

STARS AND GALAXIES ASTRONOMY SYLLABUS

Instructor: David Vakil.

Course: Astronomy 25

Class time: Section 1060: TTh 9:30-10:55am.

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America Online Instant Message screen name: astrteach

Yahoo Instant Messenger screen name: ecc_astrteach

Web Page: http://www.elcamino.edu/faculty/dvakil/astronomy_25.html -- All materials except tests will be posted on the web page. If something is missing, please inform me.

Office Hours: (morning) MW 9:30-10:30am, Th 11-11:30am,
(afternoon) MW 2:30-3:30pm, OR by appointment, OR just stop by! I'm around. **Use them!**

Text You must have regular access to one of the following two texts:

The Cosmic Perspective: Stars, Galaxies, and Cosmology, 4th edition by Bennett, Donahue, Schneider, and Voit. **OR** *The Cosmic Perspective*, 4th edition by Bennett, same authors, etc. [called "combined version" below]

Textbook costs: Retail is approximately \$65 for the Stars version, \$110 for the combined version.

Required clicker: TurningPoint XR clicker. Available from bookstore in software cabinet near register 9. Approximately \$50. You **MUST** purchase this. **Exams will be administered using the clicker.**

Note: the combined-volume version will be on reserve in the library, for use in the library.

You will need to get:

1. **The clicker**
2. **The textbook**
3. **A picture of yourself on a 9 x 11½ manila folder labeled on the tab with your name.** The picture should be glued, taped, or stapled, but NOT paper-clipped, on the front of the folder to help me learn your name and quickly hand back your materials. I prefer you to be the only person visible in the photo. [+1 extra credit point]

Deciding on the textbook I recommend the combined version book to students who are taking (or who plan to take) Astro 12 (the lab class) or Astro 20 (Solar System). The full version book is the text for both Astro 20 and 25 for my classes only. (Other teachers use other books, so be careful.) The lab class covers material from both classes. Students who think they may develop a recreational interest in astronomy are also encouraged to buy the combined version. However, if you know you will sell back your book at the end of the semester, get the single-volume version specifically titled "Stars, Galaxies, and Cosmology" to save money.

Tutoring There is a FREE tutor, named Jessica, available in the Learning Center of the library. Her hours are Wednesdays and Thursdays from 9:00-11:30am. She has taken all of the astronomy courses, some with me, so she is a good resource for you. She can also be reached at jlasbell@yahoo.com. She is very knowledgeable and friendly. Put that to good use. For students in Astronomy lab courses, Jeff is available Tuesday nights on the math roof for tutoring (emphasis on telescope usage). This evening tutoring availability is subject to change.

Course goals

It is my hope that you will have developed the following qualities/skills after completing this class:

Primary goals written by Professor Vakil

1. **Appreciating** science in general, and astronomy in specific.
2. **Understanding** how knowledge is gained and how to be critical of what you see and hear. You will begin to ask “How can we test that?” when forming hypotheses or “How do we know that?” when reading new information.
3. **Distinguishing** scientific from non-scientific work, and therefore understanding what science is.
4. **Developing** a working knowledge of the scientific method and how to apply it to real world situations.
5. **Critically analyzing and evaluating** information, scientific or otherwise

Student Learning Outcomes written by Professor Vakil

You will develop a basic familiarization or understanding of:

1. some simple astronomical nomenclature/terminology
 2. objects as they appear in the sky and how these change
 3. light and different processes that cause light to be emitted or absorbed
 4. star characteristics, structure and evolution
 5. galaxy structure, evolution
 6. cosmology and the implications of the Big Bang theory
- these boxed items form the bulk of the course
7. some problems astronomers and astrophysicists are trying to solve
 8. how scientists are trying to solve these problems

More about Student Learning (Behavioral) outcomes – from the Astronomy Department.

Most of the following should be achievable during this course:

1. Judge whether a particular study is a science or a “pseudo-science” using the scientific method.
2. Diagram the positions of the Sun, the Earth, and the Moon during solar and lunar eclipses.
3. Predict the phase of the Moon seen in the sky, given the positions of the Earth, the Sun, the Moon, and the observer.
4. Explain the causes of seasonal variations in the length of the day, the direction of sunrise and sunset, and the amount of solar heating.
5. Explain how electromagnetic radiation and astronomical instruments are used to reveal the properties of stars and galaxies.
6. Diagram and explain radiative transport in the Sun. Explain the causes of surface features on the Sun.
7. Calculate the distance to a star.
8. Contrast the life history of a low-mass star with the life history of a high-mass star.
9. Explain how black holes are formed and their effect on their surrounding environment.
10. Describe the structure and contents of the Milky Way Galaxy.
11. Compare and contrast elliptical, spiral, peculiar, dwarf, and irregular galaxies.
12. Illustrate how galaxies are distributed through space.
13. Diagram the process of nuclear fusion.
14. Discuss the evidence for Dark Matter and Dark Energy.
15. Evaluate the significance of the major evidence in favor of the Big Bang theory.
16. Evaluate the possibility of intelligent life around a particular star.

Astronomy 25 is an introductory-level course which concentrates on the foundation of modern astronomy and the study of the major constituents of the universe. The course has no astronomy, physics, or math prerequisites.

A sense of curiosity regarding the universe in which we live is an essential asset in any science course. Develop the habit of questioning, critiquing, and wondering about the things you observe around you; the quality and enjoyment of your life will be immensely enriched. Hopefully this class will help you ask and answer questions.

Learning stars, constellations, and the structure and origin of the universe

If you are looking for a class that will teach you about specific stars and constellations, you should enroll in Astronomy 12, which is a nighttime astronomy lab class that will use the planetarium more than we will. You will receive credit for both Astronomy 25 and 12 **except this fall 2007 semester, where astronomy 12 is not transferable to the UC system**. If you are interested in learning about planets, moons, comets, asteroids, or similar objects, you should enroll in Astronomy 20. These topics will be covered very minimally in astronomy 25 (if at all).

Credit for the Course, Transferability to Another University

Credit for 3 units of Astronomy 25 is fully transferable to the California State University system. Credit is fully transferable to the U.C. system unless you also take Astronomy 20 (see a counselor if you have taken or will take Astro 20 and are planning to transfer to a U.C.) If you have already taken and passed Astronomy 11, you will not receive credit for this course.

Grades and Tests

Your overall course grade will be determined as follows:

- Clicker questions/attendance/participation..... 5% total..... No penalty for getting questions wrong.
- Quizzes (¿and potential homework?)..... 15% total..... There will be frequent graded quizzes.
- 4 Tests..... 20% each..... Mostly multiple choice questions.

A grade of "A" will be earned for a 90% average, "B" for 80%, "C" for 65%, "D" for 50%, and "F" for below 50%. This scale will not be revised during the semester.

Clicker questions/attendance/participation

A radio-frequency personal response system (a.k.a. “clickers” which function like “Ask the audience” on TV’s *Who Wants to Be a Millionaire*) will be used frequently during the class. Clickers will be used to take attendance daily and to ask questions during class. Answering these questions will give you full participation points. There is no penalty for answering incorrectly. Clickers will also be used for short graded quizzes and our full-length exams.

Quizzes

Be prepared for frequent quizzes, often to accompany reading assignments. Quizzes will usually occur at the beginning of each class and sometimes you will receive a helpful handout on days before the quiz is given.

Tests

- Test dates: (These dates are tentative and may change; any changes will be announced in class at least 1 week prior)
- #1 Week of September 24-28
 - #2 Week of October 22-26
 - #3: Week of November 19-23 (Thanksgiving)
 - #4: Last day of class

Bring your clicker to all tests!

Test re-writes are available for the first three tests. These rewrites are an educational way to increase the scores you earned for the tests. See elsewhere in this syllabus for test rewrite directions and for more information.

There are NO MAKE-UP TESTS. If you know you will be absent on one of the dates above, contact the instructor at least one week prior to the test to see if there is a way to accommodate you at another time. **There**

are no exceptions to this rule: if you do not contact the instructor one week prior to the test and you miss the exam, you will receive a zero on the test. But it's not so terrible. Keep reading and see the example below...

All students will have their lowest test grade replaced by 0.9 times the average of the other tests, if it is to their advantage. Thus, something could replace any test missed (or poorly done).

Example of the test replacement policy:

Assume your four test scores are: 50%, 71%, 74%, 80%.

Average of top 3 scores = 75%.

$75\% \times 0.9 = 67.5\%$. Therefore, 67.5% is the replacement score for this example.

The four scores that will be used to calculate the test grade will be: 67.5%, 71%, 74%, 80%.

The 50% test got replaced by 67.5%. In this example, any score lower than 67.5% would get replaced.

If the lowest test had been 70%, instead of 50%, the 70% score would not be replaced. In this example, anything higher than 67.5% would not get replaced.

I will attempt to keep you up-to-date with your class grade – come to my office for up-to-the-minute updates, should you desire one.

Attendance and Expectations

Please be prompt and do not leave class early without a good reason. Frequent disruptions of the class will negatively influence your grade. **Attendance in this class is mandatory, will be taken daily, and will form part of your grade.** The reason attendance is mandatory is because material will be covered in class in more detail than in the text and this extra material will appear on tests.

If you've missed more than **six** classes without justification, and you are failing, you **may** be dropped. If you wish to be dropped from the class, it is your responsibility to withdraw. Do not count on me to drop you just because you do not show up for class. Students who withdraw from the course after **November 16** will receive a letter grade based on the entire semester's requirements. If you wish to receive a refund for this class, you must drop by **September 7**. If you wish to drop and receive no mark on your record, do so by **Sep 21**.

You should plan to work outside of class for at least 1.5 hours (and more likely 2-3 hours) for every hour of class time (which amounts to 4.5-9 hours per week). It should take you at least 30 minutes alone to do the required reading each night. While this may sound like a lot, it is no more an impingement on your time than most college classes at four-year schools (e.g. USC, UC, CSU). You are expected to work at (or above) the college level and most of you will find that this requires a lot of preparation outside of class.

The most important expectation I have of you is to **ask questions** (either in class or in office hours) especially if you do not understand something covered in class (or in the readings). **Don't be shy**, since **others likely share your concerns**. Chances are that if you are having trouble with something in class, **you are not alone** and I need to address it.

Cell Phones and Pagers – please turn them off

Ringing phones and pagers are distracting to the teacher and other students. Please be considerate and turn off such devices.

Keep all handed-back assignments. My computer frequently deletes and changes scores.

Disabilities

If you have a disability (learning, physical, seeing, hearing, or otherwise), let me know so I can work with you. You should also consider visiting the Special Resource Center, located in the Student Services Building.

Tips

I hope to create a friendly, non-threatening atmosphere in class. Hopefully this will give you an opportunity to form study groups you're your peers. I strongly suggest that you **compare class notes with peers after class**. Research has shown that such interaction is very helpful for most students. I also strongly suggest you **form study groups** and that you **study regularly, not just a day or two before the tests**.

Last but not least, please take advantage of the resources available to you. Those include, in no particular order:

1. The professor
2. Your classmates
3. The entire textbook, including the introduction "How to Succeed in Your Astronomy Class"
4. The questions asked by the book in the middle of the chapters
5. The end-of-chapter questions
6. Mastering Astronomy website: www.masteringastronomy.com, which is free to you when you purchase a new textbook.

Recently, an astronomy student who had received low grades on the first two tests started to seriously use **all** of the resources listed above. She also followed the advice given about studying regularly. As a result of her hard work and dedication, especially in the 2nd half of the semester, she earned the highest grade in her class on the 4th exam. The resources truly are helpful! But don't wait until midway through the course to use them!

SAMPLE INDEX CARD (USE BACK IF NEEDED)

Due next class

Last name, First name (nickname if preferred) Semester (e.g. Fall 2005)

Course (e.g. Astro 25)

Phone number (best one to reach you at)

Non-ECC Email address – print clearly! **You have a free ECC email address that you should use for ALL ECC emails: `firstname_lastname@elcamino.edu`**

Your job, how many hours per week you work

Major/Minor (if you have one)

Total units you're taking and/or what other classes you're in

Why are you taking classes at ECC?

What is your overall educational goal?

What do you hope to gain from this course?

Is there anything I should know about you as your instructor? (e.g. disabilities, bad vision, ADHD, etc.)

List two things you like people to know about you. (Hobbies?)

ASTRONOMY TEST REWRITE INSTRUCTIONS

For up to half of the credit lost per question (i.e. up to 1 point per question), you may rewrite any T/F or multiple choice questions that you got wrong, except the questions listed by the instructor when handing back the tests. To get credit, you must:

1. **On the first page, indicate which version of the test you took. (See question #1 on the test if there were multiple versions)**
2. Explain BOTH why your answer is incorrect and why the correct answer is correct. Often you can explain both with the same explanation.
3. You should NOT explain why you picked the wrong answer – you should only explain why that answer is not correct, as discussed in #2 above. (I'm not interested in why you got the answer wrong.)
4. Write or type all answers on your own paper, NOT the original test or scantron.
5. Do not write on the scantron form or on the test questions – I will not look at them.

This re-write is due one week after the test is handed back in class.

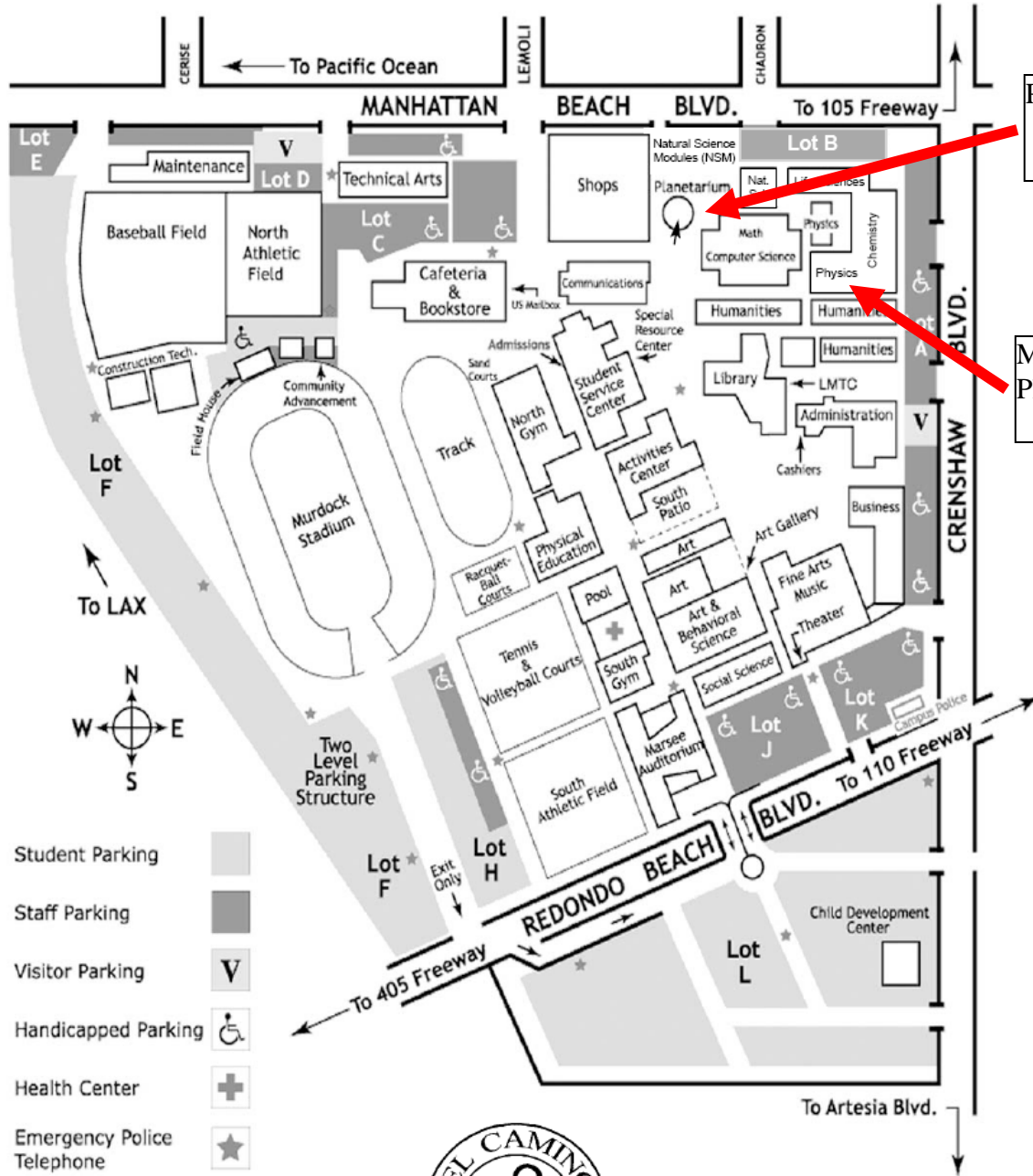
Questions NOT eligible to be re-written will be given during class.

Only Multiple Choice and True/False are eligible for re-writes.

Maximum extra credit per question re-written: 1 point (= ½ the value of the question).

You may use any resource available to you to help you determine the correct answers, including other people. However, what you submit must be written in your own words. If you work in a group, you must make sure not to have identical explanations or else you will get no credit for the assignment.

ECC CAMPUS MAP



Planetarium is here

Mr. Vakil's office =
Physics 117F is here



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