

## ASTR 110L: Introduction to Astronomy Laboratory

CRN 64009, 1 Credit

Wednesday, 1:00 PM-3:45 PM, Imiloa 137

**INSTRUCTOR:** Marvin Kessler  
**OFFICE:** Imiloa 136  
**OFFICE HOURS:** M/W, 11:15 AM-12:30 PM  
**TELEPHONE:** 222-6573 **EMAIL:** mkessler@hawaii.edu  
**EFFECTIVE DATE:** Spring 2017

### 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

Demonstration of astronomical principles through laboratory observations and analysis of astronomical data. **Prerequisite:** ASTR 110; may be taking ASTR 110 concurrently.

**Activities Required at Scheduled Times Other Than Class Times:** none

### STUDENT LEARNING OUTCOMES

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

1. Apply the scientific method to a selected group of topics in astronomy.
2. Collect, report and analyze data obtained in a laboratory and/or observatory setting in a manner exhibiting organization, proper documentation and critical thinking.
3. Demonstrate a basic understanding of the use of standard astronomical instruments, especially the telescope
4. Perform image analysis, especially as related to astronomical photographic data
5. Identify environmental factors, which affect the outcome of an experiment or observation, and apply basic error analyses techniques.
6. Demonstrate a working knowledge of computer on-line and internet astronomical programs.

### COURSE CONTENT and SKILLS

<i>Concepts or Topics</i>	<i>Skills or Competencies: student will be able to:</i>
1. Star Identification	1. identify four bright stars and four constellations for each season of the year
2. Deep Sky Objects	2. locate objects based on right ascension and declination
3. Telescope	3. calculate the resolution of a telescope based on aperture

## ASSESSMENT TASKS AND GRADING

• **Laboratory Reports:** Lab reports are completed according to the instructions given on the computer and/or on the handouts distributed at each lab session. Ordinarily, the report consists of a completed data and analysis sheet plus any other appropriate sheet of observed data and graphical analysis. Lab Reports are worth **20 points** each. There will be 12 reports. This makes a possible point total of 240. A protocol sheet explains the procedure to be followed in handing in the completed report to the instructor.

• **Total Possible Points:** 240

An optional evening observing session will be offered in which the students use the laboratory telescopes to do some of their own observing on the lawn in front of the classroom. Students may submit this report in place of a report that was missed or a report that received a low score.

• **Final Semester Grade** will be based on the total points that the student earned, as follows:

<u>Letter Grade</u>	<u>Definition</u>
---------------------	-------------------

A	90% - 100% of total possible points
B	80% - 89% of total possible points
C	70% - 79% of total possible points
D	60% - 69% of total possible points

F	below 60% of total possible points
---	------------------------------------

The grading standards given in the 2015-2017 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.** Grades also are reported on Laulima.

## LEARNING RESOURCES

### TEXTBOOKS AND OTHER ASSIGNED INSTRUCTIONAL MATERIALS:

All materials are contained on the computer or will be provided as a handout at the time of the class.

REQUIRED MATERIALS: calculator

### Additional Information

1. **Expectations of Students.** Success in this course will be enhanced by:

- attending all classes and responsibly obtaining all assignments and/or changes to the course syllabus
- having a positive, inquiring attitude
- completing reports in a professional manner
- carefully following instructions on the computer and handouts
- seeking assistance from the instructor

2. A student can determine his/her current grade during any time of the semester by dividing his/her cumulative score by the cumulative points possible and converting into a percentage and referring to the table of Letter Grades. Grades are reported on Laulima.

3. Students are encouraged to visit WCC's **Aerospace Exploration Lab** (located in Hale `Imiloa 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.

4. 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. Tickets may be purchased at the Imaginarium box office 30 minutes before the show, or call 235-7433 to reserve tickets in advance. Reserved tickets must be picked up at the box office at least 15 minutes before showtime, otherwise they may be sold to waiting customers. Scheduled events are listed on the college website.

#### DISABILITIES ACCOMMODATION STATEMENT

*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 Ann Lemke, the Disability Specialist Counselor, to discuss reasonable accommodations that will help you succeed in this class. Ms. Lemke can be reached at 235-7448, [lemke@hawaii.edu](mailto:lemke@hawaii.edu), or you may stop by Hale `Akoakoa 213 for more information.*

### CALENDAR FOR SPRING 2017

WEEK 1 January 11	<b>Laboratory Procedures</b> Tour of facilities
January 18	<b>Imaginarium:</b> "Two Small Pieces of Glass"
WEEK 2 January 25	<b>How Experiments Work:</b> Using impact craters to verify the kinetic energy formula. Significant figures in measurement
WEEK 3 February 1	<b>How Experiments Work:</b> Using an optical bench to study the Simple Lens Formula. Calculating percent error
WEEK 4 February 8	<b>Reading the Sky:</b> Introduction to <i>Starry Night</i> , a computer based planetarium Starry Night Lab # 1
WEEK 5 February 15	<b>Reading the Sky:</b> Starry Night Lab # 2 Imaginarium: circumpolar stars
February 22	<b>Imaginarium:</b> "Ancient Skies"
WEEK 6 March 1	<b>Reading the Sky:</b> Starry Night Lab # 3 Imaginarium: daily and annual motion of stars
WEEK 7	<b>Reading the Sky:</b> Starry Night Lab # 4

March 8	Imaginarium: star and constellation identification
WEEK 8 March 15	<b>How the Telescope Works:</b> Assembling and using the Orion Space Probe, 130mm Equatorial Telescope. Telescopes on the Lawn
WEEK 9 March 22	<b>Nature of Light:</b> Part A: Experiment 1 in Pasco Basic Optics System: “Color Addition” Part B: Experiment 2 in Pasco Basic Optics System: “Prism”
March 29	<b>SPRING RECESS</b>
WEEK 10 April 5	<b>Nature of Light:</b> Experiment 3 in Pasco Basic Optics System: “Reflection”
WEEK 11 April 12	<b>Nature of Light:</b> Identifying gases using a spectrometer
WEEK 12 April 19	<b>Use of Photography with the Telescope:</b> Astrometry: Finding and identifying asteroids using Astrometrica
WEEK 13 April 26	<b>Use of Photography with the Telescope:</b> Photometry: Measuring the magnitude of a variable star and plotting its light curve
WEEK 14 May 3	<b>Use of Photography with the Telescope:</b> Combining RGB images into color pictures of astronomical objects