Astronomy 301: Unique number 46675: Introduction to Astronomy

Course Syllabus

Classroom and time: Welch Hall 3.502, T Th 11:00 to 12:15.

Professor: John Scalo Phone: 471-6446 (office), or 478-2748 (home)
Office: R.L. Moore 15.318 Office hours: M2:15---3:15, T2:15---3:15,
email: scalo@astro.as.utexas.edu or after any class, or by phone (see below).

Alternatives to office hours: 1. We can talk outside the classroom (in the foyer) after class.

2. I welcome phone calls at home – it is an efficient way for us to communicate while a particular question is on your mind. It also provides a tool for both of us to assess your progress in terms of explanatory understanding (explained below).

Teaching Assistants: The TAs are knowledgeable, helpful, and friendly, so seek their guidance when you need it. If you can't make their office hours, arrange an appointment.

	Name	Office	Office hours	email	Phone
1st TA:	Sam Factor	RLM 15.310E	T 3:30-5, W 3:30-5	sfactor@astro.as.utexas.edu	471-3387
2nd TA:	Linda Delafuente	[RLM XXXXX]	TBA	lindadel@alum.mit.edu	471-8443

Materials: The items you need to purchase or obtain are:

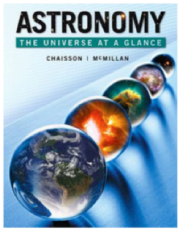
➞ Textbook (immediately!)

➞ Some #2 pencils (for each exam),

➞ The Canvas app for your phone and/or laptop. You need this when we take attendance, beginning with the second week of classes.

I assume you have convenient access to the internet, and that you check your email regularly.

Course web site: All materials, as well as exam grades, will be available via Canvas or sent to you by email.



Textbook: E. Chaisson, E. and McMillan, S. ***Astronomy: The Universe at a Glance.*** *1st edition, paperback.* ISBN-13: 978-0321909725 ISBN- 978-0-321-79299-0. The textbook comes with an Access Card Package called *Mastering Astronomy with eText.* Your book should look like the picture to the right, or else you're buying the wrong book. Make sure you only buy the version with the Access Card Package. (The only version there is, I think.)

➞ I strongly suggest you purchase a textbook as quickly as possible. Since it is a new book, you can return it for full value if you decide to drop the course. There is reading required for the second class period.

I am trying out a new version of the textbook I had used in the past, which was so long and contained so much detail and frills that it was hard for students to get the basic ideas. This new version is "modular," which means in this case that each topic is treated as a 2 page text+pictures module. Those pages are dense, but at least it's all there in front of you. You'll also have to coordinate the reading with the various "Learning outcomes" at the beginning of each chapter and "End of chapter assessment." More on that later. Since the book is SO concise, there will sometimes be additional readings to supplement a section. *All additional material will be made available online in Canvas "files."*

What is this class about? What is expected of students? In a nutshell, you will be learning about **the nature of planets, stars, galaxies, and the universe: How they are observed, how we estimate their physical properties, and how we think they are born, evolve, and die.** That last set of items is an important one to remember while studying, to know if you are thinking about the material in these

terms. There are endless aspects of each of these questions, but try to remember that these three questions are the most basic.

Important 1st assignment: Spend an hour flipping through your textbook to get an overview of the types of objects you'll be encountering.

The main expectation I have of students is simple to state, but difficult to achieve: That you try to actually ***understand*** the subject matter at hand. I have found that the test of understanding is whether you can explain it yourself, so I will be urging you to participate in this way. Memorization and problem-solving are very secondary here. You'll find that many of the test questions cannot be answered even with your book and notes in front of you, unless you understand the material, in which case the question will appear simple. Many students have trouble with this approach, so I'll provide you with a steady stream of examples during the lectures.

The second kind of expectation is also simple: That you keep up with the material to be covered before each lecture, study diligently, and communicate with me whenever you have questions or problems or even want an opportunity to talk about the topics.

I am truly a world-class procrastinator, but I still must tell you what you probably hear from every professor, that a steady effort at reading and understanding the material, without delay, is a gigantic key to success in this class. At the top of that list is to read the material in the textbook before the corresponding lecture, and then to ask questions about anything that is unclear.

This class does *not* contain an observational component, and we will have little to say about the night sky, seasons, eclipses, etc., although of course you can read about it in the textbook if interested. See below for student opportunities to observe using UT telescopes on campus..

Lectures, homework, exams: *Overall organization of the course*

■ The rhythm of the class is simple: 4 or 5 in-class lecture periods, then an exam. With so much weight given to exams (80%), and so much time between Th and the following T classes, a major factor in your success will be attendance, and diligent reading and review between classes.

■ There are a total of ***five exams*****,** with *no comprehensive final*. Each exam counts 17% of your final grade, for a total of 85%. I will send you a review sheet 2-3 days before each exam, and supply sample questions during and between lectures. Given the likely size of the class, all the exams will be multiple-choice questions, usually about 25-35 questions.

Details of the materials and readings corresponding to each exam will be made available separately, at Canvas. The exam dates are

***Ex 1*: Th Sept. 17** ***Ex 2*: Th Oct 8** ***Ex 3*: Th Oct 29** ***Ex 4*: Th Nov 12** ***Ex 5*: Th Dec. 3**

These dates are firm, unless we detect an error within the next few days. Exam scores should be ready by the morning following the exam. If you have a legitimate problem with an exam date (but not things like other exams on the same date), there will be an opportunity to take the exam a day or two early, or, if a serious emergency or health problem, a day late. All early and late exams will be handled by the TA, and you are responsible for arranging any such exams with the TA.

The reading and exam schedule will be provided separately by the second lecture period.

■ **Ten percent of your grade is based on homework assignments.** These assignments require you to turn in (electronically) written (or recorded—I'll explain in class) answers to your choices from a set of questions I send you. These are expected to be about one paragraph long, and are graded on how well they demonstrate your understanding of the answer by answering clearly and in your own words. Fluff or copied phrases will be given a low score, probably zero. These assignments are graded on a 0-5 scale, and count for 10 percent of your grade. There will be roughly one or two for each exam, as an

aid in studying. An alternative form will consist of "take home quizzes" that you will answer through Canvas, after having some time to think about the answers.

In addition, some homework questions do not require that you turn in anything. Instead, they are "due" on the days of exams, when the multiple choice equivalent of the homework questions will appear on the exam; some of these will be taken from the review questions at the end of each chapter. All information about the homework questions will be transmitted to you via email and placed at Canvas.

■ **Five percent of your grade is based on *attendance*.** In a nutshell, you'll use the Canvas app to enter a password as the answer to a quiz that we have during each class. *Get the Canvas approximation. Attendance also affects your grade indirectly*: The exams are weighted heavily toward the lecture material, as well as the textbook readings. Some statistical studies I've done in the past indicate an average difference of nearly a full letter grade between students who attend regularly and those that don't. In semesters for which I counted attendance, it was very rare for a student who didn't have at least about 80---90% attendance to receive a grade of "A."

■ There will be **an *optional comprehensive final*** for extra credit (replaces lowest **non-zero** score) given on the day that will be scheduled for the final exam. Notice that you cannot miss any of the five exams—the optional final will only replace the lowest non-zero score. More detail when the time nears.

Grading: 85% of your grade is based on 5 exams (17% each), 5% on attendance, and 10% on the assigned written homework.

Final letter grades: Final grades in our class will be assigned on the following basis.

A = 87.0 to 100 B = 77.0 to 86.9 C = 67.0 to 76.9 D = 57.0 to 66.9 F < 57.0

➡ Final percentages will *not* be "rounded up." 86.87 is a B, not an A.

➡ *Plus/minus grades will not be assigned.*

Just under the cutoff? If, at the end of the semester, you are just under the cutoff for a grade, by any amount, do not ask me to lower the cutoff--this is unfair to all concerned. The *optional comprehensive final* is the vehicle for "extra credit" if you are close to a grade cutoff.

Departmental policies: Please download and read the "Memo to Undergraduate Astronomy Students regarding Astronomy Courses" at Canvas (in files, "First Day Handout"), or at http://www.as.utexas.edu/astronomy/education/memo.html. Read it completely.

Adding and dropping, other important dates: The academic calendar is provided at http://registrar.utexas.edu/calendars. The College of Natural Sciences adheres strictly to the published deadlines of the University. The most important date at first will be the 12th class day, Friday, Sept. 11, after which you can no longer add a course, or drop course with a refund.

Special requests: Students with disabilities or other special needs may request appropriate accommodations for the exams or more general accommodations from the Division of Diversity and Community Engagement, Services for Students with Disabilities, 512-471-6259, http://www.utexas.edu/diversity/ddce/ssd/

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. Bring your UT ID card with you to exams and be prepared to show this card if asked. The University Honor Code can be found at: http://catalog.utexas.edu/general-information/the-university/#universitycodeofconduct)

Student observing opportunities (schedule is tentative; see http://outreach.as.utexas.edu/public/viewing.html for official schedule and updates).

Students interested in observing the night sky through small telescopes have several opportunities. **1.** The Painter Hall Observatory (24th E. of Guadalupe) has UT Student/Staff Night Fridays and Public Night is on Saturdays, free and open to all ages; no reservations required. **2**. The Astronomy Department sponsors weekly "Star Parties" on the 18th floor observing deck of R.L. Moore Hall 30 minutes after sunset on Wednesdays. This is free and open to the public. Call 512- 471-5007for a list of all Astronomy Department public events, since the schedule may have changed. The list of events is preceded by a description of the current night sky. Call 232-4265 for weather cancellation information.

A long version of the course description follows. Read it when you have time—it can be important to understand the orientation and goals of the course and keep them in mind while studying.

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Course description—long version

This course is meant as a ***descriptive*** and ***conceptual*** introduction to a wide range of topics in astronomy for students who are not science or math majors. The emphasis is on *understanding* the ideas and concepts, rather than solving mathematical problems.

What you should expect to learn in this class:

As stated earlier, you will be learning about the nature of planets, stars, galaxies, and the universe—how they are observed, how we estimate their physical properties, and how we think they are formed, evolve, and die. Those are the particulars. More generally, there are three categories that contain my expectations of you as a student, and the kinds of comprehension of the subject that you should gain from the course; they apply to every topic we will discuss (read carefully):

➡ **Phenomena**. The ability to *describe* a wide variety of astronomical ***phenomena***, *in your own words.* This is not as easy as it seems. For example, some of the phenomena cannot be seen at all (black holes, dark matter,…then why would we think they exist?), others only at particular wavelengths, and above the Earth's atmosphere (e.g. gamma-ray bursts), while some are wildly spectacular, in real time (supernova explosions), and might occur within our own Galaxy in the near future.

➡ **Observations.** A non-technical but clear understanding of how astronomical ***observations*** are performed and interpreted, one that you could communicate to others. This subject, how we learn things about the world, is more fun than it seems, for it is eerily similar to the ways in which infants learn to interpret their world, based on their rather incoherent and partial sensory input. There are some key ideas here that will determine how well you can see the difficulties faced when trying to understand something so far away that you can barely see it at all. One of the most important that comes up early in the course is something called "angular resolution," a measure of how much detail you can "resolve" in an image, similar to the number of megabytes you can capture in a photo. [There was a hilarious old cartoon series based entirely on the behavior of a person (Mr. Magoo) whose angular resolution was woefully poor (he was near-sighted); this led him to devise wild, perverted theories about his own experiences. Science is a little bit like Mr. Magoo, astronomy is very much like him.]

By the time you study these aspects of observational astronomy, you should be able to explain them to a parent or a little brother or sister, if you have one (an imaginary sibling otherwise), or even a pet, in everyday language that anyone could understand, using everyday examples. That should be a primary goal.

➞ **Hint, hint:** You'll find that you never quite "get" any of this unless you have been serious about the early chapters in the textbook, which try to provide you with a minimal background about the physics of light. In a way, this is the most difficult, and boring, material in the course. You *have* to become intent on understanding this background, or much of the rest of the course will be a blur.

➡ **Theories**. A non-mathematical overview of, and the ability to *explain*, **theories** for the birth, evolution, and death of various astronomical objects, from planets to stars to galaxies and the universe. How we could understand the lives of these objects, nearly all of which do not evolve on human time scales, but instead over millions or billions of years? Think about stars, whose surfaces we can't even see except as nearly-infinitesimal points of life. How could we possibly develop a useful theory about something that always appears as a point and only changes over billions of years? The intimate relation between the observations of a particular phenomenon and the theories that attempt to explain it, are the most basic level of problem that astrophysics tries to overcome.

From the above list, you can probably see that there will be a focus on a practice of attempting to explain, in your own spoken (not written) words, what you have learned in the textbook and in lectures. Because I cannot give oral exams to such a large class, in the past I used sound recordings that students dropped in a UTbox site for this purpose. I'll explain the outcome of this experiment in class. This time around the "explain it in words" suggestion is up to you, as long as you understand that I write the multiple choice questions with that level of understanding in mind, and that your grade on homework questions is based on being able to explain things in your own words.