

SYLLABUS
ASTR 250 (Lecture #001)
Fundamentals of Astronomy
Spring 2013

LECTURES: Tuesday/Thursday: 11:00 a.m. - 12:15 p.m.
Steward Observatory, Room N210
(No Class on March 12 & 14, spring break. Last lecture April 30.)

INSTRUCTOR: Dr. Nathan Smith
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OFFICE HOURS: Tues. (1:00 - 2:00 p.m.) and Wed. (11:00 a.m. - noon) or by appointment

TEACHING ASSISTANT: Megan Kiminki
Office: Steward Observatory, room 352
Email: mbagley@email.arizona.edu
Office Hours: Mon. (2:00 - 3:00 p.m.) and Fri. (11:00 a.m. - noon)

MIDTERM EXAMS: Thursday, February 21, 11:00 a.m.
Thursday, April 4, 11:00 a.m.

FINAL EXAM: Tuesday, May 7, 10:30 a.m. - 12:30 p.m., Steward Obs. N210

REQUIRED TEXTBOOK: *Foundations of Astrophysics*, by Ryden & Peterson (Addison Wesley)

COURSE WEBSITE: <http://D2L.arizona.edu>

PARTICIPATION IN CLASS: Regular attendance of lecture is essential; you will not pass this class if you have poor attendance because 25% of your grade is based on in-class participation. Points may be awarded at any lecture in the form of in-class homework presentation or other questions, pop quizzes, etc. (see below). Students are responsible for all information given out in the lecture, including problems sets and any announced schedule changes, and so attendance is *required*. If you must miss class, talk to another student or contact Prof. Smith or your TA to find out what you missed. You will not be allowed to make up any missed participation points. To allow for unavoidable periodic absences for a legitimate reason (medical emergency, death in the family, serious illness, etc.), we allow two absences with no penalty. In other words, your two lowest scores will not be counted (whether the score is a zero due to an absence or a low score due to a poor performance). Thereafter, your participation grade will be determined by how well you perform on in-class presentations of homework.

REQUIRED TEXT: The textbook named above is required for the course. The syllabus lists which chapters in the text correspond to lecture topics each week, and assigned reading. You are required to read those chapters *before* coming to class that week. Most of the homework problems will be taken from this textbook. An optional supplementary text is *The Physical Universe: An Introduction to Astronomy*, by Frank Shu. This will be helpful to you but is not required.

TOPIC SCHEDULE & READING/HOMEWORK ASSIGNMENTS:

<u>Week</u>	<u>Topic</u>	<u>Chapters</u>	<u>Assignments/Exams</u>
Jan 10	Introduction/overview/units/basics
Jan 15/17	The Sky, History of Astronomy	1, 2	PS1
Jan 22/24	Basic Orbital Mechanics	3, 4	PS2
Jan 29/31	Light, Matter, Spectroscopy, Telescopes	5, 6	PS3
Feb 5/7	Sol. System Overview – Planets etc.	8, 10	PS4
Feb 12/14	Solar System – Formation, Exoplanets	11, 12, Shu-18	PS5, Shu 474-482
Feb 19/21	The Sun	7, Shu-5	PS6, Midterm 1 (Th)
Feb 26/28	Normal Stars, Star clusters	13, Shu-9	PS7
Mar 5/7	Stellar Atmospheres & Interiors	14, 15	PS8
Mar 12/14	No Class - SPRING BREAK		
Mar 19/21	ISM, Star Formation	16, Shu-11	PS9
Mar 26/28	Stellar Evolution, Death	17, Shu-8	PS10
Apr 2/4	White Dwarfs, Neutron Stars, Black Holes	18	PS11, Midterm 2 (Th)
Apr 9/11	Milky Way, Other Galaxies	19, 20	PS12
Apr 16/18	Quasars etc., Galaxy Clusters	21, 22	PS13, Term Paper (T)
Apr 23/25	Cosmology, Dark Matter, The Big Bang	23, 24	PS14
Apr 30	Summary, review, activities, presentations		
May 7	Final Exam		

GRADES: Your final grade for the course will be based on the midterm and final exams and other assignments in the following proportion (total possible = 800 points):

Homework/Participation	240 points (30%)
Term Paper	120 points (15%)
Review Article Presentation	80 points (10%)
Midterm #1	80 points (10%)
Midterm #2	80 points (10%)
Final	200 points (25%)

Mistakes sometimes happen in grading. All questions, disputes, or mistakes regarding the grading of exams and assignments must be brought to our attention within 1 week after the exam or assignment is handed back or posted. Listed below are the hardest percentages needed to earn a specific grade for the entire course. We reserve the right to curve the class further.

A = 736 points (92%)
B = 672 points (84%)
C = 608 points (76%)
D = 544 points (68%)
E < 544 points

EXPECTATIONS: This is an introductory course intended to provide a broad foundation in astronomy knowledge and techniques for astrophysics and physics majors. We cover everything in the Universe outside Earth, so the course will be intense and must move quickly. While no previous astronomy coursework is required, basic understanding and proficiency in physics and math are expected. Advanced calculus is not a prerequisite, but some simple calculus will be used in the course. Students are expected to complete the assigned reading and problem sets before coming to class, and to use lecture time to ask clarifying questions and to participate in discussions.

HOMEWORK: This course requires weekly homework problem sets that will involve problems in the textbook and other handouts announced in class. You may discuss the astronomy concepts with classmates, but you must do your own work. **This is how you will learn most of the material.** Problems for the following week will be announced each Thursday, and these problem sets must be completed and ready to hand in at the *beginning of class the following Tuesday*. The problem sets can be extensive – plan to spend several hours on each problem set.

For each problem set, bring 2 copies of your completed work to class on the Tuesday when it is due; these two copies should be (1) the original handwritten problem set that you will turn in at the start of class, and (2) a photocopy for you to keep during class on Tuesday and Thursday of that week. The reason you need to keep this second copy for yourself is that we will spend some of the class time each day running through these problems together (also, original copies you turn in will not be handed back). Prof. Smith will call on a student to explain how they did that particular problem, and we will go through all the problems this way. The order will change, and so you might be called upon to answer *any* question in the problem set and present the answer to the class – and you must be prepared to do so. Failure to do so will earn you a score of zero for that day. You will be expected to explain how you approached the problem, to show your mathematical calculations on the board if applicable, to explain the underlying principle, and to answer any additional questions from the TA or Prof. Smith. We might then ask you or another student to re-do the problem with something changed (e.g., “Now what if this was a high-mass star instead of a low-mass star?”), and you will need to explain how that will affect the answer. Grading of your in-class participation will be on a sliding scale determined by Prof. Smith - for instance, if you are chosen to present one of the hardest problems on the homework and you don't quite get it exactly right, you will not necessarily earn a lower score than another student who gives a perfect explanation of a much easier problem. Similarly, if you do a poor job explaining a relatively easy problem, you are likely to earn a lower score than another student who does a poor job answering a difficult problem. The best approach is to do all the problem sets thoroughly and completely, and make sure you truly understand the underlying concept of each question.

Homework will be 30% of your total grade in the course. This will be divided between the complete problem sets that you hand in at the beginning of class (about 50%) and your in-class presentation of questions or other participation (about 50%). We will drop the 2 lowest participation scores, and the two lowest homework problem set scores. Dropping these two scores is meant to allow flexibility for any unforeseen disasters, illnesses, family emergencies, religious holidays, sporting events, late registration in the course, the bookstore running out of books, computer malfunctions, zombie attacks, etc. For this reason, late homework will not be accepted. Do not request the opportunity to make up homework unless your reason is serious enough (i.e. a prolonged illness) to warrant receiving a grade of incomplete in the course.

REVIEW ARTICLE PRESENTATION: Each student must present a 10 to 15-minute in-class summary of an article from the literature on a topic of their choice. The chosen topic should be closely (but not exactly) aligned with material covered in this course. Each year, a publication called *Annual Reviews of Astronomy and Astrophysics* publishes a series of review articles on a wide range of topics that are different each year, written by experts in the field. These are blue & black hardbound books that can be found in the Astronomy Department library, and the articles can be found free online using the NASA/ADS abstract server. You must choose an article published in the last 12 years, read it, internalize it, and then prepare a short presentation to summarize the article in class. The intent here is for you to develop expertise in some topic of current astronomical research (deeper than what is covered in lecture), to work on your presentation skills, and for other students to learn from you. The date on which you conduct your in-class presentation will be determined by the course schedule: if you choose an article on high-redshift galaxies or cosmology, your presentation will occur later in the course, whereas if you choose dwarf planets or comets, your presentation will occur much sooner in the semester. You must sign up for a topic, article, and presentation time by contacting Prof. Smith by email or in office hours. No two students can present the same article, and topics must be broadly distributed throughout the semester and across science topics. (This means that you will have more freedom in your choice of article if you choose sooner rather than later.) If someone else has already chosen to cover the topic you have chosen, you must find another. You must choose your article by week 4 of class (before the end of January) or one will be assigned to you. Your presentation must adequately give an overview and summary of the topic in the article, discussing the state of the field, techniques of investigation, and what some of the most interesting questions are. You may feel free to use any visual aids (i.e. Powerpoint slides that you prepare with color pictures) and/or you may choose to use the chalkboard. You *may not*, however, simply project pages of the article on the screen.

TERM PAPER WRITTEN ASSIGNMENT: All students are required to submit a written project as part of the requirements for this course. The deadline for turning in your term paper is Tuesday, April 16 at 11:00 am (start of class). This is essential to allow Prof. Smith and your TA to read all the term papers before the end of the semester, so **no late term papers will be accepted**. Please do not test us on this, or you will make yourself very unhappy. More detailed instructions for this assignment are available on D2L. You must submit a printed hardcopy in class on the due date, and you must also upload a PDF file to the course website (D2L) dropbox before 11:00 am. Failure to do either by the deadline will earn you a zero on this assignment.

LOOKING THROUGH A TELESCOPE: This is not required (and no extra credit is given), but you can attend any of the series of public evening lectures hosted by Steward Observatory: http://enterprise.as.arizona.edu/~taf/pubeve/pub_lect.html. Following all public lectures (which are held in the same room as our lecture), the telescope dome outside this lecture hall will be open for viewing objects in the night sky (weather permitting). You should also participate in this activity if it is available. This telescope is also open for eyepiece observing every MTWTh during the semester, weather permitting (the telescope will not be open if it is cloudy). However, students from many other astronomy classes may want to use the telescope for laboratory exercises or casual night sky viewing, and space in the dome is limited, so you must sign up in advance. You can sign up near the lobby in the main Steward Observatory building. Regular observing nights will begin a few weeks into the semester, after the MLK holiday.

BE AWARE OF WHAT IS IN THE SKY: This is an astronomy course, and part of basic astronomy is knowing what is above your head. As part of this course, you are required to go outside and view the sky periodically throughout the semester. Tucson has relatively dark skies compared to other cities, so hopefully you do this anyway from time to time. You do not need to make a complete and detailed sky chart every clear night of the semester, but you should view the sky on at least one clear night each week and be aware of things that change with time. Some examples of things you should pay attention to are: knowing the current phase of the moon, where it is located in the sky, which naked-eye planets are visible in the evening, midnight, or morning, and which constellation those planets are in, some of the prominent constellations that may be visible in the evening, etc. These are valid questions that Prof. Smith might ask you as part of your class participation grade (especially if there are not enough homework problems for every student to do one in class), so it is best to be ready for them. In order to become familiar with constellations and planets that may be in the sky, you can consult sky charts in popular magazines like *Sky & Telescope* or *Astronomy Magazine*, online sky charts, a smartphone app, etc.

DEADLINES: We will accept no late assignments. Homework assignments will be presented and discussed in lecture, making any late homework irrelevant. Oral reports also follow the course schedule. Term papers are to be submitted in class (hardcopy) and submitted online (PDF), and the electronic servers will not accept submission after the deadline. If you choose to wait until a few hours before the deadline to do your assignment, you are taking a calculated risk. Should your printer break, Internet go down, or an emergency arise, these will not be valid excuses. You will not get an extension because you chose to wait until the last moment to start the assignment.

MAKE-UP EXAM POLICY: In general, we do not give make-up exams. If we deem that your excuse for missing an exam is truly justified, you will be given an oral make-up exam. That means you stand at the whiteboard in Prof. Smith's office for 30-45 minutes and answer quantitative problems on the spot. Also, please note that the final exam is scheduled for May 7. Take this into account when making any travel plans. Your desire to go home earlier than May 7 **will absolutely not** be accepted as a valid excuse. You are required to be here on May 7 or you will fail the course. ALL EXAMS are closed book and closed note. All phones must be packed away and hidden from view, or you will be given a score of zero on that exam and reported to the Dean.

LEARNER-CENTERED EDUCATION: The University of Arizona has designated itself a "Learner-Centered University." This means that the student is expected to take an **active** role in his/her learning. This is especially true in this course, which is part of the required curriculum of your Astronomy/Physics major. Class time will be peppered with "mini-lectures" for qualitative understanding, separated by activities that will require your participation, especially your presentation of problems from the homework sets that will constitute 30% of your grade. Be prepared to interact with your classmates, ask questions, and participate in group discussions. Always read the relevant textbook chapters **BEFORE** coming to class, and have homework finished and be prepared to present it to your classmates. In cases where your final class score is near a borderline between two letter grades, a student who regularly exhibits active participation may be bumped up to the next letter grade – a student who typically contributes as much to class discussion as we might expect from a lump of amorphous organic material will not see any sympathy in rounding of their course grade.

ACADEMIC DISHONESTY: Presentation of any work other than your own, in whole or in part, is considered academic dishonesty. This includes copying test answers or homework assignments, other persons taking exams or quizzes for you, plagiarism of any material on the Internet or in other publications, fabrication, borrowing another student's assignment as an "example", or reference to any unauthorized materials during the exam. In instances where nearly identical assignments are submitted, *all* parties will be held in violation of the Code of Academic Integrity, *so do not share your assignment with another student*. Any other technique that gains unfair advantage over other students is also academically dishonest. All students must be prepared to present valid picture ID if requested during any exam. Any incidents of academic dishonesty will be dealt with harshly according to the University of Arizona's Code of Academic Integrity. This can be obtained at the Dean of Students website: <http://deanofstudents.arizona.edu/codeofacademicintegrity> . The consequences can range from loss of credit on an assignment or automatic failure of the course, to full dismissal from the University, depending on the severity. In our class, the penalty for plagiarism, cheating on an exam, or homework fraud will be automatic failure of the course and, depending on the circumstances, expulsion from the University. It is not worth the risk.

TURNITIN.COM: If you decide to continue in this course, you are agreeing to submit any papers online as PDF files, when so instructed, which will be examined by a plagiarism-prevention program called TurnItIn.com. You should note that TurnItIn.com – always without your name and any personal information – will retain your paper as part of their database so that students who plagiarize from it now or in the future can be detected. Because of this program, the vast majority of you who do your own work and cite your sources of information properly will not have to compete with students who commit plagiarism.

STUDENTS WITH DISABILITIES: If you anticipate issues related to the format or requirements of this course, please meet with Dr. Smith. We would like to discuss ways to ensure your full participation in the course. If you determine that formal, disability-related accommodations are necessary, it is very important that you be registered with Disability Resources (621-3268; <http://drc.arizona.edu>) and notify Dr. Smith of your eligibility for reasonable accommodations well in advance of the first midterm. We can then plan how best to coordinate your accommodations.

BEHAVIOR IN CLASS: NO smoking, eating, drinking (except water), or pets are allowed in the lecture hall. All cell phones must be turned to silent mode or powered off completely, and must be placed *completely out of sight*. Many students find open laptops in a lecture hall to be very distracting. To not interfere with other students trying to listen to the lecture, you may not use a laptop in class except to take notes - if you choose to take notes on your laptop, you must sit in the designated "*laptop section*" (in the outside aisle seats near the side walls). You should also be aware of the University's policies on disruptive and threatening behavior:
<http://deanofstudents.arizona.edu/disruptiveandthreateningstudents>