

# ASTRONOMY (ASTR)

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## **ASTR 131N - Planetary Astronomy. 3 Credits.**

Offered autumn. Prereq., high school algebra and geometry. An introduction to observational, historical, and planetary astronomy. Students will have a chance to visit UM's state-of-the-art planetarium and observe with our 0.4 meter telescope.  
Gen Ed Attributes: Natural Science

## **ASTR 132N - Stars, Galaxies, and the Universe. 3 Credits.**

Offered spring. Prereq., high school algebra and geometry. An introduction to stars, stellar evolution, galaxies, and cosmology. Students will have a chance to visit UM's state-of-the-art planetarium and observe with our 0.4 meter telescope.  
Gen Ed Attributes: Natural Science

## **ASTR 134N - Planetary Astronomy Lab. 1 Credit.**

Offered autumn. Prereq. or coreq., ASTR 131N Laboratory exercises in observational and planetary astronomy. Students will have a chance to visit UM's state-of-the-art planetarium and observe with our 0.4 meter telescope. Gen Ed Attributes: Natural Science Lab Course (N)  
Gen Ed Attributes: Natural Science Lab Course, Natural Science

## **ASTR 135N - Stars, Galaxies, and the Universe Lab. 1 Credit.**

Offered spring. Prereq. or coreq., ASTR 132N. Laboratory exercises in observational, stellar, and galactic astronomy. Students will have a chance to visit UM's state-of-the-art planetarium and observe with our 0.4 meter telescope. Gen Ed Attributes: Natural Science Lab Course (N)  
Gen Ed Attributes: Natural Science Lab Course, Natural Science

## **ASTR 142N - The Evolving Universe. 4 Credits.**

Offered spring. Prereq., working knowledge of precalculus (ie., college algebra and college trigonometry). Overview of recent developments in planetary system formation, stars, galaxies, and cosmology. Some astronomical observing required outside of normal class hours. Gen Ed Attributes: Natural Science Lab Course (N)  
Gen Ed Attributes: Natural Science Lab Course, Natural Science

## **ASTR 191 - Special Topics. 1-6 Credits.**

(R-6) Offered intermittently. Experimental offerings of visiting professors, experimental offerings of new courses or one-time offerings of current topics.

## **ASTR 198 - Internship. 1-6 Credits.**

(R-6) Offered intermittently. Prereq., consent of department. Extended classroom experience which provides practical application of classroom learning during placements off campus. Prior approval must be obtained from the faculty supervisor and the Internship Services office. A maximum of 6 credits of Internship (198, 298, 398, 498) may count toward graduation.

## **ASTR 292 - Independent Study. 1-6 Credits.**

Course material appropriate to the needs and objectives of the individual student.

## **ASTR 351 - Planetary Science. 3 Credits.**

Offered autumn even-numbered years. Prereq., PHSX 215N - PHSX 216N or PHSX 205N - PHSX 206N and M 162 or M 171. Physical and geological characteristics of planets, satellites, asteroids, comets, and meteoroids, with an emphasis on comparative planetology.

## **ASTR 353 - Galactic Astrophysics. 3 Credits.**

Offered spring odd-numbered years. Prereq., ASTR 132N or ASTR 142N, and PHSX 217N - PHSX 218N or PHSX 207N - PHSX 208N, and M 273. The nature of the Milky Way galaxy and other galaxies, galactic evolution, the large scale structure of the universe, active galaxies and quasars, and cosmology, including the early universe.

## **ASTR 362 - Observational Astronomy. 3 Credits.**

Offered autumn even-numbered years. Prereq., ASTR 132N or ASTR 142N, and PHSX 207N - PHSX 208N or PHSX 217N - PHSX 218N. Laboratory study of the probabilistic behavior of light, data acquisition with telescopes, digital imaging and spectroscopy. Emphasis on fundamental statistical tools, scientific computer programming, and written and oral presentation of scientific results.

## **ASTR 363 - Stellar Astronomy & Astrophysics I. 3 Credits.**

Offered autumn odd-numbered years. Prereq., ASTR 132N or ASTR 142N, and PHSX 207N - PHSX 208N or PHSX 217N - PHSX 218N, and prereq., or coreq., M 273. Detailed application of physical laws to determine the nature of the stars; analysis of stellar spectra and atmospheres; solar astrophysics; structure of stars and their evolution.

## **ASTR 365 - Stellar Ast & Astrophys II. 3 Credits.**

Offered spring even-numbered years. Prereq., ASTR 363. Continuation of ASTR 363.

## **ASTR 391 - Special Topics. 1-9 Credits.**

(R-6) Offered intermittently. Experimental offerings of visiting professors, experimental offerings of new courses, or one-time offerings of current topics.

## **ASTR 392 - Independent Study. 1-6 Credits.**

Course material appropriate to the needs and objectives of the individual student.

## **ASTR 398 - Internship. 1-6 Credits.**

(R-6) Offered intermittently. Prereq., consent of department. Extended classroom experience which provides practical application of classroom learning during placements off campus. Prior approval must be obtained from the faculty supervisor and the Internship Services office. A maximum of 6 credits of Internship (198, 298, 398, 498) may count toward graduation.

## **ASTR 492 - Independent Study. 1-12 Credits.**

Level: undergraduate and graduate.

## **ASTR 494 - Senior Capstone Seminar. 1 Credit.**

Offered autumn. Prereq., junior or senior standing in physics. Each student will present a seminar on research performed prior to or during their senior year. Level: undergraduate.

## **ASTR 498 - Internship. 1-6 Credits.**

(R-6) Offered intermittently. Requires consent of department. Extended classroom experience which provides practical application of classroom learning during placements off campus. Prior approval must be obtained from the faculty supervisor and the Internship Services office. A maximum of 6 credits of Internship (198, 298, 398, 498) may count toward graduation. Level: Undergraduate

## **ASTR 499 - Seminar/Workshop. 1 Credit.**

Offered autumn. Prereq., junior or senior standing in physics. Each student will present a seminar on research performed prior to or during their senior year. Level: undergraduate.