

# ASTROPHYSICS

Curious about what's out there? Students who are comfortable with mathematics and physics and who want to understand the nature of the Solar System and other planetary systems, stars, galaxies and the universe are encouraged to pursue a BA in Astronomy or a BS in Astrophysics.

## About this Program

- **College:** Liberal Arts and Sciences (<http://catalog.ufl.edu/UGRD/colleges-schools/UGLAS/>)
- **Degrees:** Bachelor of Arts in Astronomy ([http://catalog.ufl.edu/UGRD/colleges-schools/UGLAS/ATY\\_BA\\_ASP\\_BS/ATY\\_BA/](http://catalog.ufl.edu/UGRD/colleges-schools/UGLAS/ATY_BA_ASP_BS/ATY_BA/)) | Bachelor of Science in Astrophysics (p. 1)
- **Credits for Degree:** 120
- **More Info**

*To graduate with this major, students must complete all university, college, and major requirements.*

## Department Information

The Department of Astronomy is home to a vibrant community actively engaged in research, education, and outreach. The department's faculty are involved in a wide range of research programs (<https://www.astro.ufl.edu/research/>) using world-class resources including an in-house design-through-fabrication instrumentation program (<https://www.astro.ufl.edu/instrumentation/past-current-projects/>), partner level access to the Gran Telescope Canarias (<https://www.astro.ufl.edu/research/telescopes/>), the HiPerGator-2 (<https://www.astro.ufl.edu/research/computing/>) supercomputer, and more.

More Info (<https://www.astro.ufl.edu/>)

## CONTACT

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Map (<http://campusmap.ufl.edu/#/index/0038>)

## Curriculum

- Astronomy and Astrophysics
- Astronomy Minor

The Bachelor of Science (BS) in Astrophysics is for students who intend to pursue careers in a scientific or technical field by continuing to study astronomy, astrophysics, or physics at the graduate level or to commence study in some related field such as planetary science.

## Requirements for the Major

The BS in Astrophysics requires 20 credits of foundation coursework in mathematics and physics and 42 credits of major coursework in for a total of 62 credits.

All courses must be completed with minimum grades of C.

## Required Foundation Coursework

Code	Title	Credits
MAC 2311	Analytic Geometry and Calculus 1	4
MAC 2312	Analytic Geometry and Calculus 2	4
MAC 2313	Analytic Geometry and Calculus 3	4
PHY 2048/2048L	Physics with Calculus 1	3
PHY 2049/2049L	Physics with Calculus 2	3
<b>Total Credits</b>		<b>18</b>

## Required Major Coursework

Code	Title	Credits
<b>Core Courses</b>		
AST 3018	Astronomy and Astrophysics 1	3
AST 3019	Astronomy and Astrophysics 2	3
AST 3722C	Techniques of Observational Astronomy 1	3
Four 4000-level AST courses <sup>1</sup>		12

MAP 2302	Elementary Differential Equations	3
PHY 3101	Introduction to Modern Physics	3
PHY 3221	Mechanics 1	3
PHY 4222	Mechanics 2	3
PHY 3323	Electromagnetism 1	3
PHY 4324	Electromagnetism 2	3
Select one:		3
PHY 3513	Thermal Physics 1	
PHY 4424	Optics 1	
PHY 4523	Statistical Physics	
PHY 4604	Introductory Quantum Mechanics 1	
<b>Total Credits</b>		<b>42</b>

<sup>1</sup> Prerequisites: AST 3018 and AST 3019.

## Recommended Coursework for Graduate Study

Students should talk with the undergraduate coordinator and plan to take:

Code	Title	Credits
PHY 4604	Introductory Quantum Mechanics 1	3
Select additional courses:		
COP 2271	Computer Programming for Engineers	
MAA 4402	Functions of a Complex Variable	
MAS 3114	Computational Linear Algebra	
PHY 3513	Thermal Physics 1	
PHY 4424	Optics 1	
PHY 4523	Statistical Physics	
STA 3032	Engineering Statistics	

Students of exceptional ability who have some background in physics are encouraged to take the enriched physics with calculus sequence PHY 2060/PHY 2061 instead of PHY 2048/PHY 2049; PHY 3063 may then be taken in place of PHY 3101; and PHZ 3113 may be substituted for PHY 3221.

## Relevant Minors and Certificates

### UFTeach Program

There is a severe shortage of qualified secondary science teachers in Florida and nationwide. Students interested in becoming part of this high-demand profession should see the undergraduate coordinator about the UFTeach program. UFTeach students can complete the UFTeach minor in science teaching along with their BA in Astronomy and have the coursework and preparation for professional teacher certification in Florida when they graduate.

More Info (<https://education.ufl.edu/uf-teach/>)

## Research

Students pursuing the BS in Astrophysics are encouraged to engage in research with Astronomy faculty by signing up for at least three credits of AST 4911; 3 credits of AST 4911 may count toward the 4000-level requirement; an additional 3 credits of AST 4911 may be applied toward the 4000-level requirement with the approval of the undergraduate coordinator.

### Critical Tracking

Critical Tracking records each student's progress in courses that are required for entry to each major. Please note the critical-tracking requirements below on a per-semester basis.

For degree requirements outside of the major, refer to CLAS Degree Requirements: Structure of a CLAS Degree (<http://catalog.ufl.edu/UGRD/colleges-schools/UGLAS/>).

Equivalent critical-tracking courses as determined by the State of Florida Common Course Prerequisites (<https://cpm.flvc.org/advance-search/>) may be used for transfer students.

All students must meet these criteria to remain on track for the major.

## Semester 1

- Complete MAC 1147 or MAC 2311
- 2.0 UF GPA required

## Semester 2

- Complete MAC 2311
- 2.0 UF GPA required

## Semester 3

- Complete MAC 2312, PHY 2048 and PHY 2048L with a 2.5 GPA required for all critical-tracking courses
- 2.0 UF GPA required

## Semester 4

- Complete MAC 2313, PHY 2049 and PHY 2049L with 2.5 GPA required for all critical-tracking courses
- 2.0 UF GPA required

*UF freshmen and sophomores should take AST 3018 by semester 4*

## Semester 5

- 2.5 critical-tracking GPA with completion of AST 3018
- 2.0 UF GPA required

## Semester 6

- Complete four 3000/4000 level courses in AST or PHY
- 2.0 UF GPA required

## Semester 7

- Complete four 3000/4000 level courses in AST or PHY
- 2.0 UF GPA required

## Semester 8

- Complete four 3000/4000 level courses in AST or PHY
- Complete MAP 2302
- 2.0 UF GPA required

### Model Semester Plan

Students are expected to complete the Writing, Civic Literacy, summer enrollment, and Quest requirements while in the process of taking the courses below. Students are also expected to complete the general education international (GE-N) requirements concurrently with another general education requirement (typically, GE-C, H, or S) as part of the CLAS Basic Distribution requirements. One of the two general education mathematics courses must be a pure math course.

College of Liberal Arts and Sciences allows students additional flexibility in its Distribution Requirements. Students may count a maximum of 6 credits TOTAL from the CLAS Distribution course lists towards Humanities, Social and Behavioral Sciences, or Biological and Physical Sciences, with no more than 3 credits of Humanities, 3 credits of Social and Behavioral Sciences, or 6 credits of Biological or Physical Sciences.

The full list of major-specific requirements for this major can be found on the Overview tab. College of Liberal Arts and Sciences degree requirements can be found on the College's degree requirements page. (<https://catalog.ufl.edu/UGRD/colleges-schools/UGLAS/#degree requirementstext>)

MAC 2312, MAC 2313, PHY 2049 & L, and MAP 2302 may count towards the 3000-level or above electives outside of the major.

To remain on track, students must complete the appropriate critical-tracking courses, which appear in bold. These courses must be completed by the terms as listed above in the Critical Tracking criteria.

*This semester plan represents an example progression through the major. Actual courses and course order may be different depending on the student's academic record and scheduling availability of courses. Prerequisites still apply.*

Course	Title	Credits
<b>Semester One</b>		
Quest 1		3
MAC 2311	Analytic Geometry and Calculus 1 ( <b>Critical Tracking</b> ; State Core Gen Ed Mathematics)	4
State Core Gen Ed Composition ( <a href="http://catalog.ufl.edu/UGRD/academic-programs/general-education/#genedcoursestext">http://catalog.ufl.edu/UGRD/academic-programs/general-education/#genedcoursestext</a> ); Writing Requirement		3
State Core Gen Ed Social and Behavioral Sciences ( <a href="http://catalog.ufl.edu/UGRD/academic-programs/general-education/#genedcoursestext">http://catalog.ufl.edu/UGRD/academic-programs/general-education/#genedcoursestext</a> )		3
Gen Ed Humanities		3
	<b>Credits</b>	<b>16</b>
<b>Semester Two</b>		
MAC 2312	Analytic Geometry and Calculus 2 ( <b>Critical Tracking</b> ; Gen Ed Mathematics)	4
PHY 2048	Physics with Calculus 1 ( <b>Critical Tracking</b> ; State Core Gen Ed Physical Sciences)	3
PHY 2048L	Laboratory for PHY 2048 ( <b>Critical Tracking</b> ; Gen Ed Physical Sciences)	1
State Core Gen Ed Humanities ( <a href="http://catalog.ufl.edu/UGRD/academic-programs/general-education/#genedcoursestext">http://catalog.ufl.edu/UGRD/academic-programs/general-education/#genedcoursestext</a> )		3
Gen Ed Biological Science		3
	<b>Credits</b>	<b>14</b>
<b>Semester Three</b>		
AST 3018	Astronomy and Astrophysics 1 ( <b>Critical Tracking</b> )	3
MAC 2313	Analytic Geometry and Calculus 3 ( <b>Critical Tracking</b> )	4
PHY 2049	Physics with Calculus 2 ( <b>Critical Tracking</b> ; Gen Ed Physical Sciences)	3
PHY 2049L	Laboratory for PHY 2049 ( <b>Critical Tracking</b> ; Gen Ed Physical Sciences)	1
Gen Ed Social and Behavioral Sciences		3
	<b>Credits</b>	<b>14</b>
<b>Semester Four</b>		
Quest 2		3
AST 3019	Astronomy and Astrophysics 2 ( <b>Critical Tracking</b> )	3
AST 3722C	Techniques of Observational Astronomy 1 ( <b>Critical Tracking</b> )	3
MAP 2302	Elementary Differential Equations ( <b>Critical Tracking</b> )	3
Gen Ed Social and Behavioral Sciences		3
	<b>Credits</b>	<b>15</b>
<b>Semester Five</b>		
PHY 3101	Introduction to Modern Physics ( <b>Critical Tracking</b> )	3
PHY 3221	Mechanics 1 ( <b>Critical Tracking</b> )	3
AST course (4000 level; <b>Critical Tracking</b> )		3
CLAS Foreign Language Proficiency Requirement <sup>1</sup>		4-5
Elective (or Gen Ed Humanities, if needed)		3
	<b>Credits</b>	<b>16-17</b>
<b>Semester Six</b>		
PHY 3323	Electromagnetism 1 ( <b>Critical Tracking</b> )	3
PHY 4222	Mechanics 2 ( <b>Critical Tracking</b> )	3
AST course (4000 level; <b>Critical Tracking</b> )		3
CLAS Foreign Language Proficiency Requirement <sup>1</sup>		3-5
Elective		3
	<b>Credits</b>	<b>15-17</b>
<b>Semester Seven</b>		
Select one:		3
PHY 3513	Thermal Physics 1 ( <b>Critical Tracking</b> )	
PHY 4424	Optics 1 ( <b>Critical Tracking</b> )	
PHY 4523	Statistical Physics ( <b>Critical Tracking</b> )	
PHY 4604	Introductory Quantum Mechanics 1 ( <b>Critical Tracking</b> )	
PHY 4324	Electromagnetism 2 ( <b>Critical Tracking</b> )	3
AST course (4000 level; <b>Critical Tracking</b> )		3
Gen Ed Composition; Writing Requirement		3
Elective (or CLAS Foreign Language Proficiency Requirement if 4-3-3 language option)		3
	<b>Credits</b>	<b>15</b>
<b>Semester Eight</b>		
AST course (4000 level; <b>Critical Tracking</b> )		3
Gen Ed Biological Sciences		3
Electives (3000 level or above, not in major)		3

Electives	6
<b>Credits</b>	<b>15</b>
<b>Total Credits</b>	<b>120</b>

<sup>1</sup> CLAS Foreign Language Proficiency Requirement (<https://catalog.ufl.edu/UGRD/colleges-schools/UGLAS/#degreerequirementstext>)

## Academic Learning Compact

Astronomy and Astrophysics provide knowledge of basic concepts, theories and observational findings concerning the structure and evolution of planetary systems, stars, stellar systems such as galaxies, and cosmology. Students will learn scientific methodology and its application in specific contexts, the use of observations in testing hypotheses and the limitations of astronomical observations as well as how to critically evaluate them.

The Bachelor of Arts in Astronomy enables students to become familiar with modern physics and to understand mathematics, including calculus. The Bachelor of Science in Astrophysics enables students to understand the basic concepts, theories and experimental findings in modern physics, electricity and magnetism, and mechanics as they apply to astronomy and astrophysics.

## Before Graduating Students Must

- Demonstrate satisfactory (minimum grades of C) performance on a selection of coursework from each of the 4000-level astronomy courses as graded by a faculty committee independent of the instructor and not as part of the course grade.
- Complete requirements for the baccalaureate degree, as determined by faculty.

## Students in the Major Will Learn to

### Student Learning Outcomes | SLOs

#### Content

##### 1. Bachelor of Arts in Astronomy

Identify, describe and define the fundamentals of astronomy, including the basic concepts, theories and observational results for planetary systems, stars, stellar systems and cosmology.

##### Bachelor of Science in Astrophysics

Identify, describe and define the fundamentals of astrophysics, including mechanics, electromagnetism, modern physics and the basic concepts, theories and observational results for planetary systems, stars, stellar systems and cosmology.

##### 2. Define and use the techniques of astronomical observation.

#### Critical Thinking

##### 3. Critically evaluate results of astronomical research.

#### Communication

##### 4. Effectively and clearly communicate ideas and results in speech and in writing in an accepted style of presentation.

## Curriculum Map | BA and BS

*I = Introduced; R = Reinforced; A = Assessed*

Courses	SLO 1	SLO 2	SLO 3	SLO 4
AST 3018	I		I	I
AST 3019	I		I	I
AST 3722C	I, R	I, A	R	R
AST 4211	R, A		R	R
AST 4402	R, A		R	R
AST 4723C	R, A	R, A	R	R
AST 4930 (Planetary System Astrophysics)	R, A		R	R
AST 4930 (Senior Seminar)			A	A

## Assessment Types for Both Degrees

- Exams
- Portfolios

- Papers
- Oral presentations

