General Astronomy (AST C10 – Summer 2016 session A)

Instructor
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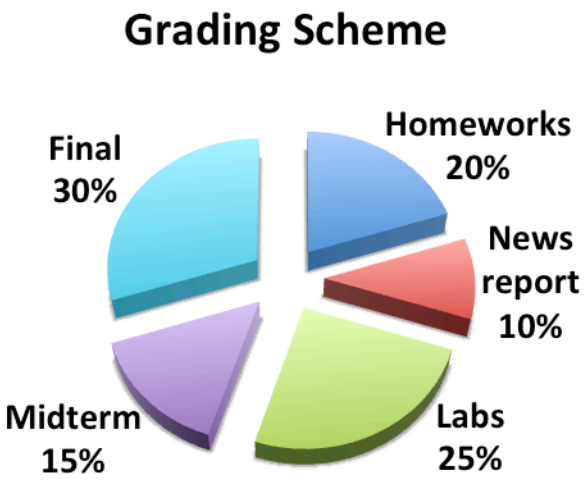
Textbook
J. Bennet, M. Donahue, N. Schneider & M. Voit: *The Cosmic Perspective (7th edition)*

Class organization
Class: MTuWTh 1-3pm; 121 Campbell Hall (TALC)
Discussion: MTu 3:30-4:30pm
Office Hours: TBD

Grading
Based on a combination of weekly homework sets, lab experiments, a "news report", a midterm and a final. **Two bonuses (up to 5% each) are available:**

- *Active class participation;*
- *Observation-based project.*



Monday	***Tuesday***	***Wednesday***	***Thursday***
May 23	**May 24**	**May 25**	**May 26**
The bases of Astronomy			
Introduction; Course Overview	The Night Sky; The Scientific Method	Key Physics: Energy, Forces, Matter	Key Physics: Light; Astronomer's Tools
May 30	**June 1**	**June 2**	**June 3**
Memorial Day No Class	**Planetary Systems**		
	The Solar System; The Main Planets	Planets: Structure, Geology & Atmospheres	Planetary Satellites; Minor Bodies
June 6	**June 7**	**June 8**	**June 9**
Planetary Systems	**Stars in our Galaxy**		
Extrasolar Planets; Planet Formation	The Sun	Stellar Diversity	Star Formation
June 13	**June 14**	**June 15**	**June 16**
MIDTERM	**Stars in our Galaxy**		**Galaxies**
	Stellar Evolution	The Death of Stars	The Milky Way
June 20	**June 21**	**June 22**	**June 23**
Galaxies			**The Universe**
Galaxy Diversity	Supermassive Black Holes; Dark Matter	Galaxy Formation and Evolution	Expanding Universe; Dark Energy
June 27	**June 28**	**June 29**	**June 30**
The Universe	**Life**	REVIEW	***FINAL EXAM***
Big Bang; Cosmology	Life in the Universe; Interstellar Travel		

Course overview

Astronomy 10 is a class that attempts to cover the incredible breadth of the Universe we inhabit. Given that our knowledge of the cosmos spans billions of light-years (quite a distance to travel in a 6 week course!), we will be moving very quickly. We will begin with familiar objects such as our Earth, Sun, Moon, and Milky Way before moving to exotic, space-bending phenomena like neutron stars, black holes, quasars, and dark matter. We will discuss how observing astronomers have used for several centuries the scientific method to understand what they see in the sky, and broach topics like extra-solar planets and the mysterious, gravitationally-repulsive "dark energy" that have only been discovered in our own lifetimes.

In order to explore these subjects in detail, we will need to use the mechanical language of our universe: physics. Because this course fulfills the physical science requirement for UC Berkeley, we will be using physical laws and relations to understand the behavior of astrophysical objects and systems (the orbits of the planets around the Sun, the interactions of light with matter, etc.). However, there are no physics prerequisites to this class, and we will develop the tools we need as we go. You will be expected to have high-school experience with algebra and geometry (squares and square roots, scientific notation, ratios, etc.), and these topics will be reviewed as they are introduced.

In addition to providing you with some science credits, I hope that this class will affect the way you think about science and the place of our Earth (and ourselves) in this vast and fantastic Universe. The class will emphasize how our understanding of the cosmos continues to evolve; how theories are constantly tested, strengthened, and rejected; and how technology is advancing astronomy. By the end of the class, you will be able to read a science article in The New York Times or Nature and understand the major terminology and techniques, as well as the importance of the results well beyond the original short story. Most of all, I hope you find yourself asking "Why?" about more of what you see in the Earth and sky.

Course materials

You will be expected to have done the readings indicated during the previous class before coming to class in order to fully participate in our discussions. All other course documents and take-home assignments will be accessible via the course website. The lecture slides will be made available through the class website after each class. This way you can focus your attention on understanding the materials rather than trying to copy down all the information in class. Note that the posted slides are not a substitute for attending lectures, as in-class discussions almost always extend well beyond the content of the slides!

Participation

I am reasonably confident that no one would enjoy 8 hours per week of me talking to a silent classroom (including me). Luckily for us all, a huge body of research has shown that interactive lectures increase learning for students at all levels. With the goal of maximizing 1) your absorption of lecture material and 2) your grades, I will ask you all to actively participate in the lecture activities including class polls and think-pair-share exercises. I will take note of your *active* participation throughout the lecture and this will constitute ***a bonus of up to 5% on top of your final grade average***. The use of computers, tablets, and phones for purposes unrelated to the lecture will result in the loss of participation points.

Homework

There will be 5 weekly homework assignments covering both lecture and reading material. The lowest homework score for each student will be dropped. Homework assignments will include a mix of multiple choice questions, true/false statement and open-ended questions. Each assignment must be turned in by 5pm on Friday of the week it is due; electronic submission is strongly preferred, either through email or via the course website. Because of the extremely compressed summer session schedule, late homework will incur a steep penalty. In return for your timeliness, homework will be returned and reviewed on the Monday after it is due. It will be very important to review and correct your returned homework, as frequently missed homework problems may reappear on the quizzes and final.

In-Class Labs

In-class labs will occur during the discussion sections, during the first, third and fifth week of the session. These activities are designed to be completed in small groups and to improve your problem-solving abilities and your practical understanding of lecture material. These labs will often require a computer, so you are encouraged to bring a laptop to discussion section (at least one per lab group). Because these activities are graded, ***attendance to discussion sections is mandatory***. If you are unable to attend the discussion section for which you are signed up in a given week, you may attend the other section. However, space is limited in the room (TALC) where the discussion sections are held, so please attend your assigned discussion section if possible, and notify me via email if you plan to switch. In-class labs will be submitted in groups (i.e., one lab report per group; students can change group from lab to lab). They must be turned in at the end of the discussion section.

News Report

As noted above, I hope that this class will change the way you think about the Earth and the sky, and will expand your understanding of the key questions in modern astronomy. To aid in this goal, you will be completing a "news report" project during the course of the session. In this project, you will pick a recent (published in 2016) news article about an astronomy topic of your choice from the printed/electronic media and will prepare a 1000-word report in which you put the discovery in the context of the class. Explaining the methodology used to make the discovery and how the discovery relates to fundamental physics principles and to other topics discussed in class are the aspects that will be expected of your report. I will ask you by the end of Week 3 to tell me which news story you have picked to ensure that it satisfies the requirement of the project, and the full report will be due on the first day of Week 6 in order to give you feedback on your work and avoid overloading yourself at the end of the session. While several students could pick the same news story to cover, each student must turn its own report that demonstrates independent work, even though you might have exchanged thoughts with other students.

Observing project

At its origin, astronomy is an empirical science, i.e., it is based on observations. To bring this point home, an optional project is offered, which consists in observing the locations of the Moon and planets in the night sky (Jupiter, Mars and Saturn are all visible in the first half of the night) and attempting to track down their motion over the course of time. Detailed instructions will be provided in class. This project relies exclusively on naked eye observations and the use of binocular or telescopes is not needed and, indeed, it would make the project more difficult. This project, which will provide ***a bonus of up to 5% on top of your final grade average***, will be graded on a best effort basis. It is not necessary to start the project during the first week of the course, but the longer the time baseline you have between your observations, the more likely you are to see the motion of the planets. You are therefore encouraged to start the project early on.

Midterm/Final

There will be one midterm on the Monday of Week 4 and a Final on the last day of class (Thursday June 30th). Each will be cumulative and contain a similar diversity of question styles as the weekly homework. The number of questions will be such that you will have plenty of time to complete the exam in the 2h session. Make-ups will not be allowed, except under extreme circumstances. The midterm and final will be closed-book but you will be allowed to bring a two-sided Letter format sheet with any material you like (and in any font you can read!).

Office Hours

Office hours are meant to be the time for you to ask clarifications about materials covered in class or in homework sets. ***No new material will be introduced during office hours***. A schedule of weekly office hours (held in TALC) will be determined by popular vote on the first day of class. ***Attendance is not mandatory but strongly encouraged***. In addition to the formal office hours, I am happy to answer questions asked via email at any time of day, but you may find that my replies outside of my in-office hours are both slower and shorter.

Grading Policy

Final grades will be assessed based on the weighted average of course components (see graphics on the first page). Letter grades will be assigned based on the criteria in the table below. ***Grades will not be curved***: it is mathematically possible for every student to get an A in this course, although this will require both a mastery of the course material and full engagement with the various course activities. Students taking the class Pass-Fail must achieve at least 70% for a passing grade.

Percentage	Letter Grade	Grade Point	Percentage	Letter Grade	Grade Point	Percentage	Letter Grade	Grade Point
95-100	A	4.0	80-82	B-	2.7	67-69	D+	1.3
90-94	A-	3.7	77-79	C+	2.3	64-66	D	1.0
86-89	B+	3.3	74-76	C	2.0	60-63	D-	0.7
83-85	B	3.0	70-73	C-	1.7	< 60	F	0.0

I understand that your grades are an important part of your experience of this course, and I will work hard to grade assignments and exams fairly and accurately. If you believe there has been an error, please go through the following steps:
1) Read the solution in detail.
2) Tally up the number of points you believe you were wrongly denied.
3) Write out your reasoning for each error you think has been made.
4) Submit the assignment back to me for a complete re-grading. Re-submitted assignments will not be accepted more than 4 days after they are returned to you (i.e., no later than the due date for the next homework assignment).

Special Accommodations

If you require any special accommodations for the lectures, discussion sections, or exams in this course (including accommodations for hearing, seeing, or time, as well as physical accommodations in the event that the room must be evacuated quickly), please let me know early in the session. If you would prefer not to discuss the details of the situation with me, you can get a letter from the Disabled Students Program (DSP; http://dsp.berkeley.edu), which will allow me to accommodate your needs with no questions asked.

Honor Code

Students should know and uphold the official campus honor code: "As a member of the UC Berkeley community, I act with honesty, integrity, and respect for others." Further information on the honor code can be found at http://asuc.org/honorcode. Two honor code areas of particular importance are academic honesty and harassment. The detection of cheating will result in severe academic consequences. Cheating is broadly defined as submitting another person's work (whether a classmate's or content from the internet) as if it were your own. Work done as a group and material collected from other resources should be clearly identified as such. The Astronomy Department's official policies on cheating will apply at all times and may be found at http://astro.berkeley.edu/programs/undergraduate-program/policy-on-academic-misconduct.

Harassment on the basis of race, color, national origin, age, gender identity, and/or sexual orientation and identity will not be tolerated. In particular, sexual harassment is unacceptable and unlawful. Sexual harassment is defined as unwelcome sexual advances, requests for sexual favors, and other verbal, nonverbal, or physical conduct of a sexual nature. Note that these definitions of harassment include conduct outside of class as well as online. If you observe, or are victim of, behavior that you believe to be harassment, sexual or otherwise, you should know that there are many resources available on campus to report and act on such behavior; a detailed overview is available on the Astronomy Department website (at http://astro.berkeley.edu/department-resources/reporting-harassment).