Bachelor of Science in Astronomy

Why study astronomy?
Because understanding the physical universe starts here.

Undergraduate Programs
Astronomy programs are offered through the Department of Physics and Astronomy. The astronomy curriculum offers undergraduates a survey of modern astronomy and an introduction to physical science, gives science and engineering students an introduction to astronomy and astrophysics, and prepares students majoring in astronomy for graduate study in astronomy or related fields.

Courses for Nonmajors
ASTR 191 surveys a wide range of contemporary astronomy topics while ASTR 293 discusses a shorter list of astrophysically extreme objects in greater detail; both courses require eligibility for MATH 101. ASTR 394 is open to students with previous coursework in astronomy, geology or biology; ASTR 391 offers an introduction to physical astronomy at a calculus-based level.

Undergraduate Admission
Admission to KU

All students applying for admission must send high school and college transcripts to the Office of Admissions. Unless they are college transfer students with at least 24 hours of credit, prospective students must send ACT or SAT scores to the Office of Admissions. Prospective first-year students should be aware that KU has qualified admission requirements that all new first-year students must meet to be admitted. Consult the Office of Admissions (http://admissions.ku.edu) for application deadlines and specific admission requirements.

Visit the Office of International Student and Scholar Services (http://www.iss.ku.edu) for information about international admissions.

Students considering transferring to KU may see how their college-level course work will transfer on the Office of Admissions (http://credittransfer.ku.edu) website.

Admission to the College of Liberal Arts and Sciences

Admission to the College is a different process from admission to a major field. Some CLAS departments have admission requirements. See individual department/program sections for departmental admission requirements.

Advising
Students considering a major in astronomy should confer early with a departmental representative about the selection of courses. The B.A. degree is appropriate for students who want a general education in astronomy as part of a broadly structured liberal education. The B.S. is a more specialized program with a substantial emphasis on physics content as well as astronomy. It provides preparation for a professional career or graduate work in astronomy, astrophysics, or related fields. A total of 120 credit hours is required for graduation.

First- and Second-Year Preparation

All major programs in physics and astronomy share requirements in basic physics and mathematics including PHSX 150, a seminar course for majors. Completion of MATH 125 and MATH 126 in the first year allows students to start calculus-based physics foundation courses (PHSX 211 and PHSX 216 or PHSX 213, followed by PHSX 212 and PHSX 236 or PHSX 214) by the second semester. Majors are encouraged to take PHSX 213 and PHSX 214, the honors versions of PHSX 211 /PHSX 216 and PHSX 212 /PHSX 236. Students should take these courses and ASTR 391 in their first two years. B.S. astronomy majors normally complete additional course work in mathematics (MATH 223, MATH 290, and MATH 320), as well as PHSX 313 and PHSX 316, in the second year.

Requirements for the B.S. Degree in Astronomy

All students pursuing the Bachelor of Science in Astronomy must complete the KU Core requirements in addition to the degree and major requirements. For details regarding the KU Core requirements, please see the KU Core section of the catalog.

General science requirements (24.5-36.5)

Majors must complete courses as specified in each of the following areas. Majors are advised to take honors courses when eligible. These hours do not contribute to the minimum number of hours required for the major.

Computing and Programming. Satisfied by one of the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>EECS 138</td>
<td>Introduction to Computing: _____</td>
<td>3</td>
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<tr>
<td>EECS 168</td>
<td>Programming I</td>
<td>4</td>
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<tr>
<td>Calculus I, Satisfied by one of the following:</td>
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<td></td>
<td>Or equivalent</td>
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<tr>
<td>MATH 125</td>
<td>Calculus I</td>
<td>4</td>
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<tr>
<td>or MATH 145</td>
<td>Calculus I, Honors</td>
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<td>Calculus II, Satisfied by one of the following:</td>
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<td></td>
<td>Or equivalent</td>
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<tr>
<td>MATH 126</td>
<td>Calculus II</td>
<td>4</td>
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<tr>
<td>or MATH 146</td>
<td>Calculus II, Honors</td>
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<tr>
<td>Seminar in Physics, Astronomy, &amp; Engineering Physics. Satisfied by the following:</td>
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<tr>
<td>PHSX 150</td>
<td>Seminar in Physics, Astronomy and Engineering Physics</td>
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<td>General Physics I, Satisfied by one of the following:</td>
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<tr>
<td>PHSX 211</td>
<td>General Physics I</td>
<td>1-4</td>
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<tr>
<td>&amp; PHSX 216</td>
<td>General Physics I Laboratory</td>
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<tr>
<td>PHSX 213</td>
<td>General Physics I Honors</td>
<td>1-5</td>
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<tr>
<td>General Physics II, Satisfied by one of the following:</td>
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<tr>
<td>PHSX 212</td>
<td>General Physics II</td>
<td>1-3</td>
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<tr>
<td>&amp; PHSX 236</td>
<td>General Physics II Laboratory</td>
<td></td>
</tr>
<tr>
<td>PHSX 214</td>
<td>General Physics II Honors</td>
<td>1-4</td>
</tr>
<tr>
<td>Foundations of Chemistry I, Satisfied by one of the following:</td>
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<td></td>
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<tr>
<td>CHEM 130</td>
<td>General Chemistry I</td>
<td>5</td>
</tr>
<tr>
<td>CHEM 190</td>
<td>Foundations of Chemistry I, Honors</td>
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Advanced Mathematics Core Knowledge and Skills (11)
Vector Calculus. Satisfied by the following:
MATH 223 Vector Calculus 3

Elementary Linear Algebra. Satisfied by the following:
MATH 290 Elementary Linear Algebra 2

Elementary Differential Equations. Satisfied by the following:
MATH 320 Elementary Differential Equations 3

Math Elective. Satisfied by one of the following: 3
PHSX 518 Mathematical Physics
PHSX 718 Mathematical Methods in Physical Sciences
MATH 526 Applied Mathematical Statistics I

PHSX 530 Mathematical Models
MATH 558 Introductory Modern Algebra
MATH 581 Numerical Methods

MATH 590 Linear Algebra
MATH 628 Mathematical Theory of Statistics
MATH 646 Complex Variable and Applications

MATH 647 Applied Partial Differential Equations
MATH 648 Calculus of Variations and Integral Equations
MATH 660 Geometry I

MATH 661 Geometry II

any 700-level MATH lecture course except MATH 701 and
MATH 715.

Astronomy Requirements for Major (18-21)

Majors must complete the following seven courses:
ASTR 391 Physical Astronomy, Honors 3
ASTR 591 Stellar Astronomy 3
ASTR 592 Galactic and Extragalactic Astronomy 3
ASTR 596 Observational Astrophysics 2
ASTR 691 Astrophysics I 3
ASTR 692 Astrophysics II 3
ASTR 503 Undergraduate Research 1-4

Physics Core Knowledge and Skills (30)

Majors must complete courses as indicated in the following areas:
General Physics III. Satisfied by the following:
PHSX 313 General Physics III 3

Intermediate Physics Lab. Satisfied by the following:
PHSX 316 Intermediate Physics Laboratory I 1

Introductory Quantum Mechanics. Satisfied by the following:
PHSX 511 Introductory Quantum Mechanics 3

Physical Measurements or Electronic Circuit Measurement and
Design. Satisfied by one of the following:
PHSX 516 Physical Measurements 4
PHSX 536 Electronic Circuit Measurement and Design 4

Mechanics I. Satisfied by the following:
PHSX 521 Mechanics I 3

Electricity and Magnetism. Satisfied by the following:
PHSX 531 Electricity and Magnetism 3

Thermal Physics. Satisfied by the following:
PHSX 671 Thermal Physics 3

Physics Elective. Satisfied by any PHSX lecture or laboratory course
numbered 500 or higher (PHSX 693 recommended) (with the
exception of PHSX 594), including:
ASTR 792 Topics in Advanced Astrophysics 3

ASTR 795 Space Plasma Physics
or PHSX 795 Space Plasma Physics

GEOL 572 Geophysics

PHSX 693 Gravitation and Cosmology (recommended)

Major Hours & Major GPA

While completing all required courses (above), majors must also meet
each of the following hour and grade-point average minimum standards:

Major Hours
Satisfied by 30 hours of major courses.

Major Hours in Residence
Satisfied by a minimum of 15 hours of KU resident credit in the major.

Major Junior/Senior (300+) Hours
Satisfied by a minimum of 12 hours from junior/senior courses (300+) in
the major.

Major Junior/Senior (300+) Graduation GPA
Satisfied by a minimum of a 2.0 KU GPA in junior/senior courses (300+) in
the major. GPA calculations include all junior/senior courses in the field
of study including F’s and repeated courses. See the Semester/Cumulative

Departmental Honors in Physics and Astronomy

A student who plans to graduate with honors in physics and astronomy
must file a Declaration of Intent Form with the Departmental Honors
Coordinator, preferably during his/her junior year but in any case no
later than enrollment for the final undergraduate semester. All of our
department’s honors requirements include student research, for which
results shall be presented in at least one of the following forms:
a) a written research summary, read by 3 faculty members in physics and
astronomy or related fields or authorship on a peer-reviewed manuscript
b) a research-based oral presentation at an appropriate venue (e.g.,
Undergraduate Research symposium, a presentation in an advanced
department seminar class, a discipline specific meeting)
c) presentation of a poster at an appropriate venue. Additional
requirements are:

Qualified students earning either a B.A. or a B.S. degree in the College
of Liberal Arts and Sciences with a major in astronomy or physics may
graduate with Honors in Physics & Astronomy by fulfilling the following
requirements: (1) By the end of the candidate’s final semester, achieve
a minimum GPA of 3.25 overall and 3.5 in the major, in all courses taken
in residence and elsewhere; (2) Complete at least 24 semester hours
of astronomy and physics courses numbered 500 or above, including
undergraduate research represented by two hours of credit in ASTR
597, ASTR 503, PHSX 501 or PHSX 503. A grade of B or better must be
earned in one of the following: ASTR 597, ASTR 503, PHSX 501 or PHSX
503.