

THE FIELD

Astronomy is the study of the regions beyond Earth: planets, moons, stars, galaxies, and the universe itself. Astronomers study these objects not only by observing them with telescopes and other instruments, but also with mathematical and computer models. Astronomers therefore make heavy use of physics, mathematics, and computer science. They also use equipment ranging from radio telescopes half a mile across and high-speed computers to optical telescopes so big a truck could park on the mirror. The discipline ranges over many areas: the study of the atmospheres and surfaces of the planets, the exploration of other planetary systems, the study of stars, including their structure and evolution, the study of other galaxies, and the origin of the universe.

A minor in astronomy is available.

Astronomy students may pursue secondary education certification in conjunction with the major. See the education major sheet, website, or the Guide to Undergraduate Programs (umass.edu/education; umass.edu/ug_programguide) for more information.

The Five College Department of Astronomy is administered jointly with Amherst, Hampshire, Mount Holyoke, and Smith colleges. The elementary courses for majors and non-majors are taught separately at each campus, but many advanced courses are given on a joint basis for students from the five participating institutions.

THE MAJOR

The bachelor of science degree in astronomy offers two tracks geared toward different career directions. The astrophysics track provides preparation for advanced studies in astronomy or allied fields after graduation. Students acquire the substantial background in physics and math essential for pursuing a research career in astronomy. The space sciences track provides preparation for a career in astronomy-related mission support; it requires somewhat less physics and math than the astrophysics track, and provides more flexibility for pursuing additional coursework suited to the individual student's goals. Students may change tracks after consultation with and approval by their advisor.

The bachelor of arts in astronomy is intended to be flexible enough for a wide variety of careers: teaching, museum work, science writing, pre-medical studies, etc. This degree program is aimed at students interested in pursuing a broader understanding of the sciences centered on astronomy, including cross-disciplinary fields such as astrobiology or archaeoastronomy. This flexibility in the curriculum requires the student to work closely with an advisor to design a program of study that will meet the student's goals.

RESEARCH OPPORTUNITIES

Independent and honors work is encouraged for all majors, and there are also opportunities for summer research internships. Students may participate in observational and theoretical studies of solar system objects, stellar astrophysics, the interstellar medium, extra-galactic sources, and cosmology. Observational studies make use of most major space-based facilities, such as the Hubble Space Telescope and the Chandra X-ray Satellite, as well as major ground-based telescopes, and cover the entire electromagnetic spectrum (X-rays, ultraviolet, visible, infrared, and radio). In addition, we are partners in the Large Millimeter-Wave Telescope (LMT), the largest telescope of its kind in the world and located in central Mexico, and a 1-m-size optical telescope located in Arizona.

A large multiple-processor computer is available for computational studies. Several small optical telescopes equipped with CCD cameras are also available locally for student training.

HONORS

Contact the departmental honors coordinator for information on how to pursue honors opportunities within the major.

STUDY ABROAD

Majors may choose to study abroad if it supports their academic and career goals. Students should contact the International Programs Office (413-545-2710, umass.edu/ipo) and work closely with their academic advisor to choose the appropriate courses in preparation.

CAREER OPPORTUNITIES

Students earning a degree in astronomy follow three primary career paths. The first route is to pursue graduate school and a professional degree. After completing an advanced degree, many astronomers are employed by universities as researchers and teachers. Professional positions are also available at national observatories and laboratories, NASA, and in the aerospace industry in such companies as Lockheed, Boeing, and Grumman.

The second primary path is astronomy-related mission support. With an undergraduate degree, positions are available at research centers supporting many major astronomical and aerospace projects, including the Space Telescope Science Institute, Harvard-Smithsonian Center for Astrophysics, and MIT Lincoln Laboratories. Support positions at national observatories and astronomy-related industries are also available. Technical trainings in astronomy also translate well to industrial positions involving problem solving, such as research and development or data sciences.

The third direction is teaching and public outreach. Combined with preparation through the College of Education, teaching positions in middle and secondary school science are available. Astronomy majors have also gone on to work in museums and planetariums.

Finally, the major can provide a broad platform for learning about the wide range of sciences involved in astronomy, making it suitable preparation for science journalism, science writing, or pre-medical studies, for example.

COLLEGE OF NATURAL SCIENCES

The College of Natural Sciences unites the life, environmental, computational, and physical sciences on campus. Students take advantage of a range of inquiry-based classroom and laboratory experiences, hands-on undergraduate research opportunities, multidisciplinary and cross-departmental education and research initiatives, and a variety of science student organizations. In addition, they are encouraged to develop strong written and oral communication skills, as well as leadership and problem-solving abilities.

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