Astrophysical and Planetary Sciences (APS) Undergraduate Program

Image courtesy of Prof. Dave Brain

Academic Year 2017-2018

Main Office: Duane Physics, E-226D
Boulder, CO 80309-0391

Office Phone: 303-492-8915

Check out our website: http://www.colorado.edu/aps/

https://www.facebook.com/aps.cu.boulder/
Candidates for the Bachelor of Arts degree in the College of Arts and Sciences must satisfy the General Requirements of the College. These General Requirements are outlined in the University of Colorado Catalog (Boulder) and are given in detail in pamphlets available from the College of Arts and Sciences. Please note: Students may count a maximum of 45 credit hours in any one department (major) towards the 120 hours required; students in departmental honors may add up to 6 additional hours designated honors coursework to the 45-hour limit. For all major courses, as well as the ancillary courses, students must receive a "C-" or better. If a course is a pre-requisite for another course, the student may not register for the subsequent course until the grade in the pre-requisite is "C-" or better.

It is strongly recommended that students meet annually with their Astronomy advisor.

**APS Undergraduate Program Assistant:**

**José Aburto**  
Office: Duane Physics E226D  
Phone: 303-492-4408  
Jose.aburto@colorado.edu

**APS first-year advisor:**

**Devin Nordson**  
Office: University Club #213  
Phone: 303-492-6801  
Devin.nordson@colorado.edu  
http://www.colorado.edu/mycuhub/

**APS undergraduate advisor:**

**Catherine Weldon**  
Office: Duane/Gamow F211  
Phone: 303-735-5477  
Catherine.weldon@colorado.edu  
http://www.colorado.edu/mycuhub/

We are all here to help you succeed! It is necessary to make sure that all requirements for the degree will be met in time for your graduation.

**Two different tracks** are available to satisfy the Astronomy Major Requirements in the College of Arts and Sciences. One can also pursue a program with Astronomy as a minor subject.
**General Astronomy:** This track is a Liberal Arts degree in the science of astronomy and planetary sciences. It includes courses that explore astronomical observations and data analysis, and encourages study in a broad range of astronomical and other science topics.

**Astrophysics/Physics:** This track is directed toward students interested in pursuing graduate studies and/or research in astrophysical, planetary and space sciences.

### Department of Astrophysical and Planetary Sciences
#### Undergraduate Mentor Program

Our department offers a mentoring program that is complementary to academic advising. Your mentor will help you make the most of your education in our department, with information about opportunities outside of your classes and advice on how to prepare for your future.

**Undergraduate Mentor Program:** During your first and third semesters in APS (freshman and first semester of your sophomore year), you will meet with the Undergraduate Program Assistant to discuss your specific interests, and to receive direction on foundational coursework and other opportunities within our department.

**Faculty Mentoring:** During your final five semesters in APS (second semester sophomore thru senior year), you will be assigned to a faculty mentor according to your interests. Your mentor will meet with you at least once each semester to review astronomy-related activities (including research and educational opportunities), and help position you for your career after CU.

You will have an "academic hold" on your ability to register for classes in the CU-SIS system (Student Registration System) each semester until you meet with your mentor. Freshman will not meet with their APS mentor during their second semester, and instead must meet with the Academic Advisor, Devin Nordson.

For more information contact:
José Aburto, Undergraduate Program Assistant
Duane E-226 or by phone 303-492-4408
E-mail: Jose.aburto@colorado.edu
APS Undergraduate Major Program

The APS department offers an undergraduate Astronomy major program, culminating in a B.A. degree. The program is designed to meet student needs for training in space sciences (astronomy, astrophysics, planetary sciences, and space physics). Undergraduates will be prepared both for academic research careers and for the industrial market (aerospace, computer software, instrumentation, and other technical areas), as well as for K-12 science education, science journalism and outreach, and space policy.

The astronomy degree has two tracks - General Astronomy (APS degree only), and the Astrophysics / Physics (supervised jointly by APS and Physics).

The specific goals of the APS Astronomy major are:

- To provide both practical and theoretical knowledge of astronomy and astrophysics at a level comparable to the best programs at other major U.S. public institutions.
  - The APS Department is one of the few programs that combine both astrophysics and planetary science. As a result, we avoid duplications of overlapping curricula, and provide a unified view of space sciences, the solar system and comparative planetology, stellar and galactic astronomy, and cosmology.
- To provide courses on and significant hands-on experience with, telescopes, optics, instrumentation, computer image processing, and computing.
  - Such skills are useful for students wishing to pursue graduate degrees or careers in aerospace, technical or computer industries.
- To provide opportunities for faculty-advised research and senior (honors) theses.

General Astronomy: This track is a Liberal Arts degree in the science of astronomy, observations, and technology. This track provides core training in astronomical sciences, together with mathematics, applied physics, computational and instrumental technology needed for professions in the space sciences. Some students will be inclined toward space observations (ground-based telescopes, rocket probes, space-borne observatories). Others will have strong interests in K-12 science education, for which astronomy provides excellent science content for motivating young students. Still other students will desire to acquire broad training in science policy and science writing.

Astrophysics: This track is directed toward students interested in pursuing graduate studies and/or research in astrophysics. For these students, we require multi-disciplinary work in physics and mathematics together with astronomy. The track offers a rigorous experience for students, with ‘value added’ from the professional astrophysics and planetary science faculty in APS. Graduates will be provided with scientific and technological training in the space sciences, including mathematical, physical, computational, and instrumental expertise.

We offer you the ability to graduate with honors. This requires you maintain a minimum 3.3 GPA, and that you write and defend an honors thesis. More information can be obtained from the APS website and CU-Boulder's Honors Program page (http://www.colorado.edu/honors), or the APS Honors Council Representative.
ASTROPHYSICS MAJOR
(Supervised by both APS and Physics Departments)

This is appropriate for someone intending to continue on to a graduate program or professional research in astrophysics or planetary sciences. It is similar to the Physics Plan 2 (Astrophysics) degree, but with additional labs in astrophysics instrumentation, and with different electives.

Part A: Lower Division Coursework (40 credit hour minimum)

1. Pre- or Co-Requisite Mathematics (16 hours minimum):
   - MATH 1300/2300/2400/2130/3430 Calculus I, II, III, Linear Algebra, Differential Equations (20)
   - OR
   - APPM 1350/1360/2350/2360 Calc. I for Engineers, Calc. II for Engineers, Calc. III for Engineers, Linear Algebra/Differential Equations for Engineers (16)

2. Lower Division Physics (16 hours):
   - PHYS 1115/1125/1140 preferred (or 1110/1120/1140 accepted) General Physics (9)
   - PHYS 2170 Foundations of Modern Physics (3)
   - PHYS 2150 Experimental Physics (1) [Taken with PHYS 2170]
   - PHYS 2210 Classical Mechanics and Math Methods 1 (3)

3. Lower Division ASTR (8 hours):
   - ASTR 1030/1040 Accelerated Introductory Astronomy (4 + 4)

Part B: Upper Division Coursework (27 credit hour minimum)

1. Advanced Physics (12 hours):
   - PHYS 3310 Electricity & Magnetism 1 (3)
   - PHYS 3320 Electricity & Magnetism 2 (3)
   - PHYS 3210 Classical Mechanics and Math Methods 2 (3)
   - PHYS 3220 Quantum Mechanics & Atomic Physics 1 (3)

   We suggest (optional) electives from the following:
   - PHYS 4150 Plasma Physics (3)
   - PHYS 4230 Thermodynamics & Statistical Mechanics (3)
   - PHYS 4410 Quantum Mechanics & Atomic Physics 2 (3)
   - PHYS 4420 Nuclear & Particle Physics (3)
   - PHYS 4510 Optics (3)

2. Advanced ASTR, one of the following two sequences (6 hours):
   - ASTR 3720/3750 Planetary sequence (3+3)
   - ASTR 3730/3830 Stellar and Galactic Astronomy (3+3)
Plus three additional courses from the following or from those sequence courses not used above (9 hours minimum, no more than two courses outside of ASTR):

- ASTR 3510 Observations and Instrumentation 1 (4)
- ASTR 3520 Observations and Instrumentation 2 (4)
- ASTR 3560 Astronomical Instrumentation Laboratory (3)
- ASTR 3710 Formation & Dynamics of Planetary Systems (3)
- ASTR 3740 Cosmology & Relativity (3)
- ASTR 3760 Solar & Space Physics (3)
- ASTR 3800 Scientific Data Analysis & Computing (3) [Requires Calculus III]
- ASTR 4330 Cosmochemistry (3)
- ATOC 4710 Introduction to Atmospheric Physics (3)
- ATOC 4720 Introduction to Atmospheric Dynamics (3)
- ASEN 4010 Introduction to Space Dynamics (3)
- Any ASTR 5000 or 6000 level course with Instructor's permission

**Total Credit Hours:**
23 minimum in ASTR, including 15 hrs upper division
PLUS
28 minimum in PHYS, including 12 hrs upper division

*Substitutions can be requested by submitting a petition to the APS Lead Mentor*

[http://www.colorado.edu/aps/course-substitution-petition](http://www.colorado.edu/aps/course-substitution-petition)
# ASTROPHYSICS MAJOR

## Sample Course Selections

### Freshman Year

<table>
<thead>
<tr>
<th>FALL</th>
<th>SPRING</th>
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<tbody>
<tr>
<td>ASTR 1030 (4) Accelerated Intro Astronomy I</td>
<td>ASTR 1040 (4) Accelerated Intro Astronomy II</td>
</tr>
<tr>
<td>PHYS 1115 (4) General Physics I</td>
<td>PHYS 1125 (4) General Physics II</td>
</tr>
<tr>
<td>MATH 1300 (5) Calculus I</td>
<td>MATH 2300 (5) Calculus II (or APPM 1350 (4) Calculus I for Engineers)</td>
</tr>
<tr>
<td>Core (3)</td>
<td>PHYS 1140 (1) Experimental Physics I (lab)</td>
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<tr>
<td>Total: 16</td>
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### Sophomore Year

<table>
<thead>
<tr>
<th>PHYS 2170 (3) Foundations of Modern Physics</th>
<th>PHYS 2210 (3) Classical Mechanics and Math Methods I</th>
</tr>
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<tbody>
<tr>
<td>PHYS 2150 (1) Experimental Physics (lab)</td>
<td>ASTR 2600 (3) Intro to Scientific Programming †</td>
</tr>
<tr>
<td>MATH 2400 (4) Calculus III (or APPM 2350 (4) Calculus III for Engineers)</td>
<td>APPM 2360 (4) Introduction to Differential Equations with Linear Algebra (or MATH 3430 Ordinary Differential Equations and 2130 Linear Algebra)</td>
</tr>
<tr>
<td>Core (3)</td>
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<td>Core (3)</td>
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<td>Total: 14</td>
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### Junior Year

<table>
<thead>
<tr>
<th>ASTR 3730 (3) Astrophysics I or ASTR 3750 (3) Planets, Moons, and Rings</th>
<th>ASTR 3830 (3) Astrophysics II or ASTR 3720 (3) Planets and their Atmospheres</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS 3210 (3) Classical Mechanics and Math Methods II</td>
<td>PHYS 3220 (3) Quantum Mechanics and Atomic Physics I</td>
</tr>
<tr>
<td>PHYS 3310 (3) Principles of Electricity and Magnetism I</td>
<td>PHYS 3320 (3) Principles of Electricity and Magnetism II</td>
</tr>
<tr>
<td>ASTR 3800 (3) Data Analysis and Computing</td>
<td>Core (3)</td>
</tr>
<tr>
<td>Core (3)</td>
<td>Elective (3)</td>
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<tr>
<td>Total: 15</td>
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### Senior Year

<table>
<thead>
<tr>
<th>ASTR (3) Upper Division Astronomy Elective</th>
<th>ASTR (3) Upper Division Astronomy Elective</th>
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</thead>
<tbody>
<tr>
<td>PHYS 4230 (3) Thermodynamics and Statistical Mechanics †</td>
<td>PHYS 4410 (3) Quantum Mechanics and Atomic Physics II †</td>
</tr>
<tr>
<td>Core (3)</td>
<td>Core (3)</td>
</tr>
<tr>
<td>Elective (3)</td>
<td>Elective (3)</td>
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<td>Elective (3)</td>
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<tr>
<td>Total: 15</td>
<td>Total: 15</td>
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</tbody>
</table>

† Recommended, not required

### TOTAL:
- Lower Division: 11 Credit Hours in ASTR, 16 Credit Hours in PHYS
- Upper Division: 15 Credit Hours in ASTR, 12 Credit Hours in PHYS
- Required Coursework in other Departments: 18 Credit Hours
- Arts and Sciences Core Courses: 27 Credit Hours; Arts and Sciences core curriculum satisfied
- University Total: 120 Credit Hours; General graduation requirements satisfied

Updated: April 4, 2018

\APS Shared\Undergraduate Program\Curriculum\Majors Curriculum
GENERAL ASTRONOMY MAJOR

This is appropriate for someone aiming at a career in education, science journalism, science policy, information technology, science management or technical work that does not require a graduate degree.

Part A: Lower division coursework (41 credit hour minimum)

1. MATH 1300/2300 Calculus I, II
   - Note: MATH 2400 (Calculus III for Engineers) is not required for the Astronomy track (however we highly recommend it).
   OR
   APPM 1350/1360 Calc. I for Engineers, Calc. II for Engineers (8)
   - Note: APPM 2350 (Calculus III for Engineers) is not required for the Astronomy track (however we highly recommend it).
2. PHYS 1115/1125/1140 preferred (or 1110/1120/1140 accepted) General Physics (9)
3. ASTR 1030/1040 Accelerated Introductory Astronomy sequence (8)
4. One of the following courses:
   - PHYS 2130 General Physics 3 (3) [requires Calculus III]
   - PHYS 2170 Foundations of Modern Physics (3) [requires Calculus III] should be taken with PHYS 2150
   - ASTR 2500 Gateway to Space (3)
   - ASTR 2600 Computational Techniques (3) (highly recommended for research experience)
5. Minimum of two (2) additional courses selected from:
   - ASTR 2000 Ancient Astronomies (3)
   - ASTR 2010 Modern Cosmology (3)
   - ASTR 2020 Intro to Space Astronomy (3)
   - ASTR 2030 Black Holes (3)
   - ASTR 2040 Life in the Universe (3)
   - ASTR 2050 The Sun and Society (3)
   - ASTR 2500 Gateway to Space if not taken to satisfy above (3)
   - ASTR 2600 Computational Techniques if not taken to satisfy above (3)
6. One other Arts and Sciences lower division Natural Sciences sequence, including lab.
   - CHEM 1113/1114 and CHEM 1133/1134 (10)
   - EBI0 1210/1220/1230 (7)
   - GEOL 1010/1020/1030 (7)
   - ATOC 1050/1060/1070 (7)
Part B: Upper Division Coursework

One of the following upper-level course sequences:

- **Planetary Sequence (6)**
  - ASTR 3720 Planets & Their Atmospheres (3)
  - ASTR 3750 Planets, Moons & Rings (3)

  **OR**

- **Stellar/Galactic Sequence**
  - ASTR 3730 Stellar & Interstellar (3)
  - ASTR 3830 Galactic & Extragalactic (3)

- Plus four additional courses from the following or from those sequence courses not used above (12 hrs. minimum, no more than two courses from outside ASTR):
  - ASTR 3510 Observations and Instrumentation 1 (4)
  - ASTR 3520 Observations and Instrumentation 2 (4)
  - ASTR 3560 Astronomical Instrumentation Laboratory (3)
  - ASTR 3710 Formation & Dynamics of Planetary Systems (3)
  - ASTR 3740 Cosmology & Relativity (3)
  - ASTR 3760 Solar & Space Physics (3)
  - ASTR 3800 Scientific Data Analysis & Computing (3) [Requires Calculus III]
  - ASEN 4010 Introduction to Space Dynamics (3)
  - ASTR 4330 Cosmochemistry (3)
  - ATOC 4710 Introduction to Atmospheric Physics (3)
  - ATOC 4720 Introduction to Atmospheric Dynamics (3)
  - ASTR 4800 Space Practice and Policy (3)
  - Any ASTR 5000 or 6000 level course with Instructor's permission

**Total Credit Hours:**

44 minimum in ASTR and PHYS combined

*Substitutions can be requested by submitting a petition to the APS Lead Mentor*

[http://www.colorado.edu/aps/course-substitution-petition](http://www.colorado.edu/aps/course-substitution-petition)
### General Education Requirements

Complete details can be found at [http://www.colorado.edu/aps/undergraduate-students/degree-requirements](http://www.colorado.edu/aps/undergraduate-students/degree-requirements).

### Astronomy Degree Requirements

**Coreq**
- **=** highly recommended as prereq
- **Prereq** (C- or better)

#### Majors Curriculum

- **Calc I**
  - MATH 1300 / APPM 1350
- **Calc II**
  - MATH 2300 / APPM 1360
- **Gen Phys I**
  - PHYS 1115 (or 1110)
- **Calc I**
  - Solar System
  - ASTR 1030
- **Calc I**
  - Astrophysics I
  - ASTR 3730
- **Calc II**
  - Planetary Atmospheres
  - ASTR 3720
- **Calc II**
  - Gen Phys II
  - PHYS 1125 (or 1120)
- **Exp. Phys I**
  - PHYS 1140
- **Calc III**
  - Modern Physics
  - PHYS 2170
- **Calc III**
  - Gen Phys III
  - PHYS 2130
- **MATH 2400**
  - PHYS 1120
- **Stars / Galaxies**
  - ASTR 1040
- **Calc I**
  - Planets, Moons, & Rings
  - ASTR 3750
- **Calc II**
  - Astrophysics II
  - ASTR 3830
- **Calc II**
  - Data Analysis
  - ASTR 3800
- **Space Policy**
  - ASTR 4800
  - ASTR 1030 & 1040 or PHYS 1115 and 1120
- **Solar / Space**
  - ASTR 3760
  - PHYS 2170

#### Pick one of these four courses

- **Obs / Inst I**
  - ASTR 3510
  - ASTR 1040*
  - PHYS 1120
  - **Calc II***

- **OBS / Inst II**
  - ASTR 3520
  - Form. & Dyn.
  - Planetary Sys
  - ASTR 3710
  - Calc II

#### Pick at least two of these courses

- **Gateway Space**
  - ASTR 2500
  - ASEN 1400
  - ASTR or PHYS majors only
- **Ancient Astronomies**
  - ASTR 2000
- **Black Holes**
  - ASTR 2030
- **Space Astronomy**
  - ASTR 2020
- **Cosmology**
  - ASTR 2010
- **Life in Universe**
  - ASTR 2040

#### Pick the following courses

- **Intro. Scientific Programming**
  - ASTR 2600

#### 12 credits (4 courses*) of upper div. astronomy

- From these courses, unused ASTR sequence or grad classes

### Graduation Year Options

- **Cashew**
  - ASTR 1050
  - PHYS 2170
  - PHYS 2130 or 2170
  - Gen Chem I
  - CHEM 1113
  - CHEM 1114
  - Gen Chem II
  - CHEM 1133
  - CHEM 1134
  - Gen Bio I
  - EBIO 1210
  - Gen Bio II
  - EBIO 1220
  - Gen Chem Lab I
  - CHEM 1114
  - 1 Yr HS Chem
  - Gen Chem Lab II
  - CHEM 1134
  - Intro Geol.
  - GEOL 1010
  - Intro Geol. Lab I
  - GEOL 1030
  - Weath & Atmos
  - ATOC 1050
  - Lab
  - ATOC 1070
  - ATOC 1050
  - Environment
  - GEOL 1020

- **Elephant**
  - ASTR 1050
  - PHYS 2170
  - PHYS 2130 or 2170
  - Gen Chem I
  - CHEM 1113
  - CHEM 1114
  - Gen Chem II
  - CHEM 1133
  - CHEM 1134
  - Gen Bio I
  - EBIO 1210
  - Gen Bio II
  - EBIO 1220
  - Gen Chem Lab I
  - CHEM 1114
  - 1 Yr HS Chem
  - Gen Chem Lab II
  - CHEM 1134
  - Intro Geol.
  - GEOL 1010
  - Intro Geol. Lab I
  - GEOL 1030
  - Weath & Atmos
  - ATOC 1050
  - Lab
  - ATOC 1070
  - ATOC 1050
  - Environment
  - GEOL 1020

- **Sea Turtle**
  - ASTR 1050
  - PHYS 2170
  - PHYS 2130 or 2170
  - Gen Chem I
  - CHEM 1113
  - CHEM 1114
  - Gen Chem II
  - CHEM 1133
  - CHEM 1134
  - Gen Bio I
  - EBIO 1210
  - Gen Bio II
  - EBIO 1220
  - Gen Chem Lab I
  - CHEM 1114
  - 1 Yr HS Chem
  - Gen Chem Lab II
  - CHEM 1134
  - Intro Geol.
  - GEOL 1010
  - Intro Geol. Lab I
  - GEOL 1030
  - Weath & Atmos
  - ATOC 1050
  - Lab
  - ATOC 1070
  - ATOC 1050
  - Environment
  - GEOL 1020

- **Jellyfish**
  - ASTR 1050
  - PHYS 2170
  - PHYS 2130 or 2170
  - Gen Chem I
  - CHEM 1113
  - CHEM 1114
  - Gen Chem II
  - CHEM 1133
  - CHEM 1134
  - Gen Bio I
  - EBIO 1210
  - Gen Bio II
  - EBIO 1220
  - Gen Chem Lab I
  - CHEM 1114
  - 1 Yr HS Chem
  - Gen Chem Lab II
  - CHEM 1134
  - Intro Geol.
  - GEOL 1010
  - Intro Geol. Lab I
  - GEOL 1030
  - Weath & Atmos
  - ATOC 1050
  - Lab
  - ATOC 1070
  - ATOC 1050
  - Environment
  - GEOL 1020

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[Image of course structure with arrows and course options]
## GENERAL ASTRONOMY MAJOR

### Sample Course Selections

#### Freshman Year

<table>
<thead>
<tr>
<th>FALL</th>
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<tbody>
<tr>
<td>ASTR 1030 (4) Accelerated Intro Astronomy I</td>
<td>ASTR 1040 (4) Accelerated Intro Astronomy II</td>
</tr>
<tr>
<td>MATH 1300 (5) Calculus I</td>
<td>MATH 2300 (5) Calculus II</td>
</tr>
<tr>
<td>(Or APPM 1350 Calculus I for Engineers)</td>
<td>(Or APPM 1360 Calculus II for Engineers)</td>
</tr>
<tr>
<td>Core (3)</td>
<td>Core (3)</td>
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<tr>
<td>Elective (3)</td>
<td>Elective (3)</td>
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<td>Total: 15</td>
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#### Sophomore Year

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<tbody>
<tr>
<td>ASTR 2000-Level Elective (3)</td>
<td>ASTR 2600 (3) Intro to Scientific Programming</td>
</tr>
<tr>
<td>MATH 2400 (4) Calculus III (Or APPM 2350 Calculus III for Engineers)†</td>
<td>PHYS 1125 (4) General Physics 2</td>
</tr>
<tr>
<td>PHYS 1115 (4) General Physics I</td>
<td>PHYS 1140 (1) Experimental Physics I (Lab)</td>
</tr>
<tr>
<td>Core (3)</td>
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<td>Total: 14</td>
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#### Junior Year

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<tbody>
<tr>
<td>ASTR 3730 (3) Astrophysics I or ASTR 3750 (3) Planets, Moons, and Rings</td>
<td>ASTR 3830 (3) Astrophysics II or ASTR 3720 (3) Planets and their Atmospheres</td>
</tr>
<tr>
<td>Natural Science Sequence with lab part one (4)* General Physics</td>
<td>Natural Science Sequence with lab part two (4)* General Physics</td>
</tr>
<tr>
<td>PHYS 2130 (3) General Physics III†</td>
<td>Core (3)</td>
</tr>
<tr>
<td>ASTR 3800 (3) Intro. Scientific Data Analysis &amp; Computing or other Upper-Division Astronomy Elective</td>
<td>Core (3)</td>
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<tr>
<td>Core (3)</td>
<td>Elective (3)</td>
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<tr>
<td>Total: 16</td>
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#### Senior Year

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<table>
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<tr>
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<tbody>
<tr>
<td>ASTR (3) Upper-Division Astronomy Elective</td>
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<td>ASTR (3) Upper-Division Astronomy Elective</td>
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<td>Total: 15</td>
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</tbody>
</table>

* Any natural science sequence with lab, e.g. geology, biology, chemistry, atmospheric sciences.
† Recommended for major, not required.

TOTAL:
- Lower Division: 17 Credit Hours in ASTR, 12 Credit Hours in PHYS
- Upper Division: 18 Credit Hours in ASTR
- Required coursework in other Depts: 18 Credit Hours
- Elective Credits: 24 Credit Hours
- Arts and Sciences Core Courses: 27 Credit Hours; A&S Core curriculum satisfied
- University Total: 120 Credit Hours; General graduation requirements satisfied