**ASTRON 12 Course Outline as of Fall 2013**

# CATALOG INFORMATION

Dept and Nbr: ASTRON 12 Title: ASTRON OBSERVTN LAB
Full Title: Astronomy Observational Lab
Last Reviewed: 4/22/2019

| Units | | Course Hours per Week | | Nbr of Weeks | Course Hours Total | |
|---|---|---|---|---|---|---|
| Maximum | 1.00 | Lecture Scheduled | 0 | 17.5 | Lecture Scheduled | 0 |
| Minimum | 1.00 | Lab Scheduled | 0 | 2 | Lab Scheduled | 0 |
| | | Contact DHR | 3.00 | | Contact DHR | 52.50 |
| | | Contact Total | 3.00 | | Contact Total | 52.50 |
| | | Non-contact DHR | 0 | | Non-contact DHR | 0 |

Total Out of Class Hours: 0.00 Total Student Learning Hours: 52.50

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|---|---|
| Title 5 Category: | AA Degree Applicable |
| Grading: | Grade or P/NP |
| Repeatability: | 00 - Two Repeats if Grade was D, F, NC, or NP |
| Also Listed As: | |
| Formerly: | |

**Catalog Description:**
Observational laboratory in astronomy. Students will utilize small aperture telescopes, binoculars, star charts and planispheres. Constellation identification and terrestrial and celestial coordinate systems will be introduced. Short exposure and deep sky astrophotography will be conducted. In the case of inclement weather, students will utilize the planetarium, classroom, or computer lab to perform required labs.

**Prerequisites/Corequisites:**
Course Completion or Concurrent Enrollment in ASTRON 3; OR ASTRON 4; OR ASTRON 5.

**Recommended Preparation:**
Eligibility for MATH150A; Eligibility for ENGL 100 or ESL 100

**Limits on Enrollment:**

**Schedule of Classes Information:**
Description: Observational laboratory in astronomy. Students will utilize small aperture telescopes, binoculars, star charts and planispheres. Constellation identification and terrestrial and celestial coordinate systems will be introduced. Short exposure and deep sky astrophotography will be conducted. In the case of inclement weather, students will utilize the

planetarium, classroom, or computer lab to perform required labs. (Grade or P/NP)
Prerequisites/Corequisites: Course Completion or Concurrent Enrollment in ASTRON 3; OR ASTRON 4; OR ASTRON 5.
Recommended: Eligibility for MATH150A; Eligibility for ENGL 100 or ESL 100
Limits on Enrollment:
Transfer Credit: CSU;UC.
Repeatability: Two Repeats if Grade was D, F, NC, or NP

## ARTICULATION, MAJOR, and CERTIFICATION INFORMATION:

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|---|---|---|---|---|
| **AS Degree:** | **Area** | | Effective: | Inactive: |
| **CSU GE:** | **Transfer Area** | | Effective: | Inactive: |
| | B3 | Laboratory Activity | Fall 2012 | |
| | B1 | Physical Science | Fall 1981 | Fall 2012 |
| | B3 | Laboratory Activity | | |
| **IGETC:** | **Transfer Area** | | Effective: | Inactive: |
| | 5C | Fulfills Lab Requirement | Fall 2012 | |
| | 5A | Physical Sciences | Fall 1981 | Fall 2012 |
| | 5C | Fulfills Lab Requirement | | |

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| **CSU Transfer:** | Transferable | Effective: | Fall 1981 | Inactive: |
| **UC Transfer:** | Transferable | Effective: | Fall 1981 | Inactive: |

**CID:**

**Certificate/Major Applicable:**
Major Applicable Course

## COURSE CONTENT

**Outcomes and Objectives:**
Upon completion of this course, students will be able to:
1. Explain how a lens and a mirror are capable of forming an image
2. Describe how the focal length and diameter of a lens and mirror affects the quality of an image
3. Calculate the focal ratio and magnification of an optical system
4. Compare and contrast the advantages of reflector telescopes to refractor telescopes
5. Use collected field data and the distance modulus to calculate the diameter of extended celestial objects and the distances of certain stars
6. Use collected field data to calculate the distance to certain stars using the distance modulus
7. Utilize collected field data to determine the apparent magnitude of certain stars by comparing them to given standards
8. Explain diurnal motion and describe how an observer's latitude affects the apparent paths of stars
9. Explain how coordinate systems are used to locate terrestial and celestial bodies
10. Demonstrate annual motion using a globe of Earth and describe why seasons occur on the Earth
11. Utilize star charts and planispheres to learn and apply the celestial coordinate system of right ascension and declination
12. Use star charts and planispheres to locate, identify and determine the rising and setting times

of deep sky objects, constellations, and bright stars
13. Assemble telescopes and employ them to locate, observe and sketch planets and deep sky objects
14. Utilize telescopes and cameras to photograph constellations, deep sky objects, planets and the Sun (using neutral density solar filters)
15. Recognize and identify seasonal constellations and stars by name without the aid of star charts or planispheres

**Topics and Scope:**

I. Earth and Sky
- A. The celestial sphere
- B. Diurnal motion from various locations on Earth
- C. Annual motion
- D. Seasons and why they occur
- E. Coordinate systems
  - 1. terrestrial coordinate systems
  - 2. celestial coordinate systems
- F. Constellations
- G. Star charts and planisphere

II. Optical systems
- A. Image formation
- B. Properties of a lens or mirror
  - 1. focal length
  - 2. diameter
  - 3. focal ratio
- C. Telescopes
  - 1. refractors
  - 2. reflectors
- D. Functions of a telescope
- E. Parts of a telescope
- F. Cameras
- G. Functions of a camera
- H. Parts of a camera
- I. Using cameras for astrophotography

III. Deep sky objects including the Messier Catalog
- A. Nebulae
  - 1. emission nebulae
  - 2. dark (absorption) nebulae
  - 3. reflection nebulae
  - 4. planetary nebulae
  - 5. supernova remnants
- B. Galaxies
  - 1. spiral galaxies
  - 2. barred spiral galaxies
  - 3. elliptical galaxies
  - 4. irregular galaxies
- C. Star clusters
  - 1. open (galactic) clusters
  - 2. globular cluster

IV. Determination of the diameter of celestial objects
V. Determination of the magnitude and distances of stars

A. Apparent magnitude scale
B. Absolute magnitude scale
C. Distance modulus

VI. Solar observations and photography

**Assignment:**

1.Readings from the lab manual/classnotes or other instructor prepared materials (averaging 20-30 pages/week).
2. Completion of laboratory exercises, written reports and problem solving (6-10).
3. Group exercises (3-5) involving telescope set-up and preparation for astrophotography.
4. A photobook containing photos and written descriptions (at least 1/2 page each) of the objects featured.
5. Quizzes (3-6) covering topics on labs, pre-lab orientation, and reading material.
6. A constellation exam covering the names of constellations and bright stars.
7. A star chart exam testing students ability to utilize a star chart to identify stars and deep sky objects in the night sky.
8. A comprehensive final exam covering all material presented throughout course.

**Methods of Evaluation/Basis of Grade:**

**Writing:** Assessment tools that demonstrate writing skills and/or require students to select, organize and explain ideas in writing.

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| Lab reports, photobook | Writing<br>10 - 20% |

**Problem Solving:** Assessment tools, other than exams, that demonstrate competence in computational or non-computational problem solving skills.

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| Field work, lab exercises | Problem solving<br>10 - 30% |

**Skill Demonstrations:** All skill-based and physical demonstrations used for assessment purposes including skill performance exams.

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| Set up and operation of telescopes and cameras, usage of star charts and planispheres | Skill Demonstrations<br>5 - 15% |

**Exams:** All forms of formal testing, other than skill performance exams.

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| Quizzes; constellation, star chart, final exam: multiple choice, true/false, matching, completion, fill-in, problem solving, essay questions | Exams<br>35 - 65% |

**Other:** Includes any assessment tools that do not logically fit into the above categories.

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| Attendance and participation | Other Category<br>10 - 30% |

**Representative Textbooks and Materials:**
Course text/classnotes written by SRJC Earth and Space Sciences instructors
A Workbook for Astronomy, Waxman, Jerry, 2007 (Classic)
21st Century Astronomy, Hester, Blumenthal, Smith, Burstein, Greeley, Voss: 2007
The Observer's Handbook, Royal Astronomical Society of Canada: 2009
Other instructor prepared materials