**SOLAR SYSTEM ASTRONOMY SYLLABUS**

**Instructor:** David Vakil (pronounced Vuh-keel)  
**Course:** Astronomy 20

**Class time:**  
**Daytime sections:** Section 1050: Fri 9am-12:10pm  
Section 1055: MW 1pm-2:25pm  
Section 1056: TTh 2:45-4:10pm  
(If you miss your class, you may be able to attend one of these other sections.)  
**Evening sections:** Section 1057: T 6-9:10 pm  
Section 1058: W 6-9:10pm

**Office:** Physics 117F (see map in syllabus)  
**Phone:** (310) 660-3593 x3134.  
**Email:** dvakil@elcamino.edu

**Web Page:** www.elcamino.edu/faculty/dvakil/astronomy_20.html  
All materials except exams will be posted on the web page. If something is missing, please inform me.

**Videos:** During class, I may wear a microphone and have my computer create a movie from what’s on its screen and what the microphone records. These videos will be posted on the videos website and a link will be available on the course web page. Please note: things you say may be recorded on the video. If you are reading this sentence, you have now discovered there is an extra credit assignment hidden in this syllabus in sentences like this one; keep reading. These videos are provided solely to help you succeed. They should help students who need to see/hear things again or at a different pace, as well as to help students who miss class. However, daily attendance is still mandatory, as described below. Do not rely on the video instead of coming to class!

**Office Hours:** MTWTh 10am-11am, TW 4:45-5:45pm OR by appointment, OR just stop by! I’m around.

**Tutoring** There is a FREE tutor, Jessica Asbell, available in the Learning Center of the library. *Her hours are Tuesdays & Thursdays from noon until 2:30pm.* 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 may be available one night per week on the math roof for tutoring (emphasis on telescope usage). This evening tutoring availability is subject to change; contact me for the latest information about the nighttime tutoring.

**SCANTRON FORM 882-E IS REQUIRED FOR ALL EXAMS!** The bookstore sells a 6-pack which I suggest you purchase. (Form 882-N-E is ok also, but has numbers instead of letters. My tests have lettered answers instead of numbered answers.) Total estimated scantron form cost: $1-2.

**Texts.** There are two texts and both are required.

<table>
<thead>
<tr>
<th>Text #1</th>
<th>Text #2</th>
</tr>
</thead>
<tbody>
<tr>
<td>required (or use the library’s reserved copy) and may be purchased bundled new with required text #2.</td>
<td>required text #2.</td>
</tr>
<tr>
<td>Bring this book to class every day, or sit next to someone who does.</td>
<td>Bring this book to class every day, or sit next to someone who does.</td>
</tr>
</tbody>
</table>

You must have regular access to one of the following texts:  
**OR**  
*The Cosmic Perspective*, 5th edition by Bennett, same authors. This version is called “combined version”. The ISBN is 9780321554499 if ordered bundled with text #2, and its ISBN is 9780321505675 on its own.

**Deciding on text #1**  
Textbook costs are: approximately $80 for the Solar System version bundled with text #2 or $132 for the “combined version” bundled with text #2. Adding text #2 to the bundle adds little cost to
the price. I recommend the “combined version” to students who are taking (or who plan to take) Astro 25 (Stars & Galaxies) with me or Astro 12 (the lab class) with any teacher. The “combined version” 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 not use your book after the end of the semester, get the single-volume version specifically titled "The Solar System" to save money.

**Note:** the “combined version” will be on reserve in the library, for use only inside the library. Both the 4th edition (which I used last semester) and 5th edition are on reserve. The 4th edition is similar to the 5th.

---

**Text #2 is a workbook and is also required. It is available at a discount when purchased new in a bundle with Text #1. Bring this book to class every day.**

The workbook is titled *Lecture Tutorials for Introductory Astronomy, 2nd edition* (black cover) by Prather, Slater, Adams, and Brissenden. This book will come bundled with text #1 if purchased new from ECC’s bookstore or using one of the appropriate ISBN numbers above. It costs approximately $30 if purchased separately and its ISBN on its own is 9780132392266.

---

**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 may use the planetarium more than we will. You will receive credit for both Astronomy 20 and 12. If you are interested in learning about stars, galaxies, black holes, the Big Bang, and the universe as a whole, you should enroll in Astronomy 25. These topics will be covered very minimally in astronomy 20 (if at all). The first code word is quasar.

---

**Credit for the Course, Transferability to a University**

Credit for 3 units of Astronomy 20 is fully transferable to the California State University system. Credit is fully transferable to the U.C. system unless you also take Astronomy 25. See a counselor if you have taken or will take Astro 25 and are planning to transfer to a U.C.

---

**Grades, Homework, and Tests**

**Grades**

Your overall course grade will be determined as follows:

- Clicker questions/participation……….. 20 pts total*………….No penalty for getting questions wrong
- 4 Tests………………………………… 100 pts each**………Multiple choice types of questions
- Homework………………………………approx 40-50 pts…… Assignment type varies. See other handout.
- Extra credit…………………………….. Up to 30 pts max…….See other handout for more information.

* There is a correlation between participation and final course grade. The more often you come to class and participate, the more likely you are to receive a better grade. While participation usually helps, it does not guarantee any specific grade.

**Each test will be graded out of a different number of questions. Your score will be converted into a percent, which I called “points” in the table above. The second code word is brown dwarf. For example, test 1 may be graded out of 75 questions. If you got 68 correct, you’d have 68/75 = 90.7% = 90.7 points. What matters is your percent on each test.

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.
Homework

Homework will be collected almost every day in class, except on days when we have tests. For classes that meet only once per week, two separate homework assignments may be collected in a single class session. Each homework assignment will be graded out of 2 points, with points assigned as follows:

- 2 pts: Essentially correct and meets expectations
- 1 pts: Needs improvement (you need to look carefully at the answers and perhaps see me)
- 0 pts: No meaningful attempt
- 3 pts: Wow, clearly exceeds expectations (this grade is rare)

You may also receive an intermediate score, such as 1.5 pts or ½ pt

Unless you request otherwise, it is likely you will only receive a score on your homework paper when you get it back. However, if you wish for more detailed comments from me, write your request clearly in large and/or colorful letters at the top (so I notice your request) and I will do my best to honor your request. I do tend to write more comments on homework submitted via email.

Homework will be accepted during the first 15 minutes of class. It need not be typed, but it must be easy for me to read in order to receive credit. You are also welcome, but not required, to submit homework via email before class, as long as you indicate which day(s) your class meets in the subject line of your email. I will reply with an email or two acknowledging I received your email and informing you of your grade on the assignment. These two emails may come separately or may be combined into one.

If you do not submit your homework by the beginning of class, you are given two NQA (No Questions Asked) coupons near the end of this syllabus. You may submit an NQA coupon instead of a homework assignment. The NQA coupon may be submitted up to one class after the homework was due. Submitting a coupon will give you 2 points on the assignment. I will keep track of coupon usage on my computer, so you do not need to cut the coupons out of your syllabus. However, you also may use your coupon(s) to postpone the due date for test rewrites, which tend to earn you MUCH more credit than a homework assignment. See below for more information about the NQA coupon.

Clicker questions/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 and 1 vs. 100) 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.

Tests

- For classes that meet twice per week, tests will take place on the second day of the week.
- SCANTRON FORM 882-E IS REQUIRED FOR ALL EXAMS!

Test dates: (These dates are tentative and may change; changes will be announced in class at least 1 week prior)

- #1 Week 4, September 15-19
- #2 Week 8, October 13-17
- #3: Week 12, November 10-14
- #4: Last day of class (week of December 8-12)

The 4th test will be on the last day of class and is NOT cumulative. It is the last exam, but not what most students think of as a “final exam.”

You are permitted and encouraged to use one handwritten 3-inch by 5-inch double-sided index card for each test.

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 and help you learn from your mistakes. See elsewhere in this syllabus for test rewrite directions and for more information. The third code word is your first name.

If you miss an exam… There are no make-up tests. If you know you will be absent on one of the dates above, contact the instructor at least two calendar days prior to the test to see if there is a way to accommodate you at another time (e.g. another section). There are no exceptions to this rule: if you do not contact the
instructor two calendar days 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, you can replace any test that you missed or did poorly on.

Example of the test replacement policy:
Assume your four test scores are: 50%, 71%, 74%, 80%.

Average of top 3 scores = 75%.

75% x 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.

Late Policy, Campus Deadlines, Attendance, and Expectations

All homework must be submitted within the first 15 minutes of class on the day it is due. If you miss the deadline, you may submit the NQA coupon. Other than NQA coupons (which can be used up to one class after the assignment was due), no assignments will be accepted more than 15 minutes after the beginning of the class when they are due, unless arranged prior to class. Leaving me a message notifying me that you’ll be late does NOT count as prior arrangement. The fourth code word is your last name.

Please be prompt and do not leave class early without a good reason. 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. We will also be doing several activities that require your participation and discussion. For this reason, watching the videos at home instead of coming to class is insufficient.

If you’ve missed more than six hours of class without justification, you may be dropped. However, 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 14 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 5. If you wish to drop and receive no mark on your record, do so by September 19.

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 and homework 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. The note card that I ask you to fill out (see homework handout) is a good place to do this. You should also consider visiting the Special Resource Center, located in the Student Services Building. The fifth code is my (i.e. your astronomy professor’s) last name and my office location.

Safety notice

Campus police and cadet escorts are available to take you to and from your car before, during, and after class. You can contact them with a campus “blue light” phone, located in various areas on campus. Or ask your instructor to call them for you. I am certainly happy to place this call. If you prefer, you can call them from any phone: 310-660-3100, or dial 3100 from any campus phone.

Tips

I hope to create a friendly, non-threatening atmosphere in class. Hopefully this will give you an opportunity to form study groups with 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! This story (and its occurrence more than once) is why we now have frequent homework assignments based on the 4th (starred) item in the list above. It truly is for your own good, I promise.
ASTRONOMY TEST REWRITE INSTRUCTIONS

For up to half of the credit lost per question, you may rewrite any questions that you got wrong, except the ineligible questions listed by the instructor when handing back the tests. (These ineligible questions will also be posted to the web page.) To get credit, you must:

1. Explain BOTH why your answer is incorrect and why the correct answer is correct. Often you can explain both with the same explanation.
2. 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.)
3. Write or type all answers on your own paper, NOT the original test or scantron.
4. 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, except as noted in the next sentence. You may use the NQA coupon to postpone the rewrite due-date by one week. After that, the test rewrite will not be accepted.

| 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: 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.

Test rewrites, like all homework, may be submitted by email.
Everyone deserves another chance, so here are two “NQA coupons” for you. You may use an NQA coupon if you are unable to turn in a homework assignment on the day it is due. For homework assignments, the coupon must be submitted no later than one class period after the assignment this coupon replaces is due. You may also use the NQA coupon to postpone the test rewrite due-date by one week. Coupons will not be accepted for anything other than homework assignments or postponing test rewrites.

**For once-a-week classes,** you will often have two assignments due per week, so you will need to use BOTH coupons if you forget all of your homework for the week.

Remember there are many ways to get the homework to me on time, even if you don't make it to class. You can ask a classmate to submit it for you (although YOU are held responsible if I don’t get it), you can email it to me, or drop it off early.

**You need not cut out the coupon below. You can simply turn in a piece of paper (or email) with your name, the day(s) your class meets, and which assignment you are using the coupon for.** I keep track in my computer of which assignments you have used your coupon for and how many you have used.

**NO QUESTIONS ASKED COUPON #1**

Used by: _____________________________________________

Used for: _____________________________________________

Only valid for Homework Assignments or for postponing test rewrites.

**NO QUESTIONS ASKED COUPON #2**

Used by: _____________________________________________

Used for: _____________________________________________

Only valid for Homework Assignments or for postponing test rewrites.
Please read this entire sheet! Keep this for your records.

Each clicker has a label on the back with a number on it. From now on, you should use the same clicker for every class.

My Clicker Number is ______________

Voting
To vote, press and release the number of your choice. The light above the “1” should blink amber (orange) until the signal is received by the teacher’s computer. When the signal is received, the light should turn green and then go off. If your response was a valid choice (i.e. 1 or 2 for a True/False question – 3 through 9 are not valid choices for T/F questions), the response box (projected on the same display as the question) corresponding to your clicker number should change from the background color to a different color.

Changing your vote
Except for questions that allow more than one choice, you may change your vote as many times as you like until polling closes. Only your final vote will be recorded by the computer unless told otherwise. Each time you change your vote, the response box corresponding to your clicker number will alternate between two colors. Polling opens when the PowerPoint presentation shows a green box in the upper right corner. When that box turns red, polling closed.

Troubleshooting:
1) If your signal was not received by the teacher’s computer, your light will flash amber (orange) up to 10 times and then turn red. Try resubmitting your vote. If it doesn’t work the second time, try again and if it still fails, ask your teacher for a temporary replacement clicker to be used for the rest of class.
2) Don’t press the “Go” button below the “7”. This will change the “channel” of your clicker, and your teacher’s computer only reads channel 41 right now. All clickers are currently set to channel 41. If you do accidentally press “Go”, the colors on your clicker light should alternately flash red-orange-green. When this happens, press “4” and “1” and press “Go” again. This should turn the light green, indicating you successfully changed back to channel 41. If not, try “Go” “4” “1” “Go” again. If that doesn’t work, ask your teacher for a temporary replacement clicker to be used for the rest of class. The last syllabus extra credit word is astronomy.

On your homework sheet, there is a clicker contract you MUST sign and submit to the instructor.
Planetarium is here

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