ASTR 110L: Introduction to Astronomy Laboratory
CRN 64029, 1 Credit
Monday, 1:00 PM-3:45 PM, Imiloa 137

INSTRUCTOR: Marvin Kessler
OFFICE: Imiloa 136
OFFICE HOURS: Wednesday, 11:30am to 1:00pm
TELEPHONE: call instructor cell, 808 222-6573   EMAIL: mkessler@hawaii.edu
EFFECTIVE DATE: Fall, 2018

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
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
One evening observing session.

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

Concepts or Topics	Skills or Competencies: student will be able to:
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
4. **Telescope**	4.calculate magnification based on the focal lengths of the objective and eyepiece
5. **Asteroid detection**	5.use Astrometrica to detect asteroids on digital images
6. **Internet Astronomical Program**	6. access NASA website for information and graphics on a specific asteroid
7. **Spectroscopy of emission spectra**	7.use a spectrometer to identify gases by their spectra
8. **Photometry of Variable Star**	8.use Iris to create a light curve of a variable star based on digital images
9. **Error Analysis**	9.calculate percent difference and explain what might account for this
10. **Image Processing**	10.process RGB images of a galaxy and other astronomical objects using the DS-9 program

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 at the Lanihuli Observatory using the 16 inch telescope. Students may attend this session and report on it 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:

Letter Grade Definition

    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 2018-2019 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 provided in class.
OTHER REQUIRED ITEMS: calculator

ADDITIONAL INFORMATION
1. **Expectations of Students**. Success in this course will be enhanced by:
   - o   attending all classes and responsibly obtaining all assignments and/or changes to the course syllabus
   - o   having a positive, inquiring attitude
   - o   completing reports in a professional manner
   - o   carefully following instructions on the computer and handouts
   - o   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, the first Friday of the month at 7:00 PM, and the fourth Saturday of the month at 1:00PM. Scheduled events are listed on the college 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 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 ʻĀkoakoa 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.

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.

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

CALENDAR FOR FALL 2018

.WEEK 1 August 20	**Laboratory Procedures** Tour of facilities **Imaginarium**: "Two Pieces of Glass"
WEEK 2 August 27	**How Experiments Work**: Using impact craters to verify the kinetic energy formula.
September 3	**LABOR DAY: NO CLASS**
WEEK 3 September 10	**Reading the Sky**: Introduction to *Starry Night,* a computer based planetarium. Starry Night Lab # 1
WEEK 4 September 17	**Reading the Sky**: Starry Night Lab # 2 **Imaginarium**: circumpolar stars
WEEK 5 September 24	**How Experiments Work**: Using an optical bench to study the Simple Lens Formula. Calculating percent error
WEEK 6 October 1	**Reading the Sky**: Starry Night Lab # 3 **Imaginarium**: daily and annual motion of stars
WEEK 7 October 8	**How the Telescope Works:** Assembling and using the Orion Space Probe, 130mm Equatorial Telescope. Telescopes on the Lawn
WEEK 8 October 15	**Reading the Sky**: Starry Night Lab # 4 **Imaginarium**: star and constellation identification
WEEK 9 October 22	**Nature of Light**: Refraction
WEEK 10 October 29	**Use of Photography with the Telescope:** Astrometry: Finding and identifying asteroids using Astrometrica
WEEK 11 November 5	**Nature of Light:** Reflection
WEEK 12 November 12	**Use of Photography with the Telescope:** Photometry: Measuring the magnitude of a variable star and plotting its light curve
WEEK 13 November 19	**Nature of Light:** Identifying gases using a spectrometer
WEEK 14 November 26	**Use of Photography with the Telescope:** Combining RGB images into color pictures of astronomical objects
WEEK 15 December 3	This lab consists of an observing session using the Orion Telescope. It will be scheduled, weather permitting, the week of October 8. If the observing session is cancelled or a student cannot attend, a substitute lab will be held on this date, December 3. Students who participated in the observing session will not need to attend this substitute session, but they are welcome.