BACHELOR OF SCIENCE (BS) DEGREE WITH A MAJOR IN ASTROPHYSICS

Program Learning Outcomes for the BS Degree with a Major in Astrophysics

Upon completing the BS degree with a major in Astrophysics, students will be able to:

1. Demonstrate an understanding of fundamental concepts in Mechanics.
2. Demonstrate an understanding of fundamental concepts in Electromagnetism.
3. Demonstrate an understanding of fundamental concepts in Quantum Mechanics.
4. Be knowledgeable in fundamental topics in Astrophysics.
5. Demonstrate proficiency in research techniques and methodology under guidance of a faculty member.
6. Communicate scientific results both in writing and oral presentations.

Requirements for the BS Degree with a Major in Astrophysics

For general university requirements, see Graduation Requirements (https://ga.rice.edu/undergraduate-students/academic-policies-procedures/graduation-requirements/). Students pursuing the BS degree with a major in Astrophysics must complete:

- A minimum of 71 credit hours to satisfy major requirements.
- A minimum of 120 credit hours to satisfy degree requirements.
- A minimum of 37 credit hours taken at the 300-level or above.

Students may obtain credit for some courses by advanced placement, and the department's undergraduate committee can modify requirements to meet the needs of students with special backgrounds.

The courses listed below satisfy the requirements for this major. In certain instances, courses not on this official list may be substituted upon approval of the Physics and Astronomy department's undergraduate committee. (Course substitutions must be formally applied and entered into Degree Works by the major's Official Certifier (https://registrar.rice.edu/facstaff/degreeworks/officialcertifier/).) Students and their academic advisors should identify and clearly document the courses to be taken.

Summary

Code	Title	Credit Hours
Total Credit Hours Required for the Major in Astrophysics		71
Total Credit Hours Required for the BS Degree with a Major in Astrophysics		120

Degree Requirements

Code	Title	Credit Hours
Core Requirements		
COMP 140	COMPUTATIONAL THINKING	4
MATH 101	SINGLE VARIABLE CALCULUS I [1]	3
or MATH 105	AP/OTH CREDIT IN CALCULUS I	
MATH 102	SINGLE VARIABLE CALCULUS II [1]	3
or MATH 106	AP/OTH CREDIT IN CALCULUS II	
MATH 211	ORDINARY DIFFERENTIAL EQUATIONS AND LINEAR ALGEBRA	3
or MATH 220	HONORS ORDINARY DIFFERENTIAL EQUATIONS	
or MATH 221	HONORS CALCULUS III	
MATH 212	MULTIVARIABLE CALCULUS	3
or MATH 222	HONORS CALCULUS IV	
or MATH 232	HONORS MULTIVARIABLE CALCULUS	
Select 1 from the following: [2]		*4*
PHYS 101 & PHYS 103	MECHANICS (WITH LAB) and MECHANICS DISCUSSION	
PHYS 111	HONORS MECHANICS (WITH LAB)	
Select 1 from the following: [3]		*4*
PHYS 102 & PHYS 104	ELECTRICITY & MAGNETISM (WITH LAB) and ELECTRICITY AND MAGNETISM DISCUSSION	
PHYS 112	HONORS ELECTRICITY & MAGNETISM (WITH LAB)	
PHYS 201	WAVES, LIGHT, AND HEAT	3
PHYS 202	MODERN PHYSICS	3
PHYS 231	ELEMENTARY PHYSICS LAB	1
PHYS 301	INTERMEDIATE MECHANICS	4
PHYS 302	INTERMEDIATE ELECTRODYNAMICS	4
PHYS 311	INTRODUCTION TO QUANTUM PHYSICS I	3
PHYS 425	STATISTICAL & THERMAL PHYSICS	3
PHYS 491 & PHYS 493	UNDERGRADUATE RESEARCH and UNDERGRADUATE RESEARCH SEMINAR [4]	3
PHYS 492 & PHYS 494	UNDERGRADUATE RESEARCH and UNDERGRADUATE RESEARCH SEMINAR [5]	3
ASTR 230	ASTRONOMY LAB	3
ASTR 350	INTRODUCTION TO ASTROPHYSICS-STARS	3
ASTR 360	INTRODUCTION TO ASTROPHYSICS-GALAXY AND COSMO	3
ASTR 400	UNDERGRADUATE RESEARCH SEMINAR [6]	1
ASTR 400	UNDERGRADUATE RESEARCH SEMINAR [7]	1
Select 3 courses from the following:		*9*
ASTR 408	STATISTICAL METHODS IN PHYSICS AND ASTRONOMY	
ASTR 451	ASTROPHYSICS I: SUN AND STARS	
ASTR 452	ASTROPHYSICS II: GALAXIES AND COSMOLOGY	
ASTR 470	SOLAR SYSTEM PHYSICS	
PHYS 312	INTRODUCTION TO QUANTUM PHYSICS II	
PHYS 480	INTRODUCTION TO PLASMA PHYSICS	

Total Credit Hours Required for the Major in Astrophysics	**71**
Additional Credit Hours to Complete Degree Requirements *	18
University Graduation Requirements (https://ga.rice.edu/undergraduate-students/academic-policies-procedures/graduation-requirements/) *	31
Total Credit Hours	**120**

Footnotes and Additional Information

* **Note:** University Graduation Requirements include 31 credit hours, comprised of Distribution Requirements (Groups I, II, and III), FWIS, and LPAP coursework. In some instances, courses satisfying FWIS or distribution requirements may additionally meet other requirements, such as the Analyzing Diversity (AD) requirement, or some of the student's declared major, minor, or certificate requirements. Additional Credit Hours to Complete Degree Requirements include general electives, coursework completed as upper-level, residency (hours taken at Rice), and/or any other additional academic program requirements.

1 Students without credit for basic calculus (e.g. MATH 101/MATH 105 and/or MATH 102/MATH 106) must either enroll in the relevant course(s) or substitute more advanced MATH or CMOR coursework, with prior approval by the Physics and Astronomy department's Undergraduate Program Committee, to earn the required credit.

2 The Physics department has determined that credit awarded for PHYS 141 *CONCEPTS IN PHYSICS I* is not eligible for meeting the requirements of the Astrophysics major.

3 The Physics department has determined that credit awarded for PHYS 142 *CONCEPTS IN PHYSICS II* is not eligible for meeting the requirements of the Astrophysics major.

4 PHYS 491 and PHYS 493 must be taken concurrently.

5 PHYS 492 and PHYS 494 must be taken concurrently.

6 ASTR 400 must be taken concurrently with PHYS 491 and PHYS 493.

7 ASTR 400 must be taken concurrently with PHYS 492 and PHYS 494.

Policies for the BS Degree with a Major in Astrophysics

Program Restrictions and Exclusions

Students pursuing the major in Astrophysics should be aware of the following program restrictions:

- Students pursuing the major in Astrophysics may not additionally declare the major in Astronomy.
- Students pursuing the major in Astrophysics may not additionally declare the minor in Physics.

Transfer Credit

For Rice University's policy regarding transfer credit, see Transfer Credit (https://ga.rice.edu/undergraduate-students/academic-policies-procedures/transfer-credit/). Some departments and programs have additional restrictions on transfer credit. The Office of Academic Advising maintains the university's official list of transfer credit advisors (https://oaa.rice.edu/advising-network/transfer-credit-advisors/) on their website: https://oaa.rice.edu. Students are encouraged to meet with their academic program's transfer credit advisor when considering transfer credit possibilities.

Departmental Transfer Credit Guidelines

Students pursuing the major in Astrophysics should be aware of the following departmental transfer credit guidelines:

- Requests for transfer credit will be considered by the program director (and/or the program's official transfer credit advisor) on an individual case-by-case basis.

Additional Information

For additional information, please see the Physics and Astronomy website: https://physics.rice.edu/

Opportunities for the BS Degree with a Major in Astrophysics

Academic Honors

The university recognizes academic excellence achieved over an undergraduate's academic history at Rice. For information on university honors, please see Latin Honors (https://ga.rice.edu/undergraduate-students/honors-distinctions/university/) (*summa cum laude*, *magna cum laude*, and *cum laude*) and Distinction in Research and Creative Work (https://ga.rice.edu/undergraduate-students/honors-distinctions/university/). Some departments have department-specific Honors awards or designations.

Research in the Department of Physics and Astronomy

The Physics and Astronomy Department encourages undergraduate participation in research, both within the department and through extramural programs. For current opportunities, please click on the *Research* tab on the department website (https://physics.rice.edu/).

Additional Information

For additional information, please see the Physics and Astronomy website: https://physics.rice.edu/