ASTR 110  INTRODUCTION TO ASTRONOMY
CRN 60102, Credits: 3
MWF 9:30-10:20 AM, Imiloa 133

INSTRUCTOR: Marvin Kessler
OFFICE: Hale Imiloa 136
OFFICE HOURS: MWF, 10:30AM-11:20AM
TELEPHONE: 222-6573 EMAIL: mkessler@hawaii.edu
EFFECTIVE DATE: Fall Semester, 2010

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. Between Monday and Wednesday the student should read the assigned pages of the textbook, outline them, do the homework, and answer the pertinent quizzes at the end of the chapter.
   Class on **Wednesday** will be devoted to reports by students on the assignments that were given on Monday. Extensive use will be made of the workbook, *Lecture Tutorials for Introductory Astronomy*. There will be use of dyads and small groups for discussion. This is a day that will focus on active learning. At the end of the class there will usually be time to write a “one minute paper” or take a short quiz, 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 or quiz 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. Friday will also be the day for open book exams that will count for 40% of 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. 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. The papers will be written responses to discussion or a video.

3. **Homework and Quizzes**. Homework will be assigned on Monday and discussed on Wednesday. On some Wednesdays there will be a Quiz to check understanding of the homework. In general mathematical problems will not be assigned. Homework and Quizzes will count for 25 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 75 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 250 possible points, as follows:

<table>
<thead>
<tr>
<th>Component</th>
<th>Points</th>
</tr>
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<tbody>
<tr>
<td>Four Tests (25 points each)</td>
<td>100</td>
</tr>
<tr>
<td>Eight One Minute Papers (5 points each)</td>
<td>40</td>
</tr>
<tr>
<td>Homework and Quizzes</td>
<td>25</td>
</tr>
<tr>
<td>Wednesday Star Show</td>
<td>10</td>
</tr>
<tr>
<td>Final Exam</td>
<td>75</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>250</strong></td>
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</tbody>
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None of the quizzes, assignments, or one minute papers may be taken late. The four 25 point tests may be taken late, only if Mr. Kessler is contacted the day of the test, and he agrees to this. This may be done by telephone at (222-6573) or by email at (mkessler@hawaii.edu).

On tests, quizzes, and one minute 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 2009-2011 Windward Community College Catalog, page 25, will be followed. The Catalog 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 at the end of the semester, 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 content to the bound fifth 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 has some animated graphics that help to understand seasons, eclipses, and retrograde motion.

Also bundled with the textbook is a folder that contains an access code to the textbook website, www.masteringastronomy.com.

- 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 2010

Week 1  August 23-27
Chapter 2, Discovering the Universe for Yourself. **Note: we are beginning with chapter 2, not with chapter one.**
Monday will be an instruction day.
Wednesday will be an active learning day, using the following:
   Lecture-Tutorial workbook, page 1: “Position”
   Lecture-Tutorial workbook, page 3: “Motion”
Friday Special: Imaginarium show on Constellations

Week 2  August 30-September 3
Continue chapter 2.
   Lecture-Tutorial, p. 7: “Seasonal Stars”
   Lecture-Tutorial, p. 13: “Ecliptic”
Friday Special: video on “The Universe: Astrobiology”

Week 3  September 6-10
Monday is a holiday, Labor Day. **No class**
Continue chapter 2.
Wednesday will be an instruction day and Friday an active learning day.
   From masteringastronomy website, Tutorial on moon phases.
   LT, p.79: “The Cause of Moon Phases”

Week 4  Sept. 13-17
Continue chapter 2. Why do eclipses occur? What causes retrograde motion?
   Friday: Open Book Test 1

Week 5  Sept. 20-24
Chapter 3: The Science of Astronomy, the Copernican Revolution
Chapter 6, Our Solar System and Its Origin
Friday Special: video on “Formation of the Solar System”

Week 6  Sept. 27-October 1
Chapter 7, The Terrestrial Planets
   Fri. Special: video: “The Planets”

Week 7  Oct. 4-8
Chapter 8, Jovian Planet Systems
Chapter 9, Remnants of Rock and Ice: Asteroids, Comets, and Pluto
   Friday: Open Book Test 2
Week 8 Oct. 11-15
Chapter 4: *Making Sense of the Universe*. Law of gravity and Newton’s version of Kepler’s third law
Friday Special: video on “Albert Einstein”

Week 9 Oct. 18-22
   LT, p. 57, on Blackbody Radiation, Parts I and II
Friday Special: video: “The Universe: Light Speed”

Week 10 Oct. 25-29
Chapter 5 continued.
   Doppler effect
   Friday: Open Book Test 3

Week 11 November 1-5
Chapter 11: *Surveying the Stars*
   Magnitude and Spectral Classes of stars
   Friday Special: Imaginarium show: *Stars of the Pharaohs*

Week 12 Nov. 8-12
   Continue chapter 11, the Hertzsprung-Russell Diagram
   LT, p. 53: “Luminosity, Temperature, and Size: Part I and II”
   LT, p. 109: “H-R Diagram”
   Friday Special: video on “The Sun”

Week 13 Nov. 15-19
Chapter 10, nuclear fusion in the Sun
   LT, p. 121, “Stellar Evolution”
   Friday: Open Book Test 4

Week 14 Nov. 22-26
   Thursday is Thanksgiving Day. No class on Friday.
   Chapter 14, *Our Galaxy*.
   LT, p. 123: “Milky Way Scales”

Week 15 Nov. 29-December 3
Chapter 15, *A Universe of Galaxies*.
   LT, p. 131: “Looking at Distant Objects”
   LT, p. 133, “Expansion of the Universe”
   Friday Special: Imaginarium show: Cosmic Perception

Week 16 Dec. 6-10 Review for Final Exam
Week 17  Dec. 13-17,  FINAL EXAM WEEK
Final Exam: Monday, December 13 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___________________________________