

# ASTRONOMY

## Natural and Applied Sciences Division

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<http://www.cabrillo.edu/programs>

## Information for Astronomy Majors

The major in astronomy provides a study of the universe at large and the physical processes that govern it. Astronomy is the oldest science and uses many of the tools of modern technology. A B.S. Degree qualifies one to work at a planetarium, teach at the high school level, assist at an observatory, and work in positions requiring a general technical knowledge. An M.S. Degree broadens the opportunities to include community college instructor, major observatory telescope operator, some space science positions, and many more positions in technical fields.

A Ph.D. Degree qualifies one to do sponsored research, either theoretical or observational, at a major observatory or university. This advanced degree also opens up opportunities to work as an astronaut, space engineer, space scientist, and scientific computer programmer.

University level astronomy curricula generally stress very strong initial preparation in mathematics, physics and computer programming. Many recommend that those planning on an advanced degree obtain their B.S. in physics or mathematics. While most astronomy courses are taken at the upper division or graduate level, students will find lower division astronomy courses helpful in exploring the major. The terms "astronomy" and "astrophysics" are interchangeable. Transfer students must also complete the admission and general education requirements of the intended transfer institution.

High School Preparation: Four years of college preparatory mathematics and one year of physics. Cabrillo offers courses which can substitute for this preparation; however, the major will then require more than two years to complete.

### MODEL PROGRAM FOR ASTRONOMY

The following model program fulfills requirements for the A.S. Degree in Astronomy at Cabrillo College. Specific lower division major preparation at four-year public institutions in California can be found at [www.assist.org](http://www.assist.org). Please see a counselor for advisement for transfer to any four-year institution.

Core Courses	Units
ASTRO 3	Solar System Astronomy . . . . . 3
ASTRO 4	Stars, Galaxies, the Universe . . . . . 3
ASTRO 8A	Observational Astronomy. . . . . 1
MATH 5ABC	Analytic Geometry and Calculus I, II, III. . . . . 12
PHYS 4ABC	Physics for Scientists and Engineers . . . . . 15

### Approved Electives

ASTRO 9A	Astrophotography . . . . . 1
ASTRO 28	Special Topics in Field Astronomy . . . . . 1

### Recommended: 6 units from Related Disciplines

CHEM 1A	General Chemistry . . . . . 5
CIS 90	Introduction to UNIX/Linux . . . . . 3

CS 19	C++ Programming . . . . . 4
MATH 7	Introduction to Differential Equations . . . . . 3
MATH 12	Elementary Statistics . . . . . 4

### Associate in Science Degree in Astronomy

General Education . . . . .	21
Core Courses . . . . .	34
Approved Electives . . . . .	2
Recommended from Related Disciplines . . . . .	3
Total for A.S. Degree in Astronomy	60

## Astronomy Courses

### ASTRO 3

#### Solar System Astronomy

3 units; 3 hours Lecture

Recommended Preparation: MATH 154; Eligibility for ENGL 100 and READ 100.

Presents a survey of the sun, planets, asteroids, comets, and the growing list of new solar systems around other stars for non-science majors. Additional topics include principles of scientific reasoning, applications to the structure and evolution of planetary systems, and methods astronomers use to discover and study other solar systems.

*Transfer Credit:* Transfers to CSU, UC.

### ASTRO 4

#### Stars, Galaxies, and the Origin of the Universe

3 units; 3 hours Lecture

Recommended Preparation: MATH 154; Eligibility for ENGL 100 and READ 100.

Surveys the lives of stars and galaxies, and the relationship of life to the origin of universes, for non-science majors. Describes how astronomers use science to arrive at our current ideas on the evolution of stars and galaxies. Investigates how the nature of life relates to the origin of our universe and possible parallel universes. Includes optional star party at Cabrillo Observatory.

*Transfer Credit:* Transfers to CSU, UC.

### ASTRO 8A

#### Observational Astronomy

1 unit; 1 hour Lecture, 2 hours Laboratory

Prerequisite: MATH 154.

Corequisite: Completion of concurrent enrollment in ASTRO 3 or ASTRO 4 or ASTRO 10 or ASTRO 11.

Recommended Preparation: Eligibility for ENGL 100 and READ 100.

Involves observatory lab projects on stars, planets, the moon, galaxies, and in-class labs and demos on cloudy nights. Sometimes offered as a field course involving camping at dark-sky locations.

*Transfer Credit:* Transfers to CSU, UC.

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## **ASTRO 9A**

### **Astrophotography**

1 unit; 1 hour Lecture, 2 hours Laboratory

Recommended Preparation: Eligibility for ENGL 100 and READ 100.

Covers photographic theory and practice at Cabrillo Observatory using telescopes, cameras, and dark room to develop, print, and mount photographs taken both on film and digitally. Clear nights usually spent at Cabrillo Observatory, cloudy nights in the photo lab. Students choose from a variety of projects and experiments. Includes optional weekend camping trip for deep-sky work.

*Transfer Credit:* Transfers to CSU.

## **ASTRO 9B**

### **Astrophotography**

1 unit; 1 hour Lecture, 2 hours Laboratory

Prerequisite: ASTRO 9A.

Recommended Preparation: Eligibility for ENGL 100 and READ 100.

Similar to ASTRO 9A, but includes more advanced projects as well as prime focus photography, advanced techniques, and opportunities for digital imaging and processing.

*Transfer Credit:* Transfers to CSU.

## **ASTRO 9C**

### **Astrophotography**

1 unit; 1 hour Lecture, 2 hours Laboratory

Prerequisite: ASTRO 9B.

Recommended Preparation: Eligibility for ENGL 100 and READ 100.

Similar to ASTRO 9A and 9B but includes more creative and advanced projects: experimental testing, advanced composition, CCD imaging and digital processing. Includes weekend camping trip for dark-sky work.

*Transfer Credit:* Transfers to CSU.

## **ASTRO 10**

### **Introduction to Astronomy**

3 units; 3 hours Lecture

Recommended Preparation: MATH 154; Eligibility for ENGL 100 and READ 100.

A comprehensive overview of modern astronomy for the nonscience major, stressing scientific method in discovering the nature of the universe. Not open to students with credit in ASTRO 11.

*Transfer Credit:* Transfers to CSU; UC, with limits: ASTRO 10 & 11 combined-maximum credit- 1 course.

## **ASTRO 11**

### **Quantitative Introductory Astronomy**

3 units; 3 hours Lecture

Prerequisite: MATH 152.

Recommended Preparation: Eligibility for ENGL 100 and READ 100.

A comprehensive survey of modern astronomy, stressing scientific thinking and quantitative problem solving. Similar to ASTRO 10, but includes algebraic homework problem sets. Satisfies quantitative reasoning requirement at UCSC. Not open to students with credit in ASTRO 10.

*Transfer Credit:* Transfers to CSU; UC, with limits: ASTRO 10 & 11 combined-maximum credit- 1 course.

## **ASTRO 27**

### **Field Astronomy at the Pinnacles**

1 unit; 0.82 hour Lecture, 0.5 hour Laboratory

Corequisite: GEOL 27.

Recommended Preparation: Eligibility for ENGL 100 and READ 100.

An intensive one weekend field lecture class in general astronomy, using direct visual and telescope observations in explaining planetary geology, solar system, star, and galaxy formation and evolution, and the origin of the universe. Held in conjunction with GEOL 27. Includes car-camping at Pinnacles National Monument.

*Transfer Credit:* Transfers to CSU.

## **ASTRO 28A-Z**

### **Special Topics in Field Astronomy**

1 unit; 0.82 hour Lecture, 0.5 hour Laboratory

Repeatability: May be taken a total of 4 times. Individual sections may be taken once.

Recommended Preparation: Eligibility for ENGL 100 and READ 100.

A weekend field lecture/lab course of descriptive astronomy in dark sky locations in park lands and camping areas. Emphasis on direct observations to explore how the universe works. Car camping is required. Similar to ASTRO 27 but each section is designed around a unique astronomical event and/or location: e.g. meteor shower, lunar occultation, professional observatory tour, comet appearance.

*Transfer Credit:* Transfers to CSU.

## **ASTRO 30**

### **Advanced Field Astronomy**

2 units; 1.65 hours Lecture, 1 hour Laboratory

Recommended Preparation: Eligibility for ENGL 100 and READ 100.

Presents an in-depth field course including evening observing projects, daytime geology excursions, and campfire lectures conducted at a remote dark-sky location. Involves camping on either two weekends or over a 5-day period. Lectures on planetary geology, solar studies, and survey astronomy. Evening telescope observing sessions. Each night will focus on one branch of astronomy. Car-camping required.

*Transfer Credit:* Transfers to CSU.

