

**Astronomy 2 - 01**  
MWF 2:30 – 5:00 (Class Number 70006)

Summer 2014 (1<sup>st</sup> session)

CLASSROOM: Nat. Sci. Annex room 102.

### OVERVIEW OF THE UNIVERSE

PROFESSOR: Dr. Martin Gaskell  
325 Thimann,  
[mgaskell@ucsc.edu](mailto:mgaskell@ucsc.edu)  
459-5078 (If you get my answering machine I suggest sending an e-mail rather than leaving a message since I check my e-mail much more frequently than my voice mail)

#### OFFICE HOURS:

(Check for possible changes)

Mondays	5:00 – 5:45
Tuesdays	4:00 – 5:00
Wednesdays	5:00 – 5:45

- or other times by arrangement – call 459-5078 to check. Please note that right before class I will almost always be busy checking that all is ready for class. My response to even small requests right before class might have to be “please wait until after class”.

#### REQUIRED MATERIALS

"Overview of the Universe", paperback, Schneider & Army (2008 edition). This book is available from the Bay Tree Bookstore only for the absolutely amazing price of \$5 (yes, that really is only five bucks!). (NOTE: this is NOT the \$69 book incorrectly listed under “Course Materials” on *ClassSearch*.)

"Star and Planet Locator" (Edmund Scientific) – available for \$3.20 from the Bay Tree Bookstore.

**DUE DATES AND TEST DATES** □ Mark your calendar NOW! (dates subject to possible change)

Constellation Test	– Wednesday July 2 <sup>nd</sup>
Midterm exam	– Wednesday July 9 <sup>th</sup>
Final (probable date)	– Friday July 25 <sup>th</sup>

The constellation test will consist of about 25-30 multiple-choice questions. The midterms and final (about 50 questions each) will consist of a mix of “true/false” questions and multiple-choice questions. Sample old test will be made available. Except as explained in class, ALL TESTS WILL BE BASED PRIMARILY ON MATERIAL COVERED IN LECTURES.

#### GRADES

Your SCORE will be calculated as follows:

Constellation test	17 %	Midterm	33 %
Mini-projects/homeworks	17 %	Final	33 %

[Sorry – no extra credit!]

Your GRADE will be assigned according to the following “curve”:

A+ $\geq$ 90%	B+ $\geq$ 74%	C+ $\geq$ 64%	F < 50
A $\geq$ 80%	B $\geq$ 70%	C $\geq$ 60%	
A- $\geq$ 77%	B- $\geq$ 67%	D $\geq$ 50	

#### Medical Emergencies etc.

If a medical emergency *etc.* interferes with some aspect of the course, I must get a doctor's note (or other written evidence) and I must be notified *as soon as possible*. Only people who satisfy these *two* conditions will be allowed to make up missed tests.

If you qualify for classroom accommodations because of a disability, please submit your Accommodation Authorization Letter from the Disability Resource Center (DRC) to me as soon as possible, preferably within the first week. Contact DRC by phone at 831-459-2089 or by email at [drc@ucsc.edu](mailto:drc@ucsc.edu) for more information."

#### OVERVIEW OF THE COURSE

This course is primarily designed to satisfy the science portion of general education requirements. Astro 2 satisfies the Mathematical and Formal Reasoning requirement (MF code), the Scientific Inquiry requirement (SI code), the Introductions to Disciplines requirement (IN code) and the old (pre-2010) Quantitative Courses (Q code) requirement. The course is intended for non-scientists with no math or science background (other than the general requirements for getting into UCSC). If you are a science or engineering major who just wants to take a fun course and learn a little about the universe, you're welcome as well (but do remember that this course is intended for non-scientists! - DON'T COMPLAIN THAT IT IS TOO EASY!). I have several aims in this course.

My first aim is to get you to learn your way around the sky; to learn what is up there, how things move, and what you can see with your unaided eye or a small telescope. We'll be working on this a lot at the start of the semester. You will do a couple of simple practical projects (the first is in the course pack) that will make you look at the sky and appreciate some of what is going on. Incidentally, if there is a reason why you cannot look at the sky, please see me as soon as possible. The stars will always be there and the knowledge you gain will be knowledge you will be able to keep with you the rest of your life (and perhaps pass on to your children and grandchildren). We'll talk about telescopes and there will be quite a number of chances for you to see through telescopes (see below). Some past students in my classes have been inspired to build their own telescopes! Almost everything talked about in the course can actually be seen

## SYLLABUS

through a small telescope during the course of the semester. In fact, almost everything can even be seen with just with a pair of binoculars!

My second aim is to answer all those questions you've been wondering like: How big are things in space? How far away are they? How long would it take to get there? How do the stars shine? How did the earth form? What is the difference between a pulsar and a quasar? What about black holes? What happens in them? Do they really exist? We'll consider exotic objects like red giants, white dwarfs, supernovae, and neutron stars. Then we'll look at what science has to say about some of the important ultimate questions about our universe: How did it begin? Is the Universe infinite? How will it end? We'll learn (in a non-technical way) about Einstein's theory of relativity. And then, what about us? What is the probability that we're the only life in the universe?

Finally, my third aim is to get you to appreciate how scientists (astronomers in particular) go about their business of learning about the universe. As is requirement fulfill the MF, SI, and Q codes we will be using (but explaining) university-level mathematics and discussing the essential roles of observation, hypothesis, experimentation and measurement in astronomy. In all we do, I will almost always want you not only to learn *what* we know, but *also how we know it*. We will look at the lives of some of the famous astronomers and see how their personalities, beliefs and environments influenced their work.

The organization of the course (see the syllabus) will be going outwards from the earth into space. We'll be starting with our earth and how the sky looks from California. From here we will be going out to the very edges of the known universe to see if we can answer some of those ultimate questions. We'll end up coming back to look briefly at our earth and the solar system in the context of the whole universe. At the same time, we will go in approximately historical order, from before the birth of Christ up to the latest cosmological discoveries. We'll see how mankind's view of the cosmos has evolved down the ages. If there are any newly breaking discoveries during the course of the class, I'll try to interrupt to give you "newsflashes" on them.

Lectures will be profusely illustrated with astronomical images and we'll have in-class demonstrations and movies. Questions in lectures are encouraged!

### Optional Star Viewings

We will be offering a number of optional star viewings for the class. These will depend on the weather and I will only announced these a day or so in advance. You are welcome to bring boyfriends, girlfriends, roommates, visiting family members, etc. along too. There will also probably be an opportunity to visit Lick Observatory.

### TOPICS

What's what in the universe/scale of the universe  
(Planets)  
(The Search for Life)  
How the sky appears to move; seasons  
The Constellations  
Seasons, precession  
Phases and rotation of the moon  
Eclipses  
Telescopes (how they work, what to buy, how to use one)  
Observing and appreciating the universe (and how you could make an astronomical discovery!)  
Orbits and gravity  
Atoms and Starlight  
Our Sun and its effect on the Earth  
Properties of stars  
Life Histories of Stars  
Deaths of Stars  
Pulsars, relativity, black holes and quasars  
Galaxies  
Cosmology

Detailed readings will be put on the web site as we go along. We will **not** be covering all material in the book. *Except when stated otherwise, TESTS WILL BE BASED ON LECTURES.*