ASTRONOMY

Astronomy
College of Science, Engineering and Technology
Department of Physics and Astronomy
141 Trafton Science Center N • 507-389-5743
Website: cset.mnsu.edu/pa/

Chair: Youwen Xu
Paul Eskridge, Steven Kipp

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.

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.

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)

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
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Description</th>
<th>Prerequisite(s)</th>
<th>Notes</th>
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<tbody>
<tr>
<td>AST 355</td>
<td>Astrometry</td>
<td>Reduction of digital images to determine positions, proper motions, and parallaxes of stars; analysis of errors.</td>
<td>Pre: AST 201 and AST 215</td>
<td>ALT-Spring</td>
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<tr>
<td>AST 357</td>
<td>Spectroscopy</td>
<td>Line identification; radial velocity determinations; spectral classification.</td>
<td>Pre: AST 225</td>
<td>ALT-Fall</td>
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<tr>
<td>AST 420</td>
<td>Stellar Astrophysics</td>
<td>Blackbody radiation; radiative transfer; atomic structure; spectroscopic notation; excitation; ionization; absorption and emission coefficients; line profiles; analysis of stellar spectra.</td>
<td>Pre: AST 225 and PHYS 223</td>
<td>ALT-Fall</td>
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<tr>
<td>AST 421</td>
<td>Stellar Structure</td>
<td>The gaseous state; degenerate matter; equations of stellar structure; polytropes; models of stellar interiors and atmospheres; stellar evolution; nucleosynthesis; stellar endpoints.</td>
<td>Pre: AST 420</td>
<td>ALT-Spring</td>
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<tr>
<td>AST 430</td>
<td>Galactic Structure</td>
<td>Structure, kinematics, and dynamics of our galaxy.</td>
<td>Pre: AST 225, PHYS 222, MATH 223</td>
<td>ALT-Fall</td>
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<tr>
<td>AST 431</td>
<td>Extragalactic Astronomy</td>
<td>Normal galaxies; groups and clusters of galaxies; galaxy interactions and mergers; active galactic nuclei; large-scale structure; galaxy formation and evolution; cosmology.</td>
<td>Pre: AST 430</td>
<td>ALT-Spring</td>
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<td>AST 488</td>
<td>Seminar</td>
<td>May be repeated for credit on each new topic.</td>
<td>Pre: Consent</td>
<td>Variable</td>
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<td>AST 491</td>
<td>In-Service</td>
<td>A course designed to upgrade the qualifications of persons on-the-job.</td>
<td>Pre: Consent</td>
<td>Variable</td>
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<tr>
<td>AST 493</td>
<td>Undergraduate Research</td>
<td>Students will conduct supervised research in astronomy.</td>
<td>Pre: Consent</td>
<td>Variable</td>
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<td>AST 494</td>
<td>Workshop</td>
<td>A short course devoted to a specific astronomical topic. May be repeated for credit on each new topic.</td>
<td>Pre: Consent</td>
<td>Variable</td>
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<tr>
<td>AST 495</td>
<td>Selected Topics</td>
<td>A course in a particular area of astronomy not regularly offered. May be repeated for credit on each new topic.</td>
<td>Pre: Consent</td>
<td>Variable</td>
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<tr>
<td>AST 497</td>
<td>Internship</td>
<td>Provides a student the opportunity to gain expertise and experience in a special field under the supervision of a qualified person.</td>
<td>Pre: Consent</td>
<td>Variable</td>
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<tr>
<td>AST 499</td>
<td>Individual Study</td>
<td>Individual study under the guidance of an astronomy faculty member.</td>
<td>Pre: Consent</td>
<td>Fall, Spring</td>
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