

B.S. in Astronomy

Housed in the Department of Physics and Astronomy within the College of Arts and Sciences, the B.S. in Astronomy allows students to engage in hands-on experiences with instruments that unveil the secrets of the skies.

Embry-Riddle's Prescott, Arizona, campus is located in one of the world's densest concentrations of certified dark-sky communities, with more than 275 clear nights each year for observation and research. Its high-altitude location, elevation, and favorable weather provide excellent viewing conditions and allow students to take full advantage of on-campus equipment to explore the night sky.

The campus is home to the mile-high Prescott Observatory Complex, featuring facilities that include 20-inch and 16-inch optical telescopes, as well as optical and radio observatories.

As one of only a handful of Astronomy degree programs in the Western United States, the program offers immersive undergraduate research opportunities, where students work directly with faculty on projects funded by NASA, the National Science Foundation, and the Space Telescope Science Institute. Faculty frequently analyze data from advanced facilities such as the James Webb Space Telescope and X-ray satellites, including those used in the X-Ray Imaging and Spectroscopy Mission (XRISM).

Program-Level Student Learning Outcomes

Students will:

- Apply data derived from conducted experiments and prevailing models in astronomy to real systems using current techniques.
- Apply mathematics, science, and contemporary issues to solve scientific problems.
- Communicate astronomical results to astronomers and non-astronomers using varied methods including giving talks, writing technical reports, and writing papers for publication.
- Describe the current state of knowledge regarding the astronomical and physical universe.
- Make professional and ethical decisions.
- Operate astronomical telescopes and detectors to obtain scientific data on astronomical objects.

Prescott Program Requirements

General Education Requirements	38
Core Requirements	67
Technical Electives	9
Open Electives	6
Total Credits	120

Program Details

The Bachelor of Science in Astronomy program requires successful completion of a minimum of 120 credit hours. The program may be completed in eight semesters, or four years, assuming appropriate background and full-time enrollment. Students pursuing this undergraduate degree must earn a minimum cumulative grade point average (CGPA) of 2.00 for all work completed at the University. In addition, students must maintain a 2.0 GPA for all ASTR and PHYS courses. The courses necessary to earn this degree are listed below.

Students should be aware that many courses have prerequisites and/or corequisites. To support success in advanced coursework, students are strongly encouraged to earn a grade of C or better in all prerequisite courses. The program includes a two-course senior research thesis sequence as part of the degree requirements. Students may not pursue both the Bachelor of Science in Astronomy and the Bachelor of Science in Space Physics; however, the first three semesters of both programs share

a common curriculum, allowing students to transfer between programs during that period without loss of credit.

General Education Requirements

Communication	9
Humanities - Lower Level	3
Social Sciences - Lower Level	3
Humanities/Social Sciences - Lower or Upper Level	3
Humanities/Social Sciences - Upper Level	3
Computer Science/Information Technology	3
CPSC 118 Fundamentals of Computer Programming or ENGR 11: Introduction to Computing for Engineers	
Mathematics	8
MATH 241 Calculus and Analytical Geometry I	
MATH 242 Calculus and Analytical Geometry II	
Physical/Life Sciences	6
PHYS 226 Physics I	
PHYS 227 Physics II	
Total Credits	38

Core Requirements

UNIV 101 College Success	1
MATH 243 Calculus and Analytical Geometry III	4
MATH 345 Differential Equations and Matrix Methods	4
MATH 441 Mathematical Methods for Engineering and Physics I	3
MATH 335 Introduction to Linear and Abstract Algebra	3
CHEM 110 General Chemistry I	3
CHEM 110L General Chemistry I Laboratory	1
PHYS 228 Physics III	3
PHYS 303 Modern Physics	3
PHYS 303P Modern Physics Laboratory	2
PHYS 320 Classical Mechanics I	3
ASTR 180L Introductory Astronomy Laboratory	1
ASTR 204 General Astronomy	3
ASTR 222 Intermediate Astronomy	3
ASTR 332 Techniques of Observational Astronomy	3
ASTR 340 Astrophysics I	3
ASTR 408 Astrophysics II	3
ASTR 490 Senior Thesis I	3
ASTR 491 Senior Thesis II	3
PHYS 226L Physics I Laboratory	1
PHYS 227L Physics II Laboratory	2
PHYS 232 Computational Methods in the Physical Sciences	3
PHYS 330 Electricity and Magnetism I	3
PHYS 350 Quantum Mechanics	3
PHYS 380L Optics Laboratory	3
Total Credits	67

Technical Electives

Choose Three of the Following:	9
ASTR 341 High Energy Astrophysics	
ASTR 420 Planetary Interiors, Surfaces, and Atmospheres	
MATH 412 Probability and Statistics	
MATH 435 Linear and Abstract Algebra II	
MATH 442 Mathematical Methods for Engineering and Physics II	
MATH 443 Complex Variables	
PHYS 322 Classical Mechanics II	

PHYS 331	Electricity and Magnetism II
PHYS 405	Atomic Nuclear Physics
PHYS 412	Particle Physics and Cosmology I
PHYS 413	Particle Physics and Cosmology II
PHYS 435	Solid State Theory
WEAX 322	Space Weather
WEAX 390	Atmospheric Physics
WEAX 420	Advanced Atmospheric Thermodynamics

Total Credits 9

Open Electives

Open Electives	6
Total Credits	6

Suggested Plan of Study

Year One

Requirements	Credits
ASTR 180L - Introductory Astronomy Laboratory	1
PHYS 226 - Physics I	3
PHYS 226L - Physics I Laboratory	1
MATH 241 - Calculus and Analytical Geometry I	4
CPSC 118 - Fundamentals of Computer Programming or ENGR 115 - Introduction to Computing for Engineers	3
COMM 122 - English Composition	3
UNIV 101 - College Success	1
Semester Hours	16

Requirements	Credits
PHYS 227 - Physics II	3
PHYS 227L - Physics II Laboratory	2
ASTR 204 - General Astronomy	3
MATH 242 - Calculus and Analytical Geometry II	4
CHEM 110 - General Chemistry I	3
CHEM 110L - General Chemistry I Laboratory	1
Semester Hours	16

Total Credits

Total Hours for All Requirements: 32

Year Two

Requirements	Credits
ASTR 222 - Intermediate Astronomy	3
PHYS 228 - Physics III	3
PHYS 232 - Computational Methods in the Physical Sciences	3
MATH 243 - Calculus and Analytical Geometry III	4
Humanities - Lower Level	3
Semester Hours	16

Requirements	Credits
ASTR 332 - Techniques of Observational Astronomy	3
PHYS 303 - Modern Physics	3

PHYS 303P - Modern Physics Laboratory	2
MATH 335 - Introduction to Linear and Abstract Algebra	3
MATH 345 - Differential Equations and Matrix Methods	4

Semester Hours 15

Total Credits

Total Hours for All Requirements: 31

Year Three

Requirements	Credits
ASTR 340 - Astrophysics I	3
PHYS 330 - Electricity and Magnetism I	3
MATH 441 - Mathematical Methods for Engineering and Physics I	3
Communication - Lower Level	3
Open Elective	3
Semester Hours	15

Requirements	Credits
PHYS 350 - Quantum Mechanics	3
PHYS 380L - Optics Laboratory	3
Technical Elective	3
Communication - Lower Level	3
Social Sciences - Lower Level	3
Semester Hours	15

Total Credits

Total Hours for All Requirements: 30

Year Four

Requirements	Credits
ASTR 408 - Astrophysics II	3
ASTR 490 - Senior Thesis I	3
PHYS 320 - Classical Mechanics I	3
Humanities - Upper Level	3
Social Sciences - Upper Level	3
Semester Hours	15

Requirements	Credits
ASTR 491 - Senior Thesis II	3
Technical Elective	3
Technical Elective	3
Open Elective	3
Semester Hours	12

Total Credits

Total Hours for All Requirements: 27