

## **ASTR 110 INTRODUCTION TO ASTRONOMY**

CRN 62117, Credits: 3

MWF 11:30 AM -12:20 PM, Imiloa 133

**INSTRUCTOR:** Marvin Kessler  
**OFFICE:** Hale Imiloa 136  
**OFFICE HOURS:** MWF, 10:30AM-11:20AM  
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**EFFECTIVE DATE:** Fall Semester, 2009

### **WINDWARD COMMUNITY COLLEGE MISSION STATEMENT**

*Windward Community College is committed to excellence in the liberal arts and career development; we support and challenge individuals to develop skills, fulfill their potential, enrich their lives, and become contributing, culturally aware members of our community.*

### **CATALOG DESCRIPTION**

Introduction to the astronomical universe for non-science students. (3 hrs. lect.)

#### **Activities Required at Scheduled Times Other Than Class Times**

One Star-Gazing show at the Imaginarium. These shows are held at 7:00 PM on the second Wednesday of each month. Substitution is permitted if student is unable to come at that time because of work commitment or similar serious impediment.

### **STUDENT LEARNING OUTCOMES**

Upon successful completion of the course, the student will be able to:

- Outline the development of astronomy from ancient times to present and explain the role of the scientific method in this historic context.
- Describe and explain the apparent motions of the celestial bodies, especially as related to naked-eye observations.
- Identify the appropriate instruments used by astronomers to understand the universe.
- Outline the origins of our solar system and appraise the leading cosmological theories of the origin of the universe.
- Describe the physical and chemical properties of the objects in our solar system and apply the concept of comparative planetology.
- Describe the physical and chemical nature of stars, and especially our sun, and apply the astronomical techniques used to measure stellar properties.
- Outline the evolutionary stages in a star's life and compare and contrast the structure of our Milky Way and other galaxies.
- Apply astronomical concepts to the search for extraterrestrial life.

## **COURSE TASKS**

### **1. Division of time**

Class on Monday will be devoted to lecture and assignments. Important sections of the textbook will also be highlighted. The focus of this first class of the week will be to listen, take direction, and read.

Class on Wednesday will be devoted to reports by students on the assignments that were given on Monday. There will be use of dyads and small groups for discussion. This is a day that will focus more on active learning. At the end of the class there will usually be time to write a “one minute paper”, which will be handed in to the instructor. Some of these will be used for grading. Students will be informed in advance if the paper will be graded.

Class on Friday will be devoted to trips to the Imaginarium and watching outstanding videos. The focus here is on motivation and inspiration. On a more somber note, Friday will also be the day for open book exams that will count for 1/3 of the points towards the course grade.

### **2. Reading**

The basic information source is the textbook (listed below). The class calendar (also listed below) gives dates on which each chapter of the textbook will be covered.

### **3. Participating**

Students are expected to participate fully with the instructor and their classmates through lecture-tutorial exercises, asking questions in class, and contributing to discussion.

### **4. Calculating**

Calculators are not required, but a ruler with both metric and English measurements on it will be needed. Calculators will be helpful for extra credit homework.

### **5. Using the Imaginarium**

The Imaginarium will be used to demonstrate the motion of the stars and the arrangement of constellations.

## **ASSESSMENT TASKS AND GRADING**

1. There will be four open-book tests, which will be given on the dates indicated on the class calendar. Each test will be worth 25 points, for a total of 100 points for the semester. These tests will be closely coordinated with the classroom discussion and assignments.

2. One Minute Papers will be worth 5 points each. They will consist of one or two essay-type questions. There will be about eight such papers. The purpose of these short essays is to help students formulate in their own words what they are studying.

3. Homework will be assigned on Monday and discussed on Wednesday. Some of the homework will be collected for grading. In general mathematical problems will not be assigned. Some such problems may be recommended for extra credit. Homework will count for 50 points.

4. Attendance at one Wednesday evening Star Show in the Imaginarium will be obligatory. It will be worth 10 points. A brief report must be submitted within one week. In writing this report, use the form that is attached at the end of this syllabus. If the student cannot attend the Star show because of work or other serious commitment, a substitute is available.

5. The Final Exam will be worth 100 points. It will cover select sections of the entire course. It will not be open-book. Study guide will be provided.

This adds up to a total of 300 possible points, as follows:

Four Tests (25 points each)	100 points
Eight One Minute Papers (5 points each)	40 points
Homework	50 points
Wednesday Star Show	10 points
Final Exam	<u>100 points</u>
TOTAL	300 points

None of the open-book tests, assignments, or one minute papers may be repeated or made up. If a student is ill or misses class for some excusable reason, he must contact Mr. Kessler immediately.

On tests, homework, and short papers the points earned will be reported to the student. At mid-term a letter grade will be given, and the final grade for the course will be a letter grade.

Correspondence between points and letter grade will be as follows:

- A- 90% to 100% of points,
- B- 80% to 89% of the points,
- C- 70% to 79%,
- D- 60% to 69%,
- F- 0 to 59%.

The grading standards given in the 2008-2009 Windward Community College Catalog, page 23, will be followed. The Catalog also allows for other assigned grades. Students are encouraged to consult the instructor at any time about their grade. If a student wishes to be informed of his/her final grade in advance of the official posting of grades, he/she should request this via email or should provide the instructor with a stamped, self-addressed postcard or envelope on the day of the Final Exam.

## LEARNING RESOURCES

REQUIRED TEXT: *The Essential Cosmic Perspective, Custom Edition*, by Bennett, Donahue, Schneider, and Voit. This is a loose leaf printing of the book. It is identical in every other way to the bound edition of the book.

WORKBOOK: *Lecture-Tutorials for Introductory Astronomy, Second Edition*, by Adams, Prather, and Slater

WEBSITE: [www.masteringastronomy.com](http://www.masteringastronomy.com)

## Additional Information

Students are strongly encouraged to spend time outside under the stars, identifying constellations, planets, the moon and their motions across the sky.

They also are encouraged to visit WCC's **AEROSPACE LAB**, located in Hale Imiloa, Room 135. Besides a large collection of astronomy related resource materials which the

student may borrow, there is a hands-on physical science museum. Phone 235-7321 for availability.

Students are directed to the **IMAGINARIUM** (planetarium) to avail themselves of the programs presented there on the second Wednesday of the month at 7:00 PM and the second Friday of the month at 7:00 PM. Reservations are recommended. Call 235-7433 for the Friday program and 235-7321 for the Wednesday program. Scheduled events are also listed on the college website.

Bundled with the textbook is *Sky-Gazer*, a **CD-ROM** that can be used as a planetarium in the student's computer at home or at one of the campus computer labs. This CD also has some animated graphics that help to understand seasons, eclipses, and retrograde motion.

- There is a table in the main hallway of Hale Imiloa that contains handouts (monthly star charts and astronomical events) and a list of internet sites for learning about constellations.
- The bulletin board in Hale Imiloa 133 is used to post print-outs of current astronomical discoveries. Most of these are from <http://spaceflightnow.com/news> and <http://skyandtelescope.com/news>.

# CLASS CALENDAR FOR FALL 2009

## Week 1 August 24-28

- Chapter 2, *Discovering the Universe for Yourself*. **Note: we are beginning with chapter 2, not with chapter one.**
  - Lecture-Tutorial, page 1: "Position"
  - Lecture-Tutorial, page 3: "Motion"
- Friday Special: Imaginarium, Constellations

## Week 2 Aug. 31 to Sept. 4

- Continue chapter 2.
  - Lecture-Tutorial, p. 7: "Seasonal Stars", p. 13: "Ecliptic"
- Friday Special: How to Use *Sky-Gazer*

## Week 3 Sept. 7-11 (Monday, Sept. 7 is a holiday)

- Continue chapter 2. From *masteringastronomy* website, Tutorial on moon phases.
  - LT, p.79: "The Cause of Moon Phases"
- Friday: report on assignments and discussion, like on a Wednesday

## Week 4 Sept. 14-18

- Continue chapter 2. Why do eclipses occur? What causes retrograde motion?
- Friday: Open Book Test 1

## Week 5 Sept. 21-25

- Chapter 3: *The Science of Astronomy*.
- Chapter 6, *Our Solar System and Its Origin*
- Friday Special: Imaginarium: *Stars of the Pharaohs*

## Week 6 Sept. 28-30, Oct. 2

- Chapter 7, *The Terrestrial Planets*
- Workshop on mystery of terrestrial planets
- Friday Special: video, *One Minute to Impact*

## Week 7 Oct. 5-9

- Chapter 8, *Jovian Planet Systems*
- Chapter 9, *Remnants of Rock and Ice: Asteroids, Comets, and Pluto*
- Friday: Open Book Test 2

## Week 8 Oct. 12-16

- Chapter 4: *Making Sense of the Universe*. Law of gravity and Newton's version of Kepler's third law
- Friday Special: video on history of telescope

**Week 9 Oct. 19-23**

Chapter 5: *Light: the Cosmic Messenger*. Tutorial on light.  
Friday Special: Imaginarium: *Cosmic Perception*

**Week 10 Oct. 26-30**

Chapter 5 continued.  
LT on light and atomic energy levels  
LT on electromagnetic radiation  
Friday: Open Book Test 3

**Week 11 Nov. 2-6**

Chapter 5 continued. Thermal curves. Doppler effect  
LT, p. 57: “Blackbody Radiation: Part I and II”  
Friday Special: to be determined

**Week 12 Nov. 9-13**

. Chapter 11: *Surveying the Stars*  
LT, p. 53: “Luminosity, Temperature, and Size: Part I and II”  
LT, p. 109: “H-R Diagram”  
Friday: class like on a Wednesday

**Week 13 Nov. 16-20**

Chapter 12, *Star Stuff*, the Lifeline of stars. Black Holes.  
LT, p. 111: “Star Formation and Lifetimes”  
Friday: Open Book Test 4

**Week 14 Nov. 23-27, Thursday and Friday are Thanksgiving Recess**

Chapter 14, *Our Galaxy*.  
LT, p. 123: “Milky Way Scales”  
Chapter 15, *A Universe of Galaxies*.  
LT, p. 131: “Looking at Distant Objects”  
LT, p. 133, “Expansion of the Universe”  
Friday Special: video, *The Universe*

**Week 15 Nov. 30 to Dec. 4**

Chapter 18, *Life in the Universe*. Is there life in our Solar System? Is Life possible in other Solar Systems? Is interstellar travel possible?  
Friday Special: Imaginarium: *Search for Life in the Universe*

**Week 16 Dec. 7-11, no class on Friday**

Review

**Week 17 Dec. 14-18, FINAL EXAM WEEK**

**Final Exam: Monday, December 14 at usual class time in Imiloa 133**

The above schedule has been carefully thought out and will be followed as much as possible, but there may have to be adjustments to it as the semester progresses. The Instructor will inform students of any changes at least one class day in advance. If a student is absent from class when changes are announced, it is the student's responsibility to find out about the changes.

# REPORT

This can be used to report on attendance at Star Shows in the Imaginarium and at Observing Sessions with the telescope. Obtain signature of the attending staff. **You may use the reverse side of this page.**

Attending Staff: \_\_\_\_\_ Date: \_\_\_\_\_

Description of the show or observing session:

Sketches of Constellations, Planets, other objects seen in the session:

What I found most interesting:

Student Signature \_\_\_\_\_