



UNIVERSITY of HAWAII\*  
**WINDWARD**  
COMMUNITY COLLEGE

### **ASTR 110, Survey of Astronomy**

**Online, Synchronous**

3 Credits, CRN 60012

MW, 10:00-11:15 AM

**INSTRUCTOR:** Marvin Kessler

**OFFICE:** online

**OFFICE HOURS:** Wednesday, 11:30 AM to 1:00 PM or by appointment

**TELEPHONE:** please call instructor cell, 808 222-6573 EMAIL: mkessler@hawaii.edu

**EFFECTIVE DATE:** Fall, 2021

### **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 the Ko'olau region of O'ahu 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.”

### **ONLINE INSTRUCTION**

This is a three credit lecture course which meets via Zoom twice a week on Monday and Wednesday at 10:00-11:15 A.M. Students must attend the Zoom meetings online at the scheduled times, just as they would attend a face-to-face class in person on campus. Before the first scheduled class, on August 23, students will receive the necessary Zoom information to be able to join the class. Students do not need to have the Zoom Application on their computers. **They do need, however, to have “audio” and “video” access on their computers.** Students must also be familiar with Lulima, and be able to use it for assignments, tests, Grade Book, and email.

### **STUDENT LEARNING OUTCOMES**

As a result of taking this course, students can expect to attain the following outcomes:

1. Outline the development of astronomy from ancient times to present and explain the role of the scientific method in this historic context.
2. Describe and explain the apparent motions of the celestial bodies, especially as related to naked-eye observations.
3. Identify the appropriate instruments used by astronomers to understand the universe.
4. Outline the origins of our solar system and appraise the leading cosmological theories of the origin of the universe.
5. Describe the physical and chemical properties of the objects in our solar system and apply the concept of comparative planetology.

6. Describe the physical and chemical nature of stars, and especially our sun, and apply the astronomical techniques used to measure stellar properties.
7. Outline the evolutionary stages in a star's life and compare and contrast the structure of our Milky Way and other galaxies.
8. 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. Assignments will focus on important sections of the textbook (listed below, page 3). Between Monday and Wednesday the student should read the pertinent pages of the textbook, outline them, and complete the assignment.

Class on Wednesday will be devoted to a review of the questions that were assigned on Monday. Extensive use will be made of the workbook, *Lecture Tutorials for Introductory Astronomy*. 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. Some of these will be used for grading. Students will be informed in advance if the quiz will be graded.

### 2. Audio-Visuals

Several videos will be shown to the class. These videos are chosen for their excellence of presentation and accuracy. A computer-based planetarium, *SkyGazer*, will be used to demonstrate the motion of the stars and the arrangement of constellations.

### 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. This is done anonymously via the audio connection on the students' computers. It proceeds very much like it would in a face-to-face classroom.

### 4. 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.

### 5. 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.

## ASSESSMENT TASKS AND GRADING

1. 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. These tests will be closely coordinated with the classroom discussion and assignments. A study guide will be provided.
2. There will be four Video Essays. The essays will be written responses to an astronomy video that has been shown in class. The essays will be worth 10 points each, for a total of 40 points.
3. Quizzes. There will be five short quizzes, worth 10 points each, for a total of 50 points.
4. Homework. As indicated above, homework will be assigned on Monday and submitted through Laulima by the beginning of class on Wednesday. **Late homework will not be accepted.** Mr. Kessler will review the homework and return it by the following Monday. Homework does not contribute points to a student's grade, but it is extremely important to do as part of the learning process. Homework is taken directly from the chapter that is being studied in the textbook.
5. Detailed review guides will be provided to help students prepare for the Final Exam.
6. The Final Exam will be worth 100 points. It will cover select sections of the entire course.

This adds up to a total of 265 possible points, as follows:

	A
Three Tests (25 points each)	75 points
Four Video Essays (10 points each)	40 points
Five Quizzes (10 points each)	50 points
Final Exam	<u>100 points</u>
TOTAL	265 points

None of the quizzes or essays may be taken 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. Mr. Kessler may be contacted by telephone (222-6573) or by email at ([mkessler@hawaii.edu](mailto:mkessler@hawaii.edu)). Points earned and course letter grade will be recorded on Laulima.

Correspondence between points and letter grade will be as follows:

- A- 90% to 100% of the 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 2020-2021 Windward Community College Catalog, page 58, will be followed. The Catalog allows for other assigned grades. **Students are encouraged to consult the instructor at any time about their grade.** As indicated above, grades are posted on the student's home page on Laulima.

## LEARNING RESOURCES

Two books are required:

1. TEXTBOOK: *The Cosmic Perspective Fundamentals, Second Edition*, by Bennett, Donahue, Schneider, and Voit.
2. WORKBOOK: *Lecture-Tutorials for Introductory Astronomy, Third Edition*, by Prather, Slater, Adams, and Brissenden.

These books are available at the Windward Community College Bookstore and online. Digital copies of the **textbook** are available for rent online. There is no digital copy of the **workbook**. It must be ordered in paperback.

## 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 computer applications that can be downloaded to smartphones and used for this.

The Imaginarium and the Aerospace Lab are temporarily closed due to the pandemic. When they are able to reopen be sure to check them out. Imaginarium shows are advertised on the WCC website.

## 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 Accessibility Counselor to discuss reasonable accommodations that will help you succeed in this class. Roy Inouye can be reached at (808) 235-7448, [royinouy@hawaii.edu](mailto:royinouy@hawaii.edu), or you may stop by Hale Kāko'o 106 for more information.

## **SEX DISCRIMINATION AND GENDER-BASED VIOLENCE RESOURCES (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/](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 the Mental Health & Wellness Office at 808-235- 7393 or Kaahu Alo, Designated Confidential Advocate for Students, at 808-235-7354 or [kaahualo@hawaii.edu](mailto:kaahualo@hawaii.edu). To make a formal report, contact the Title IX Coordinator, Karla K. Silva-Park, at 808-235-7468 or [karlas@hawaii.edu](mailto:karlas@hawaii.edu).*

As a member of the University faculty, I am required to immediately report any incident of sex discrimination or gender-based violence to the campus Title IX Coordinator. Although the Title IX Coordinator and I cannot guarantee confidentiality, you will still have options about how your case will be handled. My goal is to make sure you are aware of the range of options available to you and have access to the resources and support you need.

For more information regarding sex discrimination and gender-based violence, the University's Title IX resources and the University's Policy, Interim EP 1.204, go to [manoa.hawaii.edu/titleix/](http://manoa.hawaii.edu/titleix/)

## **ACADEMIC INTEGRITY**

Work submitted by a student must be the student's own work. The work of others should be explicitly marked, such as through use of quotes or summarizing with reference to the original author.

In this class, students who commit academic dishonesty, cheating or plagiarism will have the following consequence(s):

Students will receive a failing grade for plagiarized assignments.

All cases of academic dishonesty are referred to the Vice Chancellor for Student Affairs

## **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](mailto:wccaa@hawaii.edu)

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# CLASS CALENDAR FOR FALL 2021

## UNIT I The Celestial Sphere

### Week 1 August 23/25

Monday: WELCOME TO ASTRONOMY: orientation, syllabus

**Note: we are beginning with chapter 2, not chapter 1.**

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

**Video**, “Wonders of the Solar System: Aliens”

Post-Video essay. Written in class.

### Week 2 August 30/September 1

Monday: Assign homework for second half of chapter 2

Lecture on the celestial sphere and “Reason for Seasons”

Lecture-Tutorial workbook: “Position”, pp. 1-3

**Quiz**: what is the celestial sphere?

Wednesday: hand in homework

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

### Week 3 September 6/8

Monday: LABOR DAY—no class

Wednesday: Lecture: phases of the Moon

Complete tutorials: “The Cause of Moon Phases”, pp. 25-28

**Quiz**: the Problem

### Week 4 September 13/15

Monday: Continue chapter 2.

Why do eclipses occur? What causes retrograde motion?

Wednesday: Test One: The Celestial Sphere

## UNIT II The Solar System

### Week 5 September 20/22

Monday: Chapter 3, *Changes in Our Perspective*.

The Copernican Revolution. Handout.

Wednesday: Lecture on Gravity

How much does the Earth “weigh”?

**Quiz**: Copernican Revolution

**Week 6 September 27/29**

Monday: PRESIDENTS' DAY—no class

Wednesday: Chapter 4, *Origin of the Solar System*

The four major characteristics of the Solar System.

**Week 7 October 4/6**

Monday: the Nebular Theory of formation of the Solar System

The chemical make-up of the Solar System.

The Frost Line.

Wednesday: **Video**: “Wonders of the Solar System: Dead or Alive”

Post-Video essay.

**Week 8 October 11/13**

Monday: Chapter 5, *Terrestrial Worlds*

Focus is on the similarities and differences between Venus, Earth, and Mars.

Hand-out on Comparative Planetology.

Wednesday: continuation of chapters 4 and 5.

**Week 9 October 18/20**

Monday: Chapter 6, *The Outer Solar System*, section 6.2 on Asteroids,

Comets, and the Impact Threat.

Wednesday: Test Two: The Solar System

## UNIT III The Stars

**Week 10 October 25/27**

Monday: Lecture on Light, page 80 in textbook

Energy levels in the atom

**Quiz**: what is light?

Wednesday: **Video**: “Light Speed”

Post-Video essay.

**Week 11 November 1/3**

Monday: Chapter 8: *The Sun and Other Stars*

Fusion in the Sun

Luminosity/Distance Formula

Wednesday: The Hertzsprung-Russell Diagram

Spectral Classification of Stars—O,B,A,F,G,K,M

LT, pp 29-32: “Luminosity, Temperature, and Size: Parts I and II”

**Week 12 November 8/10**

Monday: LT, pp 47-48: “H-R Diagram”

**Quiz**: Luminosity, Temperature, Distance, and Size

Wednesday: Chapter 9, *Stellar Lives*

Go over notes on the Lifeline of stars.

**Week 13 November 15/17**

Monday: Luminosity Classes of Stars

LT, pp 49-50, “Stellar Evolution”

Wednesday: Test Three: The Stars

## **UNIT IV The Galaxies**

**Week 14 November 22/24**

Monday: Chapter 11, *Galaxies*.

LT, pp 51-54: “Milky Way Scales”

Wednesday: Chapter 12, *Galaxy Distances and Hubble’s Law*

The distance chain.

**Week 15 November 29/December 1**

Monday: LT, pp 55-56: “Looking at Distant Objects”

LT, pp 57-58, “Expansion of the Universe”

Wednesday: **Video**: “Known Universe: Biggest and Smallest”

Post-Video Essay.

**Week 16 December 6/8**

Monday: Review pages will be provided for the chapters that will be covered in the

Final Exam. These review pages are to be used for study outside of class time.

Wednesday: continue review.

**Week 17 December 13**

Monday: FINAL EXAM, 10:00 AM to 12:00 Noon

The above schedule has been carefully prepared and will be carefully followed, but there may have to be some adjustments as the semester progresses.

The Instructor will inform students of any changes in the schedule at least one class day in advance through individual email.