

ASTRONOMY 264
SPRING 2008
PURDUE UNIVERSITY
IAN SHIPSEY

INTRODUCTORY INFORMATION PACKAGE

GENERAL COURSE INFORMATION
SYLLABUS AND SCHEDULE

AST 264 Spring 2008

Purdue University

Course Information

Lecturer: Prof. Ian Shipsey

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Course Webpage: http://www.physics.purdue.edu/academic_programs/courses/astr264/

Lecture Text: The Cosmic Perspective 5th Edition

Jeffrey Bennett, Megan Donahue, Nicholas Schneider, Mark Voit

Pearson/ Addison Wesley

ISBN-13:978-0-321-50618-4

Lab Text: "Introductory Astronomy Laboratory Manual"

Ian Shipsey, Jennifer Coy, Ben MacCall

McGraw-Hill 6th Edition ISBN 0-07-353949-X (2004)

Introduction

Welcome to astronomy 264! We sincerely hope you enjoy this course and learn a great deal from it.

The night sky is an astonishingly beautiful sight, from which primitive man derived spiritual inspiration, while our more advanced civilization derives a scientific understanding of the Universe. Today, of all the physical sciences, astronomy generates perhaps the most public interest. Part of this is no doubt due to its accessible character, embodied in, for example, the stunning pictures from the Hubble Space Telescope. Another and greater part of the appeal of astronomy remains undeniably spiritual, almost everyone would like to know how the Universe came into being and if other advanced life forms exist the Universe.

The appeal of astronomy is reflected in the large enrollment in introductory astronomy courses offered at universities. The purpose of these courses is provide a sufficiently

broad and deep background in astronomy, to allow a participant to subsequently critically follow current and new developments in the field for the foreseeable future.

Astronomy is an observational science. Progress in understanding the Universe is based upon:(a) the development and application of advanced technology to observe the Universe and (b) interpretation of astronomical observations in the context of other sciences such as physics, chemistry, earth science etc. Although astronomy is perhaps the oldest science most of the important developments have occurred in the last thirty years.

This course is the second semester of a two semester sequence with the emphasis placed upon stellar astronomy and cosmology, the study of stars and the nature and origin of the Universe. (The first semester of this course, Astr 263, concentrates on the Solar System.) However Astr 264 is self-contained and Astr263 is not a prerequisite.

The Lecture and Syllabus

There are two components to ASTR264 a lecture and a laboratory. The lecture will serve three purposes. First it is intended to supplement the material covered in the text and to help clarify the concepts the text introduces. Second the lecture will extend the concepts found in the text where it is appropriate and interesting to do so. Third, the lecture is an opportunity to discuss the latest discoveries in astronomy as they happen.

The syllabus for the course is defined by the content of the lectures and the textbook with emphasis on the lectures. The lectures will closely follow the nomenclature and order of the text. To get the most benefit from the lecture, before class read the relevant material from the text as assigned in the lecture schedule/syllabus. As this is a survey course we are required to cover a large number of topics at a rapid pace, about one chapter every week. Due to severe time constraints it will not be possible to cover all of the material discussed in the textbook in class. You will find it necessary to read and understand various sections of the textbook on your own or with the help of classmates to complete some of the exam questions.

While we intend to hold to the lecture schedule, it is likely we will get ahead or behind on the schedule as the course progresses.

Class hours are Tuesday and Thursday at 12:30 p.m. - 1:20 p.m. in Class of 1950. We hope you will attend lectures because you find them valuable and interesting. There will be no attendance taken in lectures and no surprise quizzes either. You should know, however, that based on grades in ASTR264 in previous years there is a very strong correlation between lecture attendance and a good grade for the course.

The class is expected to participate in lectures through an audience response system. The system we will use is not electronic clickers but traditional: the audience will be asked a question and they will indicate which response they believe to be correct by a show of

hands. Question asked in lecture will often be repeated on the exam. Active participation is essential to maximize understanding. In an astronomy course reasoning skills and understanding tend to be more important than memorization.

Exams and Grades

The grade for the course will be computed by adding the points from each component of the course as shown in the table below. During the semester check that the exam scores and the lab scores, and at the end of the semester, the Final Exam score are entered correctly into the CHIP grade book. It is the student's responsibility to bring any problems with grades to the attention of Glynn Bricker as soon as possible after the problem is found.

Exam 1	100 pts.
Exam 2	100 pts.
Final Exam (comprehensive)	200 pts.
Laboratory	100pts.
TOTAL	500 pts.

If the exams have average difficulty, i.e. a mean of about 70%, the grade cut offs are expected to be close to those shown in the table below.

Letter grade	Range in %	Range in points
A	84-100	420-500
B	74-83	370-419
C	64-73	320-369
D	54-63	270-319
F	0-53	0-269

The grading distribution in ASTR 263 and ASTR 264 averaged over the past few semesters has been:

A : 25% B: 30% C: 26% D: 10% F: 9%

The usual causes of an F include dropping the course but remaining registered, failure to attend a significant number of lectures resulting in low exam scores, missing several exams, or failure to pass the laboratory component of the course.

All exams are in multiple choice format and will have some questions very similar to the in class questions. Exam 1 and Exam 2 are 45 minute in-class exams, the Final Exam will be of 90 minutes duration held during Finals Week. Exams will be closed book. There is no need to remember formulae as Formulae Sheets will be provided. The two in-class exams will concentrate on the material in the part of the course directly preceding the exam.

Exam 1 12:30-1:20 p.m. 2/12/2007 CL1950

Exam 2 12:30-1:20 p.m. 3/20/2007 CL1950

The Final Exam will cover material from the entire course. The date and location of the final exam will be announced by the Office of Schedules and Space around the middle of the semester.

Everyone now and then performs below their best on an exam. To allow for this if the percentage score on the final is higher than on exam 1 or exam 2, half the points earned on the final will be substituted for the score on exam 1 or 2, whichever exam has the lower score. Note that this procedure is always to the advantage of the student as it can only increase the number of points earned never reduce the number of points.

THERE WILL BE NO MAKEUP EXAMS. If Exam 1 or Exam 2 is missed for any reason half of the Final Exam score will be substituted for the missed exam. If both Exam 1 and Exam 2 are missed only one of the zeros will be replaced by $\frac{1}{2}$ the Final Exam score.

It is essential to pass the lab, which means to receive at least 50 of the possible 100 lab points to pass the course. Usually, at least 95% of students pass the lab.

The best strategy for achieving success in the course is to read the material in the text prior to coming to the lecture and taking notes on the discussion in lecture. If there are issues that you feel require clarification, we will always ask if there are questions at the beginning of lecture, and during the lecture, by all means ask your questions at that time. The whole class will benefit from the discussion that ensues as a result of the questions. Also please take advantage of office hours, we are always happy to see you.

About the Lecturer

Professor Ian Shipsey. I am an experimental particle physicist. I have had a passion for astronomy since I was seven. Astronomy and particle physics are very closely related. Both subjects seek to learn how the Universe was born, how it will evolve and how it will end. Astronomers do this by observing the largest objects in the Universe including galaxies, clusters of galaxies and large scale structures. Particle physicists on the other hand attempt to explain the Universe by observing the very smallest objects in it such as quarks, (protons are made of quarks), electrons and neutrinos. I am a member of several large multi-university research collaborations operating experiments at atom-smashers at Cornell University in New York State and at The European Laboratory for Particle Physics (CERN) in Geneva, Switzerland recreating the conditions, and the particles, that existed in the fireball shortly after the Big Bang that gave birth to the Universe. I build digital cameras to see the particles and recently began to apply this skill to building the world's largest digital camera for a new astronomy experiment: the Large Synoptic Survey Telescope.

Unlike most professors at Purdue, I am profoundly deaf. I can hear thanks to the miracle of a cochlear implant. I received the implant at the end of 2002 at Riley Hospital for

Children in Indianapolis. The implant has enabled me to hear my wife's voice for the first time in twelve years and my daughter's voice for the first time ever. Although my hearing is very good it is not as good as a person with normal hearing. There are two options for asking questions. (1) Call out your question, if you are sitting in the first fifteen rows I will probably hear you. The second way is to write down the question and pass it up to me. I will read your question aloud and then answer it. This procedure works well and has the advantage of being anonymous. Please don't feel inhibited about asking questions. My office is Physics 370A. The easiest way to reach me is through the high energy physics office secretaries:

Emjai Gregory (egregor@purdue.edu) Physics 370B 494-5391

About the Second Lecturer

Andy Irrgang. I am a third year graduate student in physics at Purdue University. Similar to Professor Shipsey, I am interested in the most fundamental aspects of our world and am pursuing research that will hopefully shed new light on some of today's biggest mysteries. I have also always had a passion for astronomy. From simply observing the sky to understanding the physics that drive stars, galaxies, and everything else out there, astronomy is one of the most interesting fields of science.

My main role in this course will be to serve as Head Teaching Assistant for the Laboratory sections of the course. However, on the occasions that Professor Shipsey is away during the semester, I will also lecture. During my lectures, please feel free to call out any questions as well as submit questions in writing if you wish.

By far the best way to contact me is through email.

Lecturer Office Hours

12:30-1:20 p.m. on Tuesday and Thursday. Both Ian Shipsey (mostly) and Andy Irrgang will lecture. The lecturer of the day will hold lecture office hours for the hour immediately after lecture. In this way two office hours are provided every week. Note that only one lecturer will be available for each office hour. If these times are not convenient, please contact Ian or Andy to make an appointment.

Homework and Self-Study

There will be no homework. However, in addition to reading the text book, the publisher of the textbook provides a very interesting web site www.masteringastronomy.com containing interactive, self-study activities that have already been used by more than 100,000 students across the country. We encourage use of this site. Access is free to those that have purchased a new copy of the text book.

Course Web Site & Lab Web Site

There is a departmental course web site

www.physics.purdue.edu/academic_programs/courses/astr264/

This site contains important announcements about the lectures, and links to the syllabus, lecture notes, practice exams, solutions to exams, and formulae sheets. There is also a laboratory site reached by a link on the course web site or directly

www.physics.purdue.edu/academic_programs/courses/astr264l/

This site contains lots of useful information about the lab, including important announcements, lots of interesting and useful links to astronomy and space sites around the world, and local observing information. Please provide feedback on how useful you find these web sites to be.

Lecture Notes

These will be posted on the course web site before each lecture starting with lecture 2. The purpose of posting before lecture is to save the student taking copious notes. Most students find it helpful to print the notes before lecture and annotate them during lecture, or follow along on a laptop during class. The posted format is black and white pdf. The notes can be printed one slide to single sheet of paper or multiple slides can be printed to a single sheet

CD-ROM of Textbook and Planetarium Software

A CD ROM of the textbook content is included with the text book. Let me know if you find it useful. A CD-Rom of a version of the program Starry Night Pro is also included with the textbook. This combines, arguably the world's most realistic desktop planetarium software with informative pre-packaged tutorials. Recommended activities are at the end of each chapter of the course book. Starry Night Pro software is also used in the astronomy laboratory component of the course.

The Lab

At most major research universities introductory astronomy courses have a lecture only, however Purdue is one of the few large universities that also includes a laboratory component in the introductory astronomy courses. The laboratory experience is often much more direct than that which can be accomplished in a lecture theatre and thereby plays an important role in achieving the goals of the course.

To accommodate the large enrollment in the course part of the class meets each weekday night, Monday through Thursday, in lab sections of about 30 students. The primary aim of the laboratory is to enhance and make permanent the learning experience by providing an appreciation of the night sky. We achieve this through a variety of complementary activities. Every week there is a focus on one constellation. On clear nights one section travels to the campus observatory where small telescopes are used to observe and sketch the planets and stars. The other section(s) travel to a dark site in the countryside where an emphasis is placed naked eye constellation and planet recognition.

About two thirds of the time, the weather is not good enough to observe the night sky and so indoor labs are held instead. These include building a simple telescope like Galileo's, determining the composition of stars using spectroscopes, extensive use of a software planetarium, (the same planetarium that is packaged with the textbook) a www tour of the solar system, and determining the age of the universe. The complete logistical details of the lab will be explained by the lab TA's during the first two lab sessions.

LECTURE SCHEDULE AST 264, 2008 Ian Shipsey

DATE	TOPIC	CHAPTER OF BOOK
1/8	(1) Introduction & Our Place in the Universe	1
1/10	(2) Our Place in the Universe II	1
1/15	(3) Copernican Revolution & The Nature of Science	3
1/17	(4) Understanding Motion, Energy & Gravity I	4
1/22	(5) Understanding Motion, Energy & Gravity II	4
1/24	(6) Light and Matter	5
1/29	(7) Light and Matter	5
1/31	(8) Telescopes	6
2/5	(9) The Sun	14
2/7	Catch-up & Review for Exam I	
2/12	Exam I	1, 3, 4, 5, 6
2/14	(10) The Sun	14
2/19	(11) A Survey of the Stars I	15
2/21	(12) A Survey of the Stars II	15
2/26	(13) Star Birth	16
2/28	(14) Star Stuff I	17
3/4	(15) Star Stuff II	17
3/6	(16) The Bizarre Stellar Graveyard I	18
3/18	Catch-up & Review for Exam II	
3/20	Exam II	14, 15, 16, 17, 18 (part)
3/25	(17) The Bizarre Stellar Graveyard II	18
3/27	(18) Our Galaxy	19
4/1	(19) Galaxies & Mod. Cosmology I	20
4/3	(20) Galaxies & Mod. Cosmology I	20
4/8	(21) The Dark Side (I)	22
4/10	(22) The Dark Side (II)	22
4/15	(23) The Beginning of Time (I)	23
4/17	(24) The Beginning of Time (II)	23
4/22	(25) Catch-up or Life in the Universe	24
4/24	Catch-up & Review for the Final Exam	Comprehensive

