

ASTRONOMY MINOR

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: Thomas R. Brown

Faculty: Paul Eskridge, Steven Kipp

The astronomy program serves the needs of a wide range of students, from those with only a casual interest in the subject to those students planning careers in the field. The 100-level courses (which include general education offerings) are designed to introduce astronomy to the student with a minimal background in mathematics and the physical sciences. The courses taken by astronomy minors cover a variety of topics in modern astronomy and astrophysics and require significant preparations in mathematics and physics. Paired with a major in physics, the astronomy minor serves as the first step towards a career in teaching or research in astronomy.

Academic Map/Degree Plan at www.mnsu.edu/programs/#All

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 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 125L. 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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Core for Minor

AST	125L	Observational Astronomy (3)
AST	201	Spherical Astronomy (2)
AST	215	Astronomy and Astrophysics I (4)
AST	225	Astronomy and Astrophysics II (4)
AST	351	Telescope Operations (2)
PHYS	223	General Physics III (3)

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 125L (3) Observational Astronomy

Techniques for observing with the naked eye, binoculars and small telescopes; constellation and star identification; use of star atlases and handbooks; observations of stars, binaries, clusters, nebulae, planets and the sun and moon, etc. Students will also learn how astronomical theories are formulated and tested by observing phenomena in the sky. Evening observing labs required.

Prerequisite: AST 101 or consent

Fall
 GE-3

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.

Prerequisite: 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.

Prerequisite: 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 (2) Telescope Operations

Operating the 0.5 meter telescope; operating the BRC 250 astrograph; learning to install and operate ancillary equipment for both telescopes.

Prerequisite: 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.

Prerequisite: AST 215

ALT-Fall

AST 354 (2) Photometry II

Observations of extended sources; photometric calibration of extended sources; use of secondary standard stars.

Prerequisite: AST 353

ALT-Spring

AST 355 (2) Astrometry

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

Prerequisite: AST 201 and AST 215

ALT-Spring

AST 357 (2) Spectroscopy

Line identification; radial velocity determinations; spectral classification.

Prerequisite: 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.

Prerequisite: 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.

Prerequisite: AST 420

ALT-Spring

AST 430 (3) Galactic Structure

Structure, kinematics, and dynamics of our galaxy.

Prerequisite: 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.

Prerequisite: AST 430

ALT-Spring

AST 488 (1-4) Seminar

May be repeated for credit on each new topic.

Prerequisite: 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.

Prerequisite: 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.

Prerequisite: 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.

Prerequisite: Consent

Variable

AST 499 (1-8) Individual Study

Individual study under the guidance of an astronomy faculty member.

Prerequisite: Consent

Fall, Spring