores and answers will be available after each deadline.

Exam and Quiz Scores:

What is my current grade?

The background graphic of these pages is from a chart in Johannes Kepler's 1606 celestial atlas entitled De Stella Nova.