ASTR 110 WI, Introduction to Astronomy  
3 Credits, CRN 60217  
08:30-09:45am, Imiloa 133

INSTRUCTOR: Marvin Kessler  
OFFICE: Imiloa 136  
OFFICE HOURS: Wednesday, 11:30am to 01:30pm  
TELEPHONE: please call instructor cell, 808 222-6573  
EMAIL: mkessler@hawaii.edu  
EFFECTIVE DATE: Spring 2019

WINDWARD COMMUNITY COLLEGE MISSION STATEMENT
Windward Community College offers innovative programs in the arts and sciences and opportunities to gain knowledge and understanding of Hawai‘i and its unique heritage. With a special commitment to support the access and educational needs of Native Hawaiians, we provide O‘ahu’s Ko‘olau region and beyond with liberal arts, career and lifelong learning in a supportive and challenging environment — inspiring students to excellence.

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. Substitution must be approved by instructor.

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 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 pertinent pages of the textbook, outline them, and answer the assigned questions at the end of the chapter.

Class on Wednesday will be devoted to reports by students on the questions that were assigned on Monday. Extensive use will be made of the workbook, *Lecture Tutorials for ASTR 110 and ASTR 110WI*. 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.

#### 2. Writing

In a writing intensive course the student is expected to use writing as a way to stimulate critical thinking. This process is well explained by John Bean in his book, *Engaging Ideas*, where he focuses on writing as critical thinking. There he explains that writing can actually contribute to critical thinking. In academic writing, students often come away with the mistaken notion that there is a divorce between thinking and writing. First you think, and then you write down what you think. Bean’s article explains that in real life most writers come to their insights while writing. That probably is not the case in much scientific reporting where data has been gathered, reduced, and the conclusion reached before writing. Then there is just the reporting of the outcome. However, even then there may be times when the conclusion becomes clearer during the writing.

The WCC website adds the following:

“Writing Intensive (WI) Courses are part of the University of Hawai‘i system wide movement to incorporate more writing in courses from all disciplines. A WI course is a discipline-specific course in which writing plays a major integrated role. Students in course sections designated as a “WI” (preceding the course title in the Schedule of Classes) learn to understand course content through writing and to write in ways appropriate to that discipline. English 100 is a prerequisite before students take the two required WI courses for the Associate in Arts degree. Students transferring to some bachelor’s degree campuses in the UH system may bring two or three WI courses with them to count for the bachelor’s degree. The hallmarks of a writing intensive course are:

**W1.** The class uses writing to promote the learning of course materials.

**W2.** The class provides interaction between the instructor and students while students do assigned writing.

**W3.** Written assignments contribute significantly to each student’s course grade.

**W4.** The class requires students to do a substantial amount of writing—a minimum of 4,000 words, or about 16 pages.

**W5.** To allow for meaningful professor-student interaction on each student’s writing, the class is restricted to 20 students.”
3. **Conferences**  
At least one formal conference will be held with each student. Frequent brief conferences before and after class and via email are also encouraged. This is in addition to the exchange of written comments and suggestions by teacher and student.

4. **Turnitin**  
This online site checks written material for plagiarism and English grammar. The four video papers must be submitted to this site to be checked for plagiarism and grammatical correctness. The instructor adds comments and grades these on the website.

5. **Audio-Visuals**  
Several videos will be shown to the class. These videos are chosen for their excellence of presentation and accuracy.

6. **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.

7. **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.

8. **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.

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**ASSESSMENT TASKS AND GRADING**

1. **Three Unit Tests.** There will be three Unit Tests, which will be given on the dates indicated on the class calendar. Each test will be worth 25 points, for a total of 75 points for the semester. There will be five questions on a test. Each answer should comprise about 100 words, with a total of 500 words for the entire test. The 500 words count toward the four thousand word goal of a writing intensive course. The five questions will be based on the questions that were given for homework. “Blue Books” should be used for the tests. Study guides will be provided for each of the tests.

2. **Video Essays.** During the semester four videos on various topics will be shown. These have been chosen based on their astronomical content and excellence of presentation. The student will be expected to write a reaction essay on each of these videos. The essay will be worth 25 points toward the final grade. The essay should be a minimum of 1000 words in length. This will count toward the WI goal.

3. **Quizzes.** There will be 4 of these. They will be given as “on the spot” checks of student comprehension of the lecture material during that particular class. They will be worth 5 points, for a total of 20 points.

4. **Homework.** Homework will be assigned on Monday and handed in at the beginning of class on Wednesday. Homework is not graded. The purpose of homework is to point out the most important topics for the student to study. **Late homework will not be accepted.** Students who do not hand in homework on time are still expected to complete the homework in preparation for tests.

5. **Attendance at one Wednesday evening Star Show in the Imaginarium is obligatory.** It will be worth 10 points. A brief report must be submitted within one week. In writing this report, the student should 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.

6. The Final Exam will be worth 100 points. It will be a multiple-choice test, and will cover select sections of the entire course. A study guide will be provided.

This adds up to a total of 310 possible points, as follows:

<table>
<thead>
<tr>
<th>Component</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Three Tests (25 points each)</td>
<td>75</td>
</tr>
<tr>
<td>Four Video Papers (25 points each)</td>
<td>100</td>
</tr>
<tr>
<td>Wednesday Star Show</td>
<td>10</td>
</tr>
<tr>
<td>Quizzes</td>
<td>25</td>
</tr>
<tr>
<td>Final Exam</td>
<td>100</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>310</strong></td>
</tr>
</tbody>
</table>

The video papers must be handed in on time or there is a penalty deduction, depending on how many days late. The three 25 point tests may be taken late, only if Mr. Kessler is contacted the day of the test or before, and he agrees to this. This may be done by telephone (222-6573) or by email (mkessler@hawaii.edu). Quizzes may not be taken late. Points earned and letter grade will be recorded on Laulima.

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 2017-2018 Windward Community College Catalog, page 30, will be followed. The Catalog allows for other assigned grades. Students are encouraged to consult the instructor at any time about their grade.

**LEARNING RESOURCES**

Two books are required:

1. TEXTBOOK: *The Cosmic Perspective Fundamentals, Second Edition*, by Bennett, Donahue, Schneider, and Voit. Used textbooks or digital textbooks may be used, but they must be the same edition.

These books are available at the Windward Community College Bookstore. Copies of the Videos that are shown in class are on reserve in the library, and some of them may be found on YouTube.

**ADDITIONAL INFORMATION**

Students are strongly encouraged to spend time outside under the night sky, identifying constellations, planets, the moon and their motions across the sky. There are some excellent applications that can be downloaded to smartphones and used for this. Students 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. There is also a full-sized replica of the Mercury Friendship capsule used by John Glenn in the first American orbital flight. 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. Scheduled events are listed on the college website.

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.

**DISABILITIES ACCOMMODATIONS**

If you have a physical, sensory, health, cognitive, or mental health disability that could limit your ability to fully participate in this class, you are encouraged to contact the Disability Specialist Counselor to discuss reasonable accommodations that will help you succeed in this class. Ann Lemke can be reached at 235-7448, lemke@hawaii.edu, or you may stop by Hale ‘Ākoakoa 213 for more information.

**TITLE IX**

Title IX prohibits discrimination on the basis of sex in education programs and activities that receive federal financial assistance. Specifically, Title IX prohibits sex discrimination; sexual harassment and gender-based harassment, including harassment based on actual or perceived sex, gender, sexual orientation, gender identity, or gender expression; sexual assault; sexual exploitation; domestic violence; dating violence; and stalking. For more information regarding your rights under Title IX, please visit: https://windward.hawaii.edu/Title_IX/.

Windward Community College is committed to the pursuit of equal education. If you or someone you know has experienced sex discrimination or gender-based violence, Windward CC has resources to support you. To speak with someone confidentially, contact Karla Silva-Park, Mental Health Counselor, at 808 235-7468 or karlas@hawaii.edu or Kaahu Alo, Designated Confidential Advocate for Students, at 808 235-7354 or kaahualo@hawaii.edu. To make a formal report, contact the Title IX Coordinator at 808 235-7393 or wcctix@hawaii.edu.

**ALTERNATE CONTACT INFORMATION**

If you are unable to contact the instructor, have questions that your instructor cannot answer, or for any other issues, please contact the Academic Affairs Office:

Location: Alakai 121
Phone: 808 235-7422
Email: wccaa@hawaii.edu
CLASS CALENDAR FOR SPRING 2019

UNIT I  The Celestial Sphere

Week 1  January 7 and 9
 Monday: Review syllabus.
 Chapter 2, Understanding the Sky. Assign homework for
 first half of chapter 2.
 What would you most like to learn from this course?
 Wednesday: hand in homework
 Lecture on the celestial sphere and reason for seasons
 Lecture-Tutorial workbook: “Position”, pp. 1-3
 Quiz: what is the celestial sphere?

Week 2  January 14 and 16
 Monday: Assign homework for second half of chapter 2
 Lecture on: daily and annual motion
 Lecture-Tutorial workbook: “Motion” on pp 3-6,
 “Seasonal Stars” on pp 7-10, and “Ecliptic” on pp 11-16
 Post-Video essay. Due at Turnitin by midnight Sunday.

Week 3  January 21 and 23
 Monday: MARTIN LUTHER KING DAY---no class
 Wednesday: hand in homework
 Lecture: phases of the Moon
 Complete tutorials: “The Cause of Moon Phases”, pp. 25-28

Week 4  January 28 and 30
 Monday: Continue chapter 2.
 Why do eclipses occur? What causes retrograde motion?
 Wednesday: Test One

UNIT II  TRANSITION

Week 5  February 4 and 6
 Monday: Chapter 3, Changes in Our Perspective.
 The Copernican Revolution. Quiz on Copernican Revolution
 Wednesday: Lecture on Gravity
 How much does the Earth “weigh”?
Week 6  February 11 and 13  
Monday: Lecture on Light, page 80 in textbook  
  Energy levels in the atom  
Wednesday: Video: “Light Speed”  
  Post-Video essay. Due at Turnitin by midnight Sunday.

UNIT III  The Solar System

Week 7  February 18 and 20  
Monday: PRESIDENTS DAY—no class  
Wednesday: Chapter 4, Origin of the Solar System

Week 8  February 25 and 27  
Monday: Chapter 5, Terrestrial Worlds  
  Focus is on the similarities and differences between Venus, Earth, and Mars  
Wednesday: Video: “Wonders of the Solar System: Dead or Alive”  
  Post-Video essay. Due at Turnitin by midnight Sunday.

Week 9  March 4 and 6  
Monday: Chapter 6, The Outer Solar System, section 6.2 on Asteroids,  
  Comets, and the Impact Threat  
Wednesday: Test Two  
  Review of scientific notation called “Powers of 10”.

UNIT IV  The Stars

Week 10  March 11 and 13  
Monday: Chapter 8: The Sun and Other Stars  
  Luminosity/Distance Formula  
Wednesday: continue chapter 8  
  LT, pp 33-36, on Blackbody Radiation, Parts I and II

SPRING RECESS  March 18-22

Week 11  March 25 and 27  
Monday: Spectral classification of stars  
Wednesday: The Hertzsprung-Russell Diagram  
  LT, pp 47-48: “H-R Diagram”  
  Quiz on Luminosity, Temperature, Distance, and Size

Week 12  April 1 and 3  
Monday: Chapter 9, Stellar Lives  
  Go over notes on the Lifeline of stars.  
Wednesday: continue Chapter 9.  
  Quiz on Lifeline of Stars
Week 13    April 8 and 10
        LT, pp 49-50, “Stellar Evolution”
Wednesday: Test Three

UNIT V  The Galaxies

Week 14    April 15 and 17
Monday: Chapter 11, Galaxies.
        LT, pp 51-54: “Milky Way Scales”
Wednesday: Video: “Known Universe: Biggest and Smallest”
            Post-Video Essay. Due at Turnitin by midnight Sunday.

Week 15    April 22 and 24
Monday: Chapter 12, Galaxy Distances and Hubble’s Law
        The distance chain
Wednesday:
        LT, pp 55-56: “Looking at Distant Objects”
        LT, pp 57-58, “Expansion of the Universe”

Week 16    April 29 and May 1
Monday: Review
        Wednesday: Review

Week 17    FINAL EXAM WEEK    May 6 to 10

The above schedule has been carefully thought out and will be followed as much as possible, but there may have to be adjustments 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 one of the attending staff.

Attending Staff: __________________________    Date: ______

Description of the show or observing session:

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

What I found interesting (at least 100 words; may use reverse side of page):

Student Signature ____________________________