Astronomy 1 Syllabus

Astronomy 1, Section 24153: Introduction to Astronomy
Spring 2009: 11:00-12:20 MW in Room C104
Office Hours & Place: TBA

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➔**Online Reference: www.Badtke.com or www.Qcounty.com (follow link to College of Alameda classes)**

Visceral Course Objectives: You're living in an amazing time, the third golden age of astronomy, and your appreciation of how fantastic this period is will be enhanced as you begin to understand the basic concepts of astronomy.

The first golden age of astronomy began during the late Renaissance when Copernicus placed the sun at the center of our solar system, when Galileo focused his telescope on planets, the cloudy Milky Way and nebulae, when Kepler helped us understand planetary orbits, and when Newton captured the nature of motion and gravity in laws and mathematical equations that finally enabled us to understand the dynamics of slowly moving, macroscopic matter.

The second golden age of astronomy began with Einstein's remarkable discovery that the speed of light is the same constant in every moving reference frame (special theory of relativity), that the geometry of our universe is defined by gravitation (general theory of relativity), and that our microscopic world is "digital" in ways that remain hard to comprehend even today (quantum mechanics). During the first half of the 20th century scientists discovered that the Milky Way is only one of billions of other galaxies, that our sun is situated far out on one of the spiral arms of the Milky Way, that the universe is expanding from an initial big bang, and that the motion of stars in galaxies appears to be dominated by dark matter.

The third golden age of astronomy began with the development of the transistor and micro-electronics, which led to the miniaturization of increasingly sophisticated calculations that were necessary for us to leave Earth to put men on the moon and to fly spacecraft throughout our solar system. And most recently high-energy particle accelerators have enabled us to see deeper and deeper into a subatomic world populated by photons, electrons, quarks, gluons and gravitons while the Hubble Space Telescope has enabled us to step outside atmospheric distortion to see deeper and deeper into our vast universe populated by galaxies containing red giants, white dwarfs, neutron stars, and black holes.

But don't be intimidated, don't be scared by words and ideas you don't understand. If you're afraid of math, don't worry. First of all, there won't be much math. But when there is, I'll walk you through what you need to know. If you're afraid of physics, don't be. The physics in this course will be conceptual. You'll learn the ideas, you'll become familiar with fundamental laws, and again it's my hope that you'll slowly realize that you never should have been afraid in the first place. And for those of you who have no fear of math or physics, there will be many fascinating ideas for you to explore.

Believe in yourself – I believe in you. If you work hard on your readings and journal and if you participate in class, you will understand at an introductory level the concepts mentioned above and many others. You will know how these wonderful, amazing ideas work together in our universe, and that will be about as much fun as you can have, with hard work, in a college course.

Required:

- *Discovering the Universe* by Neil F Comins and William F. Kaufmann III. 8th Edition ($130).
- A bound composition book, either lined or quadrille-lined, that will be your scientific journal (~$2).
- Edmund's *Scientific Star & Planet Locator* ($2.25).

Optional:

- An inexpensive scientific calculator. The TI-30XA, e.g., is about $12.

Specific Course Objectives: *Discovering the Universe* will guide us through the universe, a journey that you will record in your journals, the only resource you will be allowed to reference during quizzes and tests, and a journey that will enable you (1) to explain how theories in astronomy are based on observations; (2) to differentiate between planets, stars, galaxies and the universe in terms of scale; (3) to explain and discuss basic astronomical phenomena, including the seasons, the phases of the moon, eclipses, and planetary motion; and (4) to explain and discuss the origin, development, and properties of planetary systems, stars, galaxies, and the universe.

Some of the topics that we will cover in helping you to achieve these learning outcomes are the following:

- The evolution of our perceptions of space and time.

- Measurement techniques such as geometrical parallax, Doppler shifts and stellar composition that we use to determine the position and motion of astronomical objects.
- Electromagnetic radiation in its various forms and its importance to astronomy.
- The instruments and tools of astronomy.
- The origin and development of planetary systems.
- Stellar evolution and classification.
- The interstellar medium.
- The nature of nebulae, fuzzy objects, that include stellar explosions and galaxies like our own Milky Way.
- The evolution, composition and dynamics of galaxies and the evidence for dark matter.
- The big bang, our expanding universe, and the evidence for dark energy.
- And an evaluation of the probability that there's life elsewhere in the universe.

Ethical class behavior: In order for us to cover this material successfully, we have to engage in ethical behavior. By this I mean that in dealing with me and your classmates, treat others as ends, not as means; be happy for others when they succeed and be understanding when they struggle; be respectful of others' beliefs, most especially when they're different from your own; and be true to all these things even when no one is watching. In particular, since it's always ethical to write "I don't know" when you have an urge to glance at someone else's paper, any cheating on quizzes or exams will result in a zero on that quiz or exam and a 10% reduction in your overall grade.

Requirements & Grades:

Since your on-time attendance and classroom participation are critical to your success, it is imperative that you be in class from 11:00-12:20 Mondays and Wednesdays, ready to work with all required materials. Because you are allowed by school policy to miss one class for each credit, you have two free passes, but for each additional class missed beyond two, I reserve the option to reduce your grade by 5 percent.

1) **20% of grade:** In your scientific journals you will record class notes, answer chapter questions, solve simple astronomy problems, and also record observations that I will ask you to perform at home from time to time. You will be able to use your journals during your quizzes and tests, and you will hand in your journals with your chapter tests, which you will take every two to three weeks.

2) **30% of grade:** I will give frequent, short quizzes to make sure that you're keeping up with the reading and that you're understanding the concepts. If you are in class, pay attention, participate in discussions, take good journal notes, do the readings, and answer assigned questions in your journals, I expect that you will do quite well on your quizzes.

3) **50% of grade:** There will be chapter tests, each usually covering two to three chapters, and a final exam, which will cover all the material presented during the semester.

Important: Since one-on-one help can be the best kind of help, please make an effort to see me during office hours or make an appointment to meet with me.

Finally, will you be successful in Astronomy 1? Most students who struggle in my classes are trying to do too much because they start each week believing that there are plenty of hours to get everything done. Here's a quick calculation to help you determine whether you have enough time to do well:

Expect to spend two hours for homework for each class unit. Also don't forget that you need to sleep, eat, spend time with friends and family, get to all the places you need to go via car or public transportation, and also that you need to exercise and waste time to preserve your mental health. Let's say this is 15 hours each day (8 for sleeping, 2 for eating, 2 for commuting, and 3 hours for other things), which leaves you with just (24 - 15) x 7 hours per week = 63 hours. Now do the calculation below to see how much time you need:

Hrs of work per week = _____

Hrs in class per week = _____

Hrs of homework per week = _____ units this semester x 2 = _____

Add these to get total hours needed for work+class+study = _____

If you need more than 60 hours, you should consider cutting back on either work or school to be successful in Astronomy 1 *and* your other courses.