

ASTRONOMY AND ASTROPHYSICS, B.S.

Begin Campus: Any Penn State Campus

End Campus: University Park

Degree Requirements

For the Bachelor of Science degree in Astronomy and Astrophysics, a minimum of 125 credits is required:

Requirement	Credits
General Education	45
Requirements for the Major	98

18 of the 45 credits for General Education are included in the Requirements for the Major. This includes: 9 credits of GN courses; 6 credits of GQ courses; 3 credits of GWS courses.

General Education

Connecting career and curiosity, the General Education curriculum provides the opportunity for students to acquire transferable skills necessary to be successful in the future and to thrive while living in interconnected contexts. General Education aids students in developing intellectual curiosity, a strengthened ability to think, and a deeper sense of aesthetic appreciation. These are requirements for all baccalaureate students and are often partially incorporated into the requirements of a program. For additional information, see the General Education Requirements (<https://bulletins.psu.edu/undergraduate/general-education/baccalaureate-degree-general-education-program/>) section of the Bulletin and consult your academic adviser.

The keystone symbol appears next to the title of any course that is designated as a General Education course. Program requirements may also satisfy General Education requirements and vary for each program.

Foundations (grade of C or better is required.)

- **Quantification (GQ):** 6 credits
- **Writing and Speaking (GWS):** 9 credits

Knowledge Domains

- **Arts (GA):** 6 credits
- **Health and Wellness (GHW):** 3 credits
- **Humanities (GH):** 6 credits
- **Social and Behavioral Sciences (GS):** 6 credits
- **Natural Sciences (GN):** 9 credits

Integrative Studies (may also complete a Knowledge Domain requirement)

- **Inter-Domain or Approved Linked Courses:** 6 credits

University Degree Requirements

First Year Engagement

All students enrolled in a college or the Division of Undergraduate Studies at University Park, and the World Campus are required to take 1 to 3 credits of the First-Year Seminar, as specified by their college First-Year Engagement Plan.

Other Penn State colleges and campuses may require the First-Year Seminar; colleges and campuses that do not require a First-Year Seminar provide students with a first-year engagement experience.

First-year baccalaureate students entering Penn State should consult their academic adviser for these requirements.

Cultures Requirement

6 credits are required and may satisfy other requirements

- United States Cultures: 3 credits
- International Cultures: 3 credits

Writing Across the Curriculum

3 credits required from the college of graduation and likely prescribed as part of major requirements.

Total Minimum Credits

A minimum of 120 degree credits must be earned for a baccalaureate degree. The requirements for some programs may exceed 120 credits. Students should consult with their college or department adviser for information on specific credit requirements.

Quality of Work

Candidates must complete the degree requirements for their major and earn at least a 2.00 grade-point average for all courses completed within their degree program.

Limitations on Source and Time for Credit Acquisition

The college dean or campus chancellor and program faculty may require up to 24 credits of course work in the major to be taken at the location or in the college or program where the degree is earned. Credit used toward degree programs may need to be earned from a particular source or within time constraints (see Senate Policy 83-80 (<http://senate.psu.edu/policies-and-rules-for-undergraduate-students/82-00-and-83-00-degree-requirements/#83-80>)). For more information, check the Suggested Academic Plan for your intended program.

Requirements for the Major

To graduate, a student enrolled in the major must earn a grade of C or better in each course designated by the major as a C-required course, as specified by Senate Policy 82-44 (<http://senate.psu.edu/policies-and-rules-for-undergraduate-students/82-00-and-83-00-degree-requirements/#82-44>).

Common Requirements for the Major (All Options)

Code	Title	Credits
Prescribed Courses		
ASTRO 320	Observational Astronomy Laboratory	3
CHEM 111	Experimental Chemistry I	1
CHEM 112	Chemical Principles II	3
ENGL 202C	Effective Writing: Technical Writing	3
MATH 230	Calculus and Vector Analysis	4
MATH 251	Ordinary and Partial Differential Equations	4
PHYS 237	Introduction to Modern Physics	3

Prescribed Courses: Require a grade of C or better

ASTRO 291	Astronomical Methods and the Solar System	3
ASTRO 292	Astronomy of the Distant Universe	3
CHEM 110	Chemical Principles I	3
MATH 140	Calculus With Analytic Geometry I	4
MATH 141	Calculus with Analytic Geometry II	4

PHYS 211	General Physics: Mechanics	4
PHYS 212	General Physics: Electricity and Magnetism	4
PHYS 213	General Physics: Fluids and Thermal Physics	2
PHYS 214	General Physics: Wave Motion and Quantum Physics	2

Additional Courses

Select one of the following:		3
CMPSC 121	Introduction to Programming Techniques	
CMPSC 201	Programming for Engineers with C++	
CMPSC 202		

Supporting Courses and Related Areas

Supporting Courses and Related Areas: Require a grade of C or better

Select 12 credits from 400-level ASTRO courses ¹	12
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Requirements for the Option

Select an option	34
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¹ Except ASTRO 401, ASTRO 402W, ASTRO 494H, and ASTRO 496.

Requirements for the Option**Graduate Study Option (33 credits)**

Code	Title	Credits
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Prescribed Courses

PHYS 400	Intermediate Electricity and Magnetism	3
PHYS 410	Introduction to Quantum Mechanics I	3-4
PHYS 419	Theoretical Mechanics	3

Additional Courses

Select one of the following:		3
MATH 405	Advanced Calculus for Engineers and Scientists I	
MATH 411	Ordinary Differential Equations	
MATH 417	Qualitative Theory of Differential Equations	

Select 6-7 credits of the following:	6-7
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EE 471/ AERSP 490/ NUCE 490	Introduction to Plasmas	
PHYS 402	Electronics for Scientists	
PHYS 406	Subatomic Physics	
PHYS 411	Introduction to Quantum Mechanics II	
PHYS 420	Thermal Physics	
PHYS 457	Experimental Physics	
PHYS 457W	Experimental Physics	
PHYS 458	Intermediate Optics	
PHYS 479	Special and General Relativity	

Supporting Courses and Related Areas

Select 3 additional credits from advanced courses in computer science and engineering, mathematics, or statistics	3
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Select 10-11 credits in consultation with adviser from department list	10-11
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Computer Science Option (33 credits)

Code	Title	Credits
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Prescribed Courses

CMPSC 122	Intermediate Programming	3
CMPSC 221	Object Oriented Programming with Web-Based Applications	3
CMPSC 451	Numerical Computations	3

Additional Courses

Select one of the following:		3
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STAT 318	Elementary Probability	
STAT 319	Elementary Mathematical Statistics	
STAT 401	Experimental Methods	
STAT 414	Introduction to Probability Theory	

Select two of the following:		6
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CMPEN 271	Introduction to Digital Systems	
CMPEN 331	Computer Organization And Design	
CMPSC 360	Discrete Mathematics for Computer Science	
CMPSC 465	Data Structures and Algorithms	

Supporting Courses and Related Areas

Select 3 additional credits from advanced courses in computer science and engineering, mathematics, or statistics	3
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Select 12 credits in consultation with adviser from department list	12
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