The Department of Astronomy offers a major and a minor in astronomy. In addition, students may pursue astronomy as part of the LAS Major in Computer Science and Astronomy (http://catalog.illinois.edu/undergraduate/las/comp-science/astronomy).

The major in astronomy, administered by the Department of Astronomy, is based upon both a broad and an in-depth exploration into astronomy and allied disciplines, and is an excellent way to gain a general science education. It may be chosen by students who wish to have an astronomy research career or an astronomy background for use in related fields, such as working in national laboratories, observatories, planetariums, NASA, aerospace industry, many computer-related fields, journalism, or science writing to name a few. Astronomy courses can also be customized to satisfy a secondary field for the undergraduate curriculum in General Engineering.

Astronomy students are also encouraged to double major or minor in a second field such as chemistry, computer science, geology, mathematics or physics. Specific programs of study in other areas such as biology, economics, English, history, or journalism for individual students can be designed and periodically updated through mutual discussions between the students and their academic advisers.

The Department of Astronomy also sponsors the Minor in Astronomy.

For the Degree of Bachelor of Science in Liberal Arts and Sciences

Major in Sciences and Letters Curriculum

E-mail: astronomy@illinois.edu

Minimum required major and supporting course work normally equates to 47-48 hours.

General education: Students must complete the Campus General Education requirements (https://courses.illinois.edu) including the campus general education language requirement.

Twelve hours of 300- and 400-level Astronomy/Physics courses must be taken on this campus.

Minimum hours required for graduation: 120 hours

Departmental distinction. A student majoring in astronomy may earn distinction or high distinction by attaining a minimum grade point average of 3.4 or 3.75, respectively, in required major courses (defined in the table below) taken at UIUC. For highest distinction, in addition to meeting the minimum requirements for high distinction, a senior thesis (ASTR 490) must be completed with strong endorsement by the research supervisor. Questions about eligibility for distinction status should be directed to an astronomy advisor before the senior year.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
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</thead>
<tbody>
<tr>
<td></td>
<td><strong>Astronomy Core</strong></td>
<td></td>
</tr>
<tr>
<td>ASTR 210</td>
<td>Introduction to Astrophysics ^1</td>
<td>3</td>
</tr>
</tbody>
</table>

Select three of the following: 9-10

- ASTR 404 Stellar Astrophysics
- ASTR 405 Planetary Systems
- ASTR 406 Galaxies and the Universe
- ASTR 414 Astronomical Techniques

Select at least 12 hours of 300- or 400-level ASTR or PHYS courses ^2, ^3

Supporting Technical Courses

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS 211</td>
<td>University Physics: Mechanics</td>
<td>1</td>
</tr>
<tr>
<td>PHYS 212</td>
<td>University Physics: Elec &amp; Mag</td>
<td>1</td>
</tr>
<tr>
<td>PHYS 213</td>
<td>Univ Physics: Thermal Physics</td>
<td>2</td>
</tr>
<tr>
<td>PHYS 214</td>
<td>Univ Physics: Quantum Physics</td>
<td>2</td>
</tr>
<tr>
<td>Mathematics</td>
<td></td>
<td>11</td>
</tr>
<tr>
<td>MATH 221</td>
<td>Calculus I ^4</td>
<td></td>
</tr>
<tr>
<td>MATH 231</td>
<td>Calculus II</td>
<td></td>
</tr>
<tr>
<td>MATH 241</td>
<td>Calculus III</td>
<td></td>
</tr>
</tbody>
</table>

1. Students without a background in physics or astronomy are encouraged to take ASTR 121 and ASTR 122 during their freshman year.
2. Other 300- or 400-level technical classes, e.g. chemistry, computer science engineering, or statistics can be substituted with academic adviser approval.
3. A maximum of 4 hours of credit in ASTR 390 (or equivalent “Independent Study” course, such as PHYS 497) can be counted towards this requirement.
4. MATH 220 may be substituted for MATH 221. MATH 220 is appropriate for students with no background in calculus.

Minor in Astronomy

The minor in astronomy is designed to broaden the student's knowledge of science and our place in the universe. The minor in Astronomy will benefit especially those students who are eager to learn astronomy but suitably those students who do not anticipate it to be their career. The Astronomy minor is also suitable for students who intend to pursue careers in areas that may benefit from a good knowledge of astronomy such as aerospace industry, science writing, scientific journalism, or science teaching in schools.

E-mail: astronomy@illinois.edu

Web address for department: http://www.astro.illinois.edu/

Information listed in this catalog is current as of 10/2017
ASTR 121, or concurrent registration in ASTR 121.

Laboratory exercises will include properties of telescopes, observations of star clusters, nebulae and galaxies using telescopes at the Campus Observatory, and computer-based activities that illustrate modern astronomical techniques using digital data. Prerequisite: Credit in ASTR 100 or ASTR 122, or concurrent registration in ASTR 122.

ASTR 122   Stars and Galaxies Lab   credit: 1 Hour.

Laboratory studies which complement the lecture course, ASTR 122. Laboratory exercises will include properties of telescopes, observations of star clusters, nebulae and galaxies using telescopes at the Campus Observatory, and computer-based activities that illustrate modern astronomical techniques using digital data. Prerequisite: Credit in ASTR 100 or ASTR 121, or concurrent registration in ASTR 121.

ASTR 123   The Solar System Lab   credit: 1 Hour.

Laboratory studies which complement the lecture course, ASTR 123. Laboratory exercises will include properties of telescopes, observations of the Moon and planets using telescopes at the Campus Observatory, and computer-based activities that illustrate modern astronomical techniques using digital data. Prerequisite: Credit in ASTR 100 or ASTR 121, or concurrent registration in ASTR 121.

Information listed in this catalog is current as of 10/2017
ASTR 404  Stellar Astrophysics  credit: 3 Hours.
Introduction to astrophysical problems, with emphasis on underlying physical principles; includes the nature of stars, equations of state, stellar energy generation, stellar structure and evolution, astrophysical neutrinos, binary stars, white dwarfs, neutron stars and pulsars, and novae and supernovae. 3 undergraduate hours. 3 graduate hours.
Prerequisite: PHYS 212; or consent of instructor. Recommended: ASTR 210, PHYS 213, PHYS 214.

ASTR 405  Planetary Systems  credit: 3 Hours.
This course traces, from a physical perspective, the evolution of planetary systems from star formation in molecular clouds to the emergence of habitable worlds. Topics include the properties of HII regions and molecular clouds, gravitational collapse and disk formation, formation of planetesimals and planets, dynamics of the solar system, physics of planetary atmospheres, properties of individual planets and their rings and satellites, detection and characterization of extra-solar planets, and searches for life in the Solar System and beyond. 3 undergraduate hours. 3 graduate hours.
Prerequisite: PHYS 212 or consent of instructor. Recommended: ASTR 210, PHYS 213.

ASTR 406  Galaxies and the Universe  credit: 3 Hours.
Nature of the Milky Way galaxy: stellar statistics and distributions, stellar populations, spiral structure, the nucleus and halo. Nature of ordinary galaxies; galaxies in our Local Group, structure of voids and superclusters. Nature of peculiar objects: Seyfert galaxies, starburst galaxies, and quasars. Elementary aspects of physical cosmology. 3 undergraduate hours. 3 graduate hours.
Prerequisite: PHYS 212; or consent of instructor. Recommended: ASTR 210, PHYS 213, PHYS 214.

ASTR 414  Astronomical Techniques  credit: 4 Hours.
Introduction to techniques used in modern optical and radio astronomy with emphasis on the physical and mathematical understanding of the detection of electromagnetic radiation; includes such topics as fundamental properties of radio and optical telescopes and the detectors that are used with telescopes. Lectures and laboratory. 4 undergraduate hours. 4 graduate hours.
Prerequisite: MATH 241 or equivalent; PHYS 212; or consent of instructor. Recommended: ASTR 210, PHYS 213, PHYS 214.

ASTR 450  Astrochemistry  credit: 4 Hours.
Same as CHEM 450. See CHEM 450.

ASTR 451  Astrochemistry Laboratory  credit: 3 or 4 Hours.
Same as CHEM 451. See CHEM 451.

ASTR 490  Senior Thesis  credit: 3 Hours.
Research with thesis, under the direction of a faculty member in astronomy. This course is recommended for all students who plan to do research and graduate study, and it is a prerequisite for graduation with highest distinction in astronomy. In the term preceding their initial enrollment, those interested in taking the course should consult with an academic advisor as well as the potential research advisor. A thesis must be presented for credit to be received. 3 undergraduate hours. No graduate credit.
Prerequisite: Two 400-level Astronomy courses and consent of academic advisor and of faculty member who supervises the work. Intended for Astronomy majors of senior standing.
This course satisfies the General Education Criteria for: Advanced Composition

ASTR 496  Seminar in Astronomy  credit: 1 to 4 Hours.
Lectures on topics of current interest in astronomy and astrophysics; for advanced undergraduates and graduates. See Class Schedule for current topics. 1 to 4 undergraduate hours. 1 to 4 graduate hours. Approved for both letter and S/U grading. May be repeated. Prerequisite: Consent of instructor.

ASTR 499  Astronomy Laboratory  credit: 2 Hours.
Provides hands-on observational experience: how to use a telescope, how to image sources using a modern CCD camera, how to use a modern CCD spectrometer, and how to apply data analysis to astrophysical problems. 2 undergraduate hours. 2 graduate hours.
Prerequisite: One 400-level astronomy course.