COMPUTER SCIENCE + ASTRONOMY, BSLAS

for the degree of Bachelor of Science in Liberal Arts & Sciences Major in Computer Science + Astronomy

The LAS major in **Computer Science + Astronomy** is a flexible program for students who wish to combine a solid grounding in computer science (https://siebelschool.illinois.edu) with technical knowledge of astronomy (https://astro.illinois.edu/). This blended curriculum helps develop a unique approach to problem solving and offers novel perspectives in interdisciplinary work, such as data visualization, data mining, astrophysical simulations, and image processing.
STEM designated*; BSLAS Degree (Bachelor of Science in Liberal Arts & Sciences)

The Astronomy Department undergraduate program also includes majors in Astronomy (http://catalog.illinois.edu/undergraduate/las/astronomy-bslas/), Astrophysics (http://catalog.illinois.edu/undergraduate/las/astrophysics-bslas/), and Astronomy + Data Science (http://catalog.illinois.edu/undergraduate/las/astronomy-data-science-bslas/), as well as a minor in Astronomy (http://catalog.illinois.edu/undergraduate/las/minors/astronomy/).

Astronomy Major

The LAS major in Astronomy (http://catalog.illinois.edu/undergraduate/las/astronomy-bslas/) is a flexible program for students who are fascinated by the cosmos and plan to pursue technical or professional careers in areas requiring a solid grounding in physical science and mathematics. It is based upon both a broad and an in-depth exploration into astronomy and allied disciplines, and is flexible enough to be paired with many other majors or minors.
STEM designated*; BSLAS Degree (Bachelor of Science in Liberal Arts & Sciences)

Astrophysics Major

Astrophysics (http://catalog.illinois.edu/undergraduate/las/astrophysics-bslas/), the study of how the universe works by applying the methods and principles of physics, is the cornerstone of modern astronomy. Students majoring in Astrophysics must complete advanced coursework in both astronomy and physics, allowing them to demonstrate the rigorous preparation necessary for graduate study in astronomy/astrophysics, physics, and planetary and space sciences.
STEM designated*; BSLAS Degree (Bachelor of Science in Liberal Arts & Sciences)

Astronomy + Data Science Major

The Astronomy + Data Science (http://catalog.illinois.edu/undergraduate/las/astronomy-data-science-bslas/) major incorporates simultaneously a strong foundation in Data Science and Astronomy to develop an appreciation and understanding of how big data is transforming science. Graduates of the Astronomy + Data Science program will have gained experience working with modern large data sets using current computational and statistical methods, with a strong grounding in data curation and ethics.
STEM designated*; BSLAS Degree (Bachelor of Science in Liberal Arts & Sciences)

Astronomy Minor

The minor in astronomy (http://catalog.illinois.edu/undergraduate/las/minors/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 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 the aerospace industry, science writing, scientific journalism, or science teaching in schools.

QUESTIONS?

To get answers to your questions about our undergraduate programs in astronomy or to schedule a visit, contact Astronomy Advising (advising@astro.illinois.edu).

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A Major Plan of Study Form must be completed and submitted to the LAS Student Affairs Office by the beginning of the fifth semester (60-75 hours). Please see the computer science advisor as well as the astronomy advisor.

Graduation Requirements

Minimum hours required for graduation: 120 hours.

Minimum required major and supporting course work: Normally equates to 68-71 hours. Twelve hours of 300- and 400-level in the major must be taken on this campus.

A Major Plan of Study form must be completed and submitted to the LAS Student Affairs office by the beginning of the fifth semester (60-75 hours). Please see the Computer Science advisor as well as the Astronomy advisor.

University Requirements

Minimum of 40 hours of upper-division coursework, generally at the 300- or 400-level. These hours can be drawn from all elements of the degree. Students should consult their academic advisor for additional guidance in fulfilling this requirement.

The university and residency requirements can be found in the Student Code (https://studentcode.illinois.edu/article3/part8/3-801/) (§ 3-801) and in the Academic Catalog (http://catalog.illinois.edu/general-information/degree-general-education-requirements/).

General Education Requirements

Follows the campus General Education (Gen Ed) requirements (https://courses.illinois.edu/gened/DEFAULT/DEFAULT/). Some Gen Ed requirements may be met by courses required and/or electives in the program.

Code	Title	Hours
Composition I		4-6
Advanced Composition		3

Humanities & the Arts (6 hours)	6
Natural Sciences & Technology (6 hours)	6
fulfilled by PHYS 211 and PHYS 212	
Social & Behavioral Sciences (6 hours)	6
Cultural Studies: Non-Western Cultures (1 course)	3
Cultural Studies: US Minority Cultures (1 course)	3
Cultural Studies: Western/Comparative Cultures (1 course)	3
Quantitative Reasoning (2 courses, at least one course must be Quantitative Reasoning I)	6-10
fulfilled by MATH 220 or MATH 221, MATH 231, MATH 241, PHYS 211, PHYS 212, CS 124, CS 128, CS 225	
Language Requirement (Completion of the fourth semester or equivalent of a language other than English is required)	0-20

Major Requirements

Code	Title	Hours
Required Computer Science Coursework		
CS 100	Computer Science Orientation (recommended; CS 100 is an orientation course aimed at first-year students, so students who declare the major after the freshman year are not required to complete it.)	1
CS 124	Introduction to Computer Science I	3
CS 128	Introduction to Computer Science II	3
CS 173	Discrete Structures	3
CS 225	Data Structures	4
CS 222	Software Design Lab	1
Choose one of the following combinations		8-11
CS 233 & CS 341	Computer Architecture and System Programming	
OR		
CS 340	Introduction to Computer Systems	
& two CS courses at the 400 level above CS 403, excluding CS 421 and CS 491		
Choose one of the following:		3
STAT 200	Statistical Analysis	
STAT 212	Biostatistics	
CS 361	Probability & Statistics for Computer Science	
CS 374	Introduction to Algorithms & Models of Computation	4
CS 421	Programming Languages & Compilers	3
Mathematics (may also fulfill the General Education Quantitative Reasoning I and II requirements)		
MATH 221	Calculus I	4-5
or MATH 220	Calculus	
MATH 225	Introductory Matrix Theory	2 or 3
or MATH 257	Linear Algebra with Computational Applications	
MATH 231	Calculus II	3
Required Astronomy Coursework - Minimum of 27 Hours		
Physics, Mathematics, and Astronomy Foundations		**15**
PHYS 211	University Physics: Mechanics	4
PHYS 212	University Physics: Elec & Mag	4
MATH 241	Calculus III	4
ASTR 210	Introduction to Astrophysics	3
Advanced Astronomy Courses (Minimum 12 total advanced ASTR hours required)		**12-13**
ASTR 310	Computing in Astronomy	3
Select 2 courses from the following list:		6-7
ASTR 404	Stellar Astrophysics	
ASTR 405	Planetary Systems	
ASTR 406	Galaxies and the Universe	
ASTR 414	Astronomical Techniques	
Additional ASTR course(s) at the 300 level or higher		2-3

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Sample Sequence

This sample sequence is intended to be used only as a guide for degree completion. All students should work individually with their academic advisors to decide the actual course selection and sequence that works best for them based on their academic preparation and goals. Enrichment programming such as study abroad, minors, internships, and so on may impact the structure of this four-year plan. Course availability is not guaranteed during the semester indicated in the sample sequence.

Students must fulfill their Language Other Than English requirement by successfully completing a fourth level of a language other than English. See the corresponding section on the Degree and General Education Requirements page *(*http://catalog.illinois.edu/general-information/degree-general-education-requirements/*).*

First Year

First Semester	**Hours**
Free Elective course	1
CS 100	1
CS 124	3
MATH 220 or 221	5
Composition I or General Education course	4
	14

Total Hours 14

First Year

Second Semester	**Hours**
CS 128	3
CS 173	3
MATH 231	3
PHYS 211	4
General Education or Composition I course	3
	16

Total Hours 16

Second Year

First Semester	Hours
ASTR 210	3
CS 222	1
CS 225	4
MATH 257 or 225	3
Language Other Than English (3rd level)	4
	15

Total Hours 15

Second Year

Second Semester	Hours
CS 340	3
MATH 241	4
PHYS 212	4
Language Other Than English (4th level)	4
	15

Total Hours 15

Third Year

First Semester	Hours
ASTR 310	3
CS 361, STAT 200, or STAT 212	3
CS 374	4
General Education course	3
General Education course	3
	16

Total Hours 16

Third Year

Second Semester	Hours
ASTR 404, 405, 406, or 414	3
CS 421	3
General Education course	3
General Education course	3
Free Elective course	3
	15

Total Hours 15

Fourth Year

First Semester	Hours
ASTR 404, 405, 406, or 414	3
CS Tech Elective	3
General Education course	3
General Education course	3
Free Elective course	3
	15

Total Hours 15

Fourth Year

Second Semester	Hours
Advanced ASTR Elective	3
CS Tech Elective	3
General Education course	3
Free Elective course	3
Free Elective course	2
	14

Total Hours 14

Total Hours: 120

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Undergraduate Computer Science & Astronomy majors will graduate with a demonstrated ability to:

1. LO1. Understand the hierarchical architecture of the cosmos, increasing in scale from the Solar System to the Galaxy to the Universe, and decreasing in scale to atoms and their nuclei. Understand the interplay among these scales.
2. LO2. Define and use fundamental principles and techniques of astronomy and astrophysics.
   a. Identify which principles should be applied to a specified situation
   b. Show familiarity with astronomical observables and their physical origin.
   c. Understand and apply basic physics and computational techniques to solve problems in astrophysics, and interpret the results.
3. LO3. Analyze astronomical data, and quantitative data generally.
   a. Demonstrate the ability to link observation and theory.
   b. Demonstrate the ability to draw qualitative conclusions from quantitative information, and vice versa.
   c. Demonstrate the ability to plan observational programs, use astronomical telescopes and instrumentation, and to analyze and present astronomical data.
4. LO4. Plan and perform guided research, or attain an advanced-level understanding of a topic of contemporary interest in astronomy and astrophysics.
5. LO5. Demonstrate the ability to communicate effectively both verbally and in writing.

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Department of Astronomy

- Department of Astronomy website (https://astro.illinois.edu/)
- Astronomy faculty (https://astro.illinois.edu/directory/faculty/)
- Astronomy undergraduate programs (https://astro.illinois.edu/academics/undergraduate-program/)
- advising@astro.illinois.edu

College of Liberal Arts & Sciences

- Overview of College Admissions & Requirements: Liberal Arts & Sciences (http://catalog.illinois.edu/schools/las/)
- College of Liberal Arts and Sciences website (https://las.illinois.edu/)
- College of LAS Advising (https://las.illinois.edu/academics/advising/college/)
- Majors in LAS (https://las.illinois.edu/academics/programs/majors/)

Siebel School of Computing and Data Science

- School Website (https://siebelschool.illinois.edu/)
- Undergraduate Programs (https://siebelschool.illinois.edu/academics/undergraduate/)
- CS+Astronomy Information (https://siebelschool.illinois.edu/academics/undergraduate/degree-program-options/cs-x-degree-programs/computer-science-astronomy/)
- Undergraduate Admissions (https://siebelschool.illinois.edu/admissions/undergraduate/)
- Undergraduate Advising (https://siebelschool.illinois.edu/academics/undergraduate/undergraduate-advising/)

Grainger College of Engineering

- Information (https://grainger.illinois.edu/)
- Undergraduate Programs (https://grainger.illinois.edu/academics/undergraduate/)
- Admissions (https://grainger.illinois.edu/admissions/undergraduate/)
- Advising (https://grainger.illinois.edu/academics/undergraduate/advising/)