

# ASTRONOMY 4

## De Anza College

Section 1

M - F, 8:30 - 9:20 am

De Anza Planetarium (PLT)

Marek Cichanski

Office: S-15a

Office hours: M thru F 9:30-10:20am; other times by appt.

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**IMPORTANT:** This syllabus document is only a `condensed' version of the class website! For all of the information you need about this course, see the class website at: <http://mrcgeoastro.com/astro4/index.html>

### TEXTBOOK

***The Solar System, 9th edition*** by Seeds & Backman

(You can use the 8th edition if you want - the reading assignments and `What2Know' list have both the 8th and 9th edition pages listed.)

### STUDENT LEARNING OUTCOMES

You'll be learning a lot about our solar system - and others - this quarter. You'll also learn a lot about how a large college course like this works. Here are some specific things your instructor wants to help you do; I hope that doing these things enables you to become a more scientifically aware citizen, and gets you excited about science no matter what your eventual path in life!

SLO #1: "Evaluate claims about the nature of the physical universe using the scientific method of hypothesis testing."

*In other words:* We observe the universe around us and we wonder how it works; why is it the way it is? A proposed explanation for how the universe (or some part of it) works is called a *hypothesis*. When someone proposes a hypothesis, other scientists try to *evaluate* that hypothesis, by checking to see if its predictions fit all of the other relevant observations. This process, of making and testing hypotheses, is called the *scientific method*. It is a way of thinking about the world that minimizes our chances of fooling ourselves, and maximizes our chances of figuring out how things really work. Part of what you'll do in this class is to put yourself in a scientist's shoes, by using this method.

SLO #2: "Compare and contrast the histories of solar-system bodies (e.g. moons, planets, asteroids, comets, meteorites) by integrating data from spacecraft and Earth-based observatories."

*In other words:* Many scientists - with job descriptions like *astronomers* and *planetary scientists* - study solar systems and the things they're made of (stars, planets, asteroids, etc). Their observations have shown a tremendous diversity among the things that make up our solar system, and among the solar systems that we know about in our galaxy. There are many differences from object to object, and from system to system, but there are some similarities, too. What are the reasons for these similarities and differences? Why, for example, did the Earth and Venus wind up so similar in some ways (size, mass), but so different in other ways (such as their surface temperatures)? These scientists use all of the information they can, both from Earth-based telescopes, and from spacecraft - to try and puzzle out these histories, and to try and understand the reasons for the diversity they see. In this class, I'll try to give you the opportunity to think like a scientist, and go through some of this reasoning yourself.

# Astronomy 4 lecture schedule, Winter 2017 Morning Class

**Important:** Dates of TESTS are fixed, but the *lecture topics* (shown in *italics*) are tentative. For example, we may or may not cover “Observatories...” on Feb 6th, depending on how quickly we cover the preceding material.

*Each test covers the material since the last test. See the What2Know list for details.*

*Final Exam is comprehensive - it covers the whole quarter.*

		MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
Wk. 1	Jan	9 <i>Class Enrollment</i>	10 <i>How the class works, Looking at the Sky</i>	11 <i>Diurnal apparent motions in the sky</i>	12 <i>Annual apparent motions in the sky</i>	13 <i>Apparent Magnitudes, The Ancient Two-Sphere Univ.</i>	14
Wk. 2	Jan	16 <b>HOLIDAY</b>	17 <i>Moon Phases: What we see in the sky</i>	18 <i>Moon Phases: What's really going on?</i>	19 <i>Eclipses</i>	20 <i>Seasons</i>	21 Last day to add
Wk. 3	Jan	23 <i>Pre-Copernican models of the universe</i>	24 <i>The Copernican model</i>	25 <i>“Galileo’s Battle for the Heavens”</i>	26 <i>Galileo: Jupiter’s moons and seeing a gibbous Venus</i>	27 <i>Tycho’s data and Kepler’s laws</i>	28
Wk. 4	Jan/ Feb	30 <b>TEST 1</b>	31 <i>Newton’s Laws: What causes a change of motion?</i>	1 <b>Review Test 1</b>	2 <i>Tides, How orbits work</i>	3 <i>How telescopes work</i>	4
Wk. 5	Feb	6 <i>Observatories on Earth and in space</i>	7 <i>Light and spectra</i>	8 <i>“Birth of the Earth”</i>	9 <i>Origin of the Solar System</i>	10 <i>The Sun: Structure, Fusion, Magnetic field</i>	11
Wk. 6	Feb	13 <i>The Earth: A quick course in geology and geophysics</i>	14 <i>Earth’s Moon: What formed all those craters?</i>	15 <i>Earth’s Moon: Its origin, geology, and exploration</i>	16 <i>Mercury: The (slightly) shrinking planet</i>	17 <b>HOLIDAY</b>	18 <b>HOLIDAY</b>
Wk. 7	Feb	20 <b>HOLIDAY</b>	21 <b>TEST 2</b>	22 <i>Comparative planetology: Venus and Earth</i>	23 <b>Review Test 2</b>	24 <i>Mars: Early observations and discoveries</i>	25
Wk. 8	Feb/ Mar	27 <i>Mars: Evidence for water and the search for life</i>	28 <i>“Five Years on Mars”</i>	1 <i>Jupiter: The giant planet</i>	2 <i>Jupiter’s Moons: Ice, volcanoes, and the search for life</i>	3 <i>Saturn and its rings</i>	4 Last day to drop with “W” grade
Wk. 9	Mar	6 <i>Saturn’s Moons: Ice, geysers, a giant “walnut”, and lakes</i>	7 <i>Uranus</i> <i>Neptune</i>	8 <i>Asteroids: A failed planet</i>	9 <i>The Dawn mission: Asteroids Ceres and Vesta</i>	10 <i>Meteors and meteorites</i>	11
Wk. 10	Mar	13 <b>TEST 3</b>	14 <i>Comets</i>	15 <b>Review Test 3</b>	16 <i>Rosetta: Mission to A Comet</i>	17 <i>Impact hazards and planetary defense</i>	18
Wk. 11	Mar	20 <i>Discovery of Pluto</i>	21 <i>New Horizons: Pluto revealed at last</i>	22 <i>What is a planet? and the search for Planet Nine</i>	23 <i>How to find planets around other stars</i>	24 <i>Extrasolar Planets: What we know so far</i>	25
Wk. 12	Mar/ Apr	27	28	29 <b>FINAL EXAM</b> 7:00 - 9:00 am	1	2	3

# Astronomy 4 reading assignments, Winter 2017 Morning Class

The reading assignments shown below should be done BEFORE each class.

Some assignments apply to both the 8th and 9th editions of "The Solar System" by Seeds and Backman.

Where the pages are different between the two editions, the 8th and 9th edition pages are listed separately.

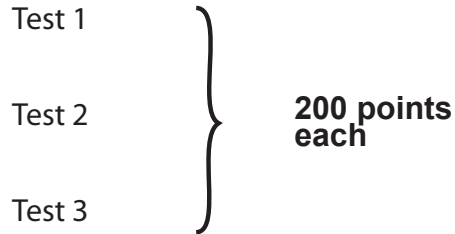
	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
Wk. 1	Jan 9 <i>Class Enrollment</i>	10 <i>How the class works, Looking at the Sky</i> Chap. 1	11 <i>Diurnal apparent motions in the sky</i> p. 18-19	12 <i>Annual apparent motions in the sky</i> Sec. 2-2, 2-3	13 <i>Apparent Magnitudes The Ancient Two-Sphere Univ.</i> Section 2-1	14
Wk. 2	Jan 16 <b>HOLIDAY</b>	17 <i>Moon Phases: Drawings 2a, 2b</i> in "The Phases of the Moon"	18 <i>Moon Phases: What's really going on?</i> Section 3-1	19 <i>Eclipses</i> Sec. 2-2, 2-3	20 <i>Seasons</i> 8th: p. 22, 24-25 9th: p. 22-25	21 Last day to add
Wk. 3	Jan 23 <i>Pre-Copernican models of the universe</i> 8th: p. 55-59 9th: p. 56-61	24 <i>The Copernican model</i> 8th: p. 60-63 9th: p. 59, 62-64	25 <i>"Galileo's Battle for the Heavens"</i> 8th: p. 70-73 9th: p. 71-74	26 <i>Galileo: Jupiter's moons and seeing through the telescope</i> 8th: carefully review Figs. 4-17 and 4-18 9th: Fig. 4-18	27 <i>Tycho's data and Kepler's laws</i> 8th: p. 64-69 9th: p. 65-70	28
Wk. 4	Jan/ Feb 30 <b>TEST 1</b>	31 <i>How Stars are Born</i> 8th: p. 78-84 (up to Sec. 5-2) 9th: p. 80-86 (up to Sec. 5-2)	1 <b>Review Test 1</b>	2 <i>Tides, How orbits work</i> Section 5-2	3 <i>How telescopes work</i> Sec. 6-1, 6-2	4
Wk. 5	Feb 6 <i>Observatories on Earth and in space</i> Sec. 6-3 thru 6-5	7 <i>Light and spectra</i> Chap. 7	8 <i>"Birth of the Earth"</i> 8th: Sec. 19-1, 20-1, 20-2 9th: Sec. 10-2, 11-1, 11-2	9 <i>Origin of the Solar System</i> 8th: Sec. 19-2, 19-3 9th: Sec. 10-1, 10-3	10 <i>The Sun: Structure, Fusion, Magnetic Activity</i> Chap. 8	11
Wk. 6	Feb 13 <i>The Earth: A quick course in geology and physics</i> 8th: Sec. 20-3, 20-4 9th: Sec. 11-3, 11-4	14 <i>Earth's Moon: What formed it?</i> 8th: p. 450-456 9th: p. 244-250	15 <i>Earth's Moon: Its origin, geology, and evolution</i> 8th: p. 457-461 9th: p. 251-255	16 <i>Mercury: The (slightly) shrinking planet</i> 8th: Sec. 21-2 9th: Sec. 12-2	17 <b>HOLIDAY</b>	18 <b>HOLIDAY</b>
Wk. 7	Feb 20 <b>HOLIDAY</b>	21 <b>TEST 2</b>	22 <i>Comparative planetology: Venus and Earth</i> 8th: Sec. 22-1 9th: Sec. 13-1	23 <b>Review Test 2</b>	24 <i>Mars: Early observations</i> 8th: p. 483-490 9th: p. 278-284	25
Wk. 8	Feb/ Mar 27 <i>Mars: Evidence for water</i> 8th: p. 490-498 9th: p. 284-292	28 <i>"Five Years on Mars"</i>	1 <i>Jupiter: The giant planet</i> 8th: Sec. 23-1, 23-2 9th: Sec. 14-1, 14-2	2 <i>Jupiter's Moons: Ice, volcanoes, and auroras</i> 8th: Sec. 23-3 9th: Sec. 14-3	3 8th: p. 519-521 and 527-531 9th: p. 312-314 and 319-323	4
Wk. 9	Mar 6 <i>Saturn's Moons: "Titan" through "The Origin of Saturn's Moons"</i>	7 <i>Uranus</i> 8th: Sec. 24-1, 24-2 9th: Sec. 15-1, 15-2	8 <i>Asteroids: A failed planet</i> 8th: Sec. 25-2 9th: Sec. 16-2	9 <i>The Dawn mission: Asteroids Ceres and Vesta</i>	10 <i>Meteors and meteorites</i> 8th: Sec. 25-1 9th: Sec. 16-1	11
Wk. 10	Mar 13 <b>TEST 3</b>	14 <i>Comets</i> 8th: Sec. 25-3 9th: Sec. 16-3	15 <b>Review Test 3</b>	16 <i>Rosetta: Mission to A Comet</i>	17 <i>Impact hazards and planetary evolution</i> 8th: Sec. 25-4 9th: Sec. 16-4	18
Wk. 11	Mar 20 <i>Discovery of Pluto "The Discovery of Pluto"</i> 8th: p. 553 9th: p. 346-347	21 <i>New Horizons: Pluto revealed</i> 8th: p. 553-556 9th: p. 347-350	22 <i>What is a planet? and the search for Planet Nine</i>	23 <i>How to find planets around other stars</i> 8th: p. 422-426 9th: p. 213-218	24 <i>Extrasolar Planets: What are they?</i> 8th: p. 426-428 9th: p. 218-220	25
Wk. 12	Mar/ Apr 27	28	29 <b>FINAL EXAM</b> 7:00 - 9:00 am	1	2	3

# Astronomy 4

## GRADES

### step 1:

You take various tests and the final



FINAL EXAM 300 points

### step 2:

I drop the lowest midterm score

-200pts = 400 points of midterms

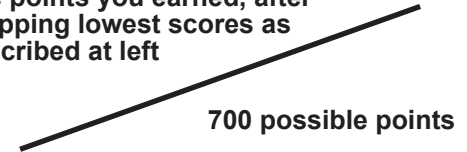
*There's no way I'm gonna drop **this** one...*

### step 3:

I calculate the final grade.

Your final percentage =

The points you earned, after dropping lowest scores as described at left



I then round your final percentage to the nearest whole percent, and use the following grading scale:

Notes:

1) A %-age like 88.7 rounds to an 89, so it's an A.

89-100	A
79-88	B
68-78	C
57-67	D
<57	F

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If something causes you to miss a test, that will be the one that you drop. This means that there are **NO MAKEUPS**.

You have to take all of your midterms and your final exam with **YOUR SECTION** of the class.

I'm afraid that my schedule won't allow me to give you a final at a different time in order to fit your vacation.

You'll need to plan around the final.

# Astronomy 4 Rules and Procedures

During the first few weeks of class, I will collect state-mandated attendance data using a sign-in sheet and/or seating chart.

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## ADDING THE CLASS:

If you add the class, *make sure that your add code has worked, and that you have been properly added to the class.* If not, it is your responsibility to check with the Admissions/Records office to find out how this can be corrected. After the end of Week 2, the College cannot process a late add, and you could find yourself not enrolled and not receiving a grade for the course, if you're not registered!

## DROPPING THE CLASS:

I would like to see everyone complete the course, earn a good grade, and become excited about science. However, the realities of life sometimes get in the way. You should assess your situation realistically throughout the quarter.

If you decide to drop the class, you must do so by the final date to drop with a "w", or you risk receiving an "F" if you haven't earned enough points to pass the class.

Let me re-emphasize that: If you decide to drop the course, it is *your* responsibility to go to the registrar and drop yourself. The deadline is the end of the eighth week.

## VERY IMPORTANT INFORMATION ABOUT DROPPING AND THE END OF THE QUARTER:

For many years, De Anza students have been given the impression that "your instructor can drop you" after the end of the 8th week. THIS IS CHANGING! We are no longer allowed to give a "W" on the final grade form. Additionally, I will NOT be able to drop you using a blue 'Addendum to Class List' form after the end of the 8th week. If you have a personal hardship after the end of the 8th week, you will have to request a "Late Drop" using a white form called "Petition for Exception to Registration Policies", which will be evaluated by the Registrar and/or the Academic Council.

## CLASS ENVIRONMENT:

Remember that we have all chosen to be in this class. We should thus have an environment that fits this choice.

Talking to your neighbor(s) while I'm lecturing, reading non-course material in class, doing outside homework, and using wireless devices of any kind are not allowed in class, and may result in dismissal for the remainder of the class period.

Such dismissal will count as an absence.

## TESTS:

After you start working on a test or quiz, you must hand it in before leaving the room.

If you arrive late for a test or quiz, you won't be given extra time to finish it.

On tests and quizzes, once the first person has turned it in and left the room, no further latecomers will be given tests.

If you find yourself wanting to use a calculator on a test (such as to solve an extra-credit question that involves a numerical calculation), you'll need to use a regular calculator; you can't use a cell-phone calculator.

## NOTICE:

Cheating on any exam or project is grounds for a failing grade in the class and a permanent note in a student's file. "Cheating" is defined (in this course) to be an effort by a student to obtain a grade by any means other than demonstration of that student's individual achievement in mastering the class material and/or fulfilling terms of a project.

Further grounds for expulsion from the class include any activity which interferes with others' ability to benefit from the class (such as chronic distracting behavior) or which degrades the Planetarium's function or environment.