

## Astronomy

College of Science, Engineering and Technology  
 Department of Physics and Astronomy  
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**The Astronomy BS is slated for closure. Some of the courses below will be offered this year for students who are working on finishing their degrees. Please note that the scheduling may deviate from the course information below. Students from other majors are welcome to join these courses for elective credit; please consult with your academic advisor and the department before registering.**

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### POLICIES/INFORMATION

**GPA Policy.** Astronomy minors must maintain a minimum 2.5 GPA in all coursework for their astronomy program, and in addition must earn a “C” or better for a course to apply to their or minor. These standards apply to the courses required for the degree and their prerequisites. A minimum cumulative GPA of 2.0 is required for graduation. There are no prerequisite GPA requirements for internships.

The astronomers operate two observatories on the southern edge of the campus. Standeford Observatory contains a 14-inch Schmidt-Cassegrain telescope, used for visual observations by general education students and other observatory visitors. Several other 10- to 13-inch telescopes are also available for instructional use by students in Astronomy 125. Andreas Observatory houses a 0.5-meter computer-controlled Cassegrain telescope. This instrument, which is equipped with photographic and electronic cameras and photometers, is used primarily for advanced instruction and faculty research. Standeford Observatory is open regularly for students and other visitors during the spring and the fall. Public viewing nights at Andreas Observatory are held occasionally during the year as weather permits.

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### ASTRONOMY MINOR

#### Required General Education

MATH	121	Calculus I (4)
PHYS	221	General Physics I (4)

#### Required Support Courses

MATH	122	Calculus II (4)
PHYS	222	General Physics II (3)
PHYS	223	General Physics III (3)

#### Required for Minor

AST	125	Observational Astronomy (3)
AST	201	Spherical Astronomy (2)
AST	215	Astronomy and Astrophysics I (4)
AST	225	Astronomy and Astrophysics II (4)

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### COURSE DESCRIPTIONS

#### AST 101 (3) Introduction to Astronomy

Broad survey of astronomy: the night sky, seasons, moon phases, eclipses, light, telescopes, stars, stellar evolution, galaxies, cosmology, the solar system.  
 Fall, Spring  
 GE-3

#### AST 102 (3) Introduction to the Planets

Survey of our solar system: the sun, planets, moons, asteroids, comets, and meteoroids; history of the discovery and exploration of the solar system.  
 Fall, Spring  
 GE-3

#### AST 104 (2) Introduction to Experimental Astronomy

Experiments in astronomy; astronomical observations; measurement, interpretation, and analysis of various types of astronomical data. Lab included.  
 Pre or Co-req: AST 101 or AST 102  
 Variable  
 GE-3

#### AST 115 (2) Life in the Universe

The probability of extraterrestrial intelligent life; the chemical basis of life; planetary environments; habitable zones; the Drake equation; UFOs; space travel; interstellar communication; limits on technical civilizations.  
 Fall, Spring  
 GE-2, GE-3

#### AST 125 (3) Observational Astronomy

Techniques for observing with naked eye, binoculars and small telescopes; constellation and star identification; use of star atlases and handbooks; observations of stars, binaries, clusters, nebulae, etc. Evening observing sessions required.  
 Pre: AST 101 or consent  
 Fall

#### AST 201 (2) Spherical Astronomy

The celestial sphere; coordinate systems; sidereal and solar time; diurnal motion; precession; proper motion; refraction; aberration; parallax. Requires a background in trigonometry.  
 Spring

#### AST 215 (4) Astronomy and Astrophysics I

Celestial mechanics; gravitational and tidal forces; stellar motions and parallax; radiation and matter; magnitudes and stellar spectra; binary stars and stellar masses; stellar structure and evolution.  
 Pre: MATH 121 and PHYS 221  
 Fall

#### AST 225 (4) Astronomy and Astrophysics II

Stellar endpoints; close binary systems; variable stars; the Milky Way; normal galaxies; galactic evolution; active galaxies and quasars; cosmology.  
 Pre: AST 215, MATH 122, PHYS 222  
 Spring

#### AST 294 (1-6) Workshop

A short course devoted to a specific astronomical topic. May be repeated for credit on each new topic.  
 Variable

#### AST 351 (1) Telescope Operations

Telescope optics; operating the 0.5-meter telescope; pointing and guiding; preparation of observing lists and finder charts; operation of the telescope's ancillary equipment.  
 Pre: AST 201 and AST 215, Consent  
 Variable

#### AST 353 (2) Photometry I

Photometric systems; observational techniques of point-source photometry; methods of data reduction; interpretation of data.  
 Pre: AST 215  
 ALT-Fall

#### AST 354 (2) Photometry II

Observations of extended sources; photometric calibration of extended sources; use of secondary standard stars.  
 Pre: AST 353  
 ALT-Spring

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## ASTRONOMY

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### **AST 355 (2) Astrometry**

Reduction of digital images to determine positions, proper motions, and parallaxes of stars; analysis of errors.

Pre: AST 201 and AST 215

ALT-Spring

### **AST 357 (2) Spectroscopy**

Line identification; radial velocity determinations; spectral classification.

Pre: AST 225

ALT-Fall

### **AST 420 (3) Stellar Astrophysics**

Blackbody radiation; radiative transfer; atomic structure; spectroscopic notation; excitation; ionization; absorption and emission coefficients; line profiles; analysis of stellar spectra.

Pre: AST 225 and PHYS 223

ALT-Fall

### **AST 421 (3) Stellar Structure**

The gaseous state; degenerate matter; equations of stellar structure; polytropes; models of stellar interiors and atmospheres; stellar evolution; nucleosynthesis; stellar endpoints.

Pre: AST 420

ALT-Spring

### **AST 430 (3) Galactic Structure**

Structure, kinematics, and dynamics of our galaxy.

Pre: AST 225, PHYS 222, MATH 223

ALT-Fall

### **AST 431 (3) Extragalactic Astronomy**

Normal galaxies; groups and clusters of galaxies; galaxy interactions and mergers; active galactic nuclei; large-scale structure; galaxy formation and evolution; cosmology.

Pre: AST 430

ALT-Spring

### **AST 488 (1-4) Seminar**

May be repeated for credit on each new topic.

Pre: Consent

Variable

### **AST 491 (1-6) In-Service**

A course designed to upgrade the qualifications of persons on-the-job.

Variable

### **AST 493 (1-6) Undergraduate Research**

Students will conduct supervised research in astronomy.

Pre: Consent

Variable

### **AST 494 (1-6) Workshop**

A short course devoted to a specific astronomical topic. May be repeated for credit on each new topic.

Variable

### **AST 495 (1-4) Selected Topics**

A course in a particular area of astronomy not regularly offered. May be repeated for credit on each new topic.

Pre: Consent

Variable

### **AST 497 (1-16) Internship**

Provides a student the opportunity to gain expertise and experience in a special field under the supervision of a qualified person.

Pre: Consent

Variable

### **AST 499 (1-8) Individual Study**

Individual study under the guidance of an astronomy faculty member.

Pre: Consent

Fall, Spring