

Astronomy 301—Scalo
Unique number 50410
Introduction to Astronomy

Classroom and time: Welch Hall 3.502, MWF 12-1

Professor: John Scalo

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Office hours (tentative): MW 1:30-3, W 5-6, or by appointment (my hours are very flexible, and I am more than willing to come in at other times). However I urge you to feel free to call me at my home or, or to talk to me after class (outside the classroom, if necessary—I have free time after most of our classes except on Wednesdays); for short questions there is usually no need for you to walk all the way to my office, and I welcome phone calls at home—it is an extremely efficient way for us to communicate while a particular question or problem is on your mind. Email is much less efficient and I usually cannot take enough time to give adequate answers to scientific questions by email, although it is fine for non-subject matter communication.

Teaching Assistant: Amy Forestell

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Office hours: TBA, other times by appointment

Textbook: Chaisson, E. and McMillan, S. *Astronomy Today, 5th Edition*

It is important that you purchase the 5th Edition. There are some used copies available, or try bestbookbuys.com to shop around online. It is not essential that the book contains its cd-rom. The textbook is expensive, but several Astronomy Department faculty members use this book, so it has resale value.

Course web page You can navigate to it through

<http://www.as.utexas.edu/astronomy/education/fall06/scalo/301.html>

The course website will contain the syllabus; an outline of most class lectures (usually as pdf files); a way for you to easily check your exam scores (link to eGradebook); and a simple way for me to distribute handouts or make slight revisions to the reading assignments or subsections covered on exams. I urge you to check the website often, and keep the url in a handy place.

Grading

Exams: 100% of your grade will be based on 7 exams (about one every two weeks, beginning with Monday, Sept. 18. All exams will be weighted equally *except* that your lowest exam score will only receive a weight of 1/2 compared to the others. So you have to take all the exams, but if you have an off day (or week, etc.) it won't hurt your final grade too much. The topics and dates of the exams (tentative—any changes will be announced heavily in class and at the class website) are listed below. There will be no comprehensive final. The exams will probably consist entirely of multiple choice questions, depending on class size. I will try to prepare you for the nature of the exam questions by occasionally giving sample questions during lectures, by trying to point out the types of information that I expect you to understand or remember, and giving examples on review sheets. There is an excellent multiple choice interactive self-testing part of the text web site (<http://www.prenhall.com/chaisson>) that I urge you to use, since the exam questions will be of that form, and some will be taken from this source. (Click on Astronomy Today 5/e, then Study Guide for each chapter.) I will suggest which questions to try on review sheets before each exam.

In case of medical or other non-academic emergencies or situations, contact me as early as possible—it may be possible for you to take an exam a day or so early or late in these cases (but not for academic reasons).

We will try to get exam grades available to you through the UT e-Gradebook system (at <https://utdirect.utexas.edu/dija/egb/>) within one or two days of the time of the exam. Often you should be able to get your exam grades on the same day (or evening) as you take the exam.

Homework: There is homework in this class, but it won't be turned in. Instead the homework consists of a subset of the questions at the end of each chapter and especially on the interactive multiple choice self-testing part of the text web site. The purposes of the homework are to give you a way of testing your understanding of the material, to provide a guide to the most important concepts, and to force you to keep up with the material. Although the homework will not be turned in or graded, you will find that your exam grades suffer significantly if you do not attempt to work through these assignments, especially since I will include some of them on each exam.

Final grades: Final grades are assigned on the basis of A=87-100, B=78-86.9, C=67-77.9, D=55-66.9, F<55. Final percentages will not be "rounded up." For example, if you end up with a 77.8, you will receive a C. There is no possibility of "extra credit" in any case because of the class size—I would have to offer the same opportunity to all students.

Departmental policies: Please download and read the "Memo to Undergraduate Astronomy Students regarding Astronomy Courses" at <http://www.as.utexas.edu/astronomy/education/courses.html> if you did not receive it in class.

Just under the cutoff? If at the end of the semester you are just under the cutoff for a grade (by, say, one, or two, or 0.3, percentage points), whether you are just under a D, say, or an A, do *not* call Prof. Scalo asking him to lower the cutoff--this is unfair to all concerned. Cutoffs will *not* be lowered to accommodate your individual score. Scores at the end of the semester are *not* rounded up, so, for example, a 77.7 will get you a C.

Special requests

If you have *any* special request of *any* sort (excluding those not allowed, like lowering the grade cutoff), please put the request in writing, preferably by email, or call me on the phone. Please state clearly and explicitly your request and why it is reasonable. Include a phone number so that I can contact you about your request. Obviously (I hope) this procedure does not apply to minor requests such as "Could you write a little larger on the board?," etc. Any suggestions for improvement of the class as we proceed will be greatly appreciated—an email is usually the easiest way.

Attendance: Although I will not take attendance records, you should keep in mind that the exams are based heavily on the lecture material (as well as the textbook), and that the "notes" that I will usually make available to you are only bare outlines or abstracts of my lectures. The biggest single danger in this course is to fall far enough behind, either through lack of reading or spotty attendance, that you cannot really understand the material being covered. I therefore urge you to attend all classes.

Suggestions for success: Read ahead before each lecture: take class notes: after studying the material, do assigned "homework" questions: and most importantly, look at material as often as possible, even if it means 15 minutes every day.

Dropping the course (see <http://www.utexas.edu/student/registrar/05-06long.html> and *General Information*, ch.4, for details of required approvals).

The 12th class day, Friday Sept. 15, is the last day to add or drop courses without penalty and to receive a refund; you can drop by phone but must add through the department. Wed. Sept. 27 is the last day a Q drop may be obtained (with Dean's approval) without the instructor's permission, except for urgent and substantial nonacademic reasons. After the end of the 4th week of class, and until the deadline for dropping courses (Wed., Oct. 25), a student wishing to drop a course will ask the instructor to complete a drop form that assigns a Q (ONLY if average grade is D or better) or an F. After Oct. 25, students are **only** allowed to drop for urgent and substantial *nonacademic* reasons (e.g. extended health-related problems or family emergencies). For non-academic reasons, a written appeal must be presented in the Student Division of the Dean's Office. The College of Natural Sciences does not in general honor the "one free drop" policy of some other colleges (e.g. Liberal Arts), so do not ask me for a Q drop after Sept. 28 if your grade is failing, or after Oct. 25 for academic reasons (i.e. because your grade is low), no matter what a counselor in your college may have told you. The only possible exceptions are first-semester freshmen who are allowed to drop a single College of Natural Sciences course.

Incompletes: An incomplete (X) will only be considered for students who cannot complete the required course work for reasons other than lack of diligence (illness or other imperative nonacademic reasons), but only if the student has a passing grade on the work completed.

Cheating: Academic dishonesty will result in failure of the course and a report to the Dean of Students, who will decide on further action. Because of the large size of this class and the temptations involved, it will be important to keep your eyes from wandering and to guard your own exam. Also, bring your UT ID card with you to exams and be prepared to show this card if asked.

Student observing opportunities (schedule is tentative—call 471-5007 for Monday updates)

Students interested in observing the night sky through small telescopes have several opportunities. 1. The Painter Hall Observatory has UT Student/Staff Night on Fridays from 9:30 to 10:30. Public Night is on Saturdays, 8:30 to 10:30. These sessions are free and open to all ages; no reservations are required. 2. The Astronomy Department sponsors weekly “Star Parties” on the 18th floor observing deck of R.L.Moore Hall 30 minutes after sunset (8pm, probably 7pm until the end of daylight saving time) on Wednesdays this fall. This is free and open to the public. First Wed. night will be Sept. 4. Call 471-5007 for a list of all Astronomy Department public events.

Course Description

This course is meant as a descriptive introduction to a wide range of topics in astronomy for students who are not science or math majors. The emphasis in this course is on description of astronomical phenomena, how astronomical observations can be interpreted, and physical theories for the evolution of various types of astronomical objects. Concerning the mathematical level, it is minimal in this course. Students will rarely be required to manipulate equations as part of the exams. However you will encounter a few important but simple formulas in the text whose understanding will be helpful. You should also get used to seeing very large and very small numbers expressed in “scientific notation” (be sure to read Appendix 1 of the text, at the end of the book, on this). Another thing that will be very helpful is to develop a comfort with looking at graphs, if you’re not already. Comfort with scientific notation and graphs will greatly enhance the ease with which you comprehend concepts later in the course, and so I urge you to spend some time on these matters early in the course. However most of the emphasis in this class will be focused on a verbal-level presentation and understanding of the material.

The lectures will generally emphasize the most important and/or difficult topics covered in the text and attempt to clarify their connections. The lectures will not cover every topic covered in the text that you are responsible for, so don’t assume that if it’s not covered in lecture, it won’t be on the exam; I will tell you in lecture (and on review sheets before each exam) which parts of the text you can skip or are of minor interest. Similarly, there are a few topics to which I will add material not covered in the text. So you may find it a distinct advantage to attend classes regularly, especially since some of the exam questions will be taken directly from lecture material.

Since reading is all you have to do in this course (besides the homework consisting of self-test questions), I expect you **not** to get behind. In particular, **I will assume that you have tried to read the relevant text material before the corresponding lecture**, so that the lecture can serve as a concentrated review and clarification.

Your textbook has a number of features worth noting, which I will remind you of as the course proceeds. I chose this text partly because of its outstanding visual displays, which I am hopeful will clarify the text and lectures. Of particular note are the use of “zoom-in” photos and diagrams, and the “spectrum icon” labels under all the photographs, which you will see if you leaf through the book.

The CD-ROM accompanying the book contains a LOT of material, including the whole textbook, with links to updates on developments that have occurred very recently, links between figures and topics in the text and animations; hyperlinks between all cross-links, glossary terms, and learning objectives; and other stuff. I will NOT hold you directly responsible for any of the material on the CD-ROM that is not in the text. The CD-ROM material can be perused at your discretion. It should be emphasized, however, that you might find your understanding of the material strongly enhanced by, say, looking at pictures and animations on the CD-ROM, so I want to encourage you to at least dabble in the CD-ROM as we cover each new topic.

Similarly, there is a World Wide Web site organized around the chapters and up-dated monthly (http://wps.prenhall.com/esm_chaisson_astronomytoday_5), that includes audio and animation clips, a collection of links to astronomy resources, and additional questions and exercises. Use of this site is entirely optional, and I will not assume that you have examined the site at all, **EXCEPT** for the use of the multiple choice self-testing module at that site. (Click on Astronomy Today 5/e, then “Study Guide”.) A separate handout will be passed out listing specific suggested study guide questions.

Basic Outline of Reading Covered on Exams (subject to possible slight modification, e.g. if we don't quite finish covering a particular chapter, we may postpone that material to a later exam—I will notify you in class and by email if there are changes, and well in advance of the exams.)

Because of the large number of topics included in "astronomy" and the finite length of the semester, I have decided to omit several chapters that consist of detailed discussions of objects in our solar system (chapters 7-14), and to not discuss the history of astronomy, except in ways that I will make clear in class. We will also omit Ch.28 (extraterrestrial intelligence); take AST 309L (which will be taught in Spring 2007, for example) for a full-semester treatment of this subject.

We need to first develop the background physical principles that will be used to understand observations and theories. This might be the most crucial part of the course, because it may seem dry and difficult, but much of your later success in understanding the material will depend on how comfortable you are with these basic physical concepts. So probably the most important advice for this course is to NOT get behind in the reading and self-testing for the first part of the course, especially chapters 3 and 4 on the topic of light.

Here is a list of the reading assignments for each of the seven exams. I suggest you copy this to a separate sheet and keep it handy. However because we only have about four to five lectures per exam, and there may be unforeseen circumstances, you should consider this list tentative; if the reading schedule is changed slightly, it will be announced prominently in class and by class email. Note that the first five exams are scheduled for Wednesdays.

Exam 1. Chapters **1** (basics), **2** (gravity, orbits,...), **3** (radiation). Also see Appendices 1 and 2 at the end of the textbook. Chapter 3 is especially important for later chapters.

Sept. 4 Monday is a holiday.

In Ch. 1 you will only be tested on sections 1.1, 1.2, 1.7. In Ch. 2 you should read sec. 2.2, 2.3, but really we will be concentrating only on sections 2.5, 2.6, 2.7. We will cover all of Ch. 3 (radiation, really important).

Date: **Mon., Sept. 18** (7 lectures including first class day)

Exam 2. Chapters **4** (spectroscopy) and **5** (telescopes). Chapter 4 is especially important for later chapters, and usually difficult for students.

Date: **Mon., Oct. 2** (4 lectures)

Exam 3. Chapters **6** (survey of the solar system), **15** (formation of the solar system), and **16** (the sun). [Note that we are skipping chaps. 7-14 covering details of the solar system.]

Date: **Fri. Oct. 13** (4 lectures)

Exam 4. Chapters **17** (properties of stars), **18** (the interstellar gas and dust), and **19** (the birth of stars).

Date: **Wed., Oct. 25** (4 lectures)

Syllabus has been edited 11/17/06 past this point:

Exam 5. Chapters **19-21** (star formation, stellar evolution and death).

Date: **Fri., Nov. 10** *Already taken.*

Revised syllabus for last two exams.

Dates of exams stay the same, division of materials/topics slightly changed.

Exam 6 will cover:

Chapter 22 (neutron stars, gamma-ray bursts, black holes),

Chapter 23 (Milky Way galaxy; skip 23.5, Galactic Spiral Arms, 617-622; skip 23.7 Galactic Center, 625-628),

Chapter 24 (other galaxies; skip last two sections 24.4 Active Galactic Nuclei, 24.5 The Central Engine of an Active Galaxy, pp. 648-662)

Date of exam 6: **Monday, Nov. 20** -- Monday before Thanksgiving break. NO CHANGE. [I am assuming an exam on the day before Thanksgiving break Nov. 23-25 would result in more problems than it is worth.]

Exam 7 will cover:

25 ([galaxies and dark matter](#)), **26** (cosmology) and **27** (the early universe).

Date of exam 7: **Friday, Dec. 8** (last class day; 5 lectures)