

# Astronomy Major 4-Year Plan

This four-year plan has been constructed for a student entering the program prepared for **first semester Calculus (MATH 122AB or 125)**. Please visit the Astronomy Department academic webpage for more information:  
<http://www.as.arizona.edu/academics>

## FALL 1

ASTR 196	1	* Astro Major Seminar
ENGL 101	3	# Composition
MATH 122AB	5	^ Calculus I
CSC 110	4	% Computer Programming
---	3	Gen Ed or Elective

**Total Units: 16**

## SPRING 1

PHYS 141/161H	4	^ Intro Mechanics
ENGL 102	3	# Composition
MATH 129	3	^ Calculus II
---	3	Gen Ed or Elective
---	3	Gen Ed or Elective

**Total Units: 16**

## FALL 2

ASTR 250	3	^ Fund. Of Astronomy
MATH 223	4	^ Vector Calculus
PHYS 142/162H	4	^ Intro Thermo. & Optics
---	4	Foreign Language
ASTR 39X	1	* Research

**Total Units: 16**

## SPRING 2

ASTR 296A	1	* Research Seminar [odd yrs]
MATH 254	3	^ Differential Equations
PHYS 241/261H	4	^ Intro E&M
PHYS 263H	3	Relativity & Quantum
---	4	Foreign Language
ASTR 39X	1	* Research

**Total Units: 16**

## FALL 3

ASTR 300A	3	Astrophys. I : Mechanics
PHYS 204	3	^ Math Tech. in Phys.
PHYS 321	3	^ Theo. Mechanics
MATH 313	3	* Linear Algebra
---	3	Gen Ed or Elective
ASTR 39X	1	* Research

**Total Units: 16**

## SPRING 3

ASTR 300B	3	Astrophys. II : Radiation & Matter
ASTR 302	3	Observational Astronomy
PHYS 331	3	^ E&M I
PHYS 371	3	Quantum Theory I
---	3	Gen Ed or Elective
ASTR 49X	1	Research

**Total Units: 16**

## FALL 4

ASTR 400A	3	Th. Astrophys. I : Stellar
PHYS 305	3	^ Computational Physics
---	3	Gen Ed or Elective
---	3	Elective
---	3	Elective
ASTR 49X	1	Research

**Total Units: 16**

## SPRING 4

ASTR 400B	3	Th. Astrophys. II : Gal/Exgal
PHYS 426	3	^ Thermal Physics
---	3	Gen Ed or Elective
---	3	Elective
---	3	Elective
ASTR 49X	1	Research

**Total Units: 16**

\* = Optional. Not required for the ASTR Major graduation, but recommended.

# = If test into ENGL 109H, may replace ENGL 101,102 with single semester of 109H.

^ = If start with MATH 129 (or higher), then may take classes denoted with "^" one semester earlier.

% = CSC 110 (or equivalently CSC 250, ECE 175 or PHYS 105A) may be taken any semester prior to taking PHYS 305.

H = Honors section. Seniors graduating with Honors must complete a Honors thesis (3 units of ASTR 498H or 499H).

# Undergraduate Astronomy Degree Requirements

## B.S. IN ASTRONOMY (36 UNITS)

The B.S. in Astronomy automatically obtains a Physics Minor. A total of 120 units (42 upper division) are required to graduate.

<u>Course No.</u>	<u>Units</u>	<u>Course Title</u>	<u>Semester(s) Offered</u>
ASTR 250	3	Fundamentals of Astronomy	Fall/Spring
ASTR 300A	3	Astronomy and Astrophysics I (Gravity and Mechanics)	Fall
ASTR 300B	3	Astronomy and Astrophysics II (Radiation and Matter)	Spring
ASTR 302	3	Introduction to Observational Astronomy	Spring
PHYS 305	3	Computational Physics	Fall/Spring
PHYS 321	3	Theoretical Mechanics I	Fall/Spring
PHYS 331	3	Electricity & Magnetism I	Fall/Spring
PHYS 371	3	Quantum Theory I	Fall/Spring
ASTR 400A	3	Theoretical Astrophysics I: Stellar (writing emphasis)	Fall
ASTR 400B	3	Theoretical Astrophysics II: Galactic and Extragalactic	Spring
PHYS 426	3	Thermal Physics	Fall/Spring
ASTR 492/8/9(H) <sup>1</sup>	3	Research Project (or Honors Thesis)	Fall/Spring/Summer

<sup>1</sup> 3 units of either 492 (Directed Research; for a letter grade), 498H (Senior Capstone; letter grade) or 499 (Independent Study; pass/fail). ASTR 499H (letter grade) may also be taken for Honors credit.

**Gen Ed Requirements:** 4 Tier 1 (two courses numbered 150s and two courses numbered 160s) plus 3 Tier 2 (1 each from HUM, INDV, and ARTS). Course descriptions may be found at <http://gened.arizona.edu>  
2 semesters of a foreign language are required (if not tested out of).

## Astrophysics Relevant Upper Division Electives

### Astronomy & Planetary Science Electives:

ASTR 485	3	Radio Astronomy
ASTR 488	3	Astrochemistry
PTYS 403	3	Physics of Solar System
PTYS 407	3	Chemistry of Solar System
PTYS 411	3	Geophysics of Solar System
PTYS 416	3	Comets, Asteroids, Kuiper Belt
PTYS 442	3	Mars
PTYS 450	3	Origin of Planetary Systems

### Statistics Electives:

ISTA 311	3	Information & Inference
ISTA 410	3	Bayesian Modeling & Inference
ISTA 421	3	Intro Machine Learning

### Math Electives (see catalog for complete list):

MATH 313	3	!! Linear Algebra
MATH 424	3	Theory of Complex Variables
MATH 454	3	ODEs & Stability Theory
MATH 456	3	Applied Partial Diffy Q
MATH 475A/B	3,3	Numerical Analysis I/II

### Optics Electives:

OPTI 310/330	3,3	Physical Optics I/II
PHYS 320	3	Optics
ASTR 416	3	Ast. Optics (Detecting Exoplanets)
ASTR 428	3	Adaptive Optics

### Astrobiology Electives:

MCB 315	3	Quantitative Biology
ASTR 475	3	Planetary Astrobiology
GEOS 484	3	Evol. of Earth & Biosphere

### Instrumentation Electives:

PHYS 381/382/481	2,2,2	Experimental Phys. I/II/III
PHYS 405	3	Digital Electronics
ASTR 418	3	Instrumentation & Stats
PHYS 460	3	Solid State Physics

### Physics Electives (see catalog for complete list):

PHYS 332	3	E&M II
PHYS 450	3	Nuclear Physics
PHYS 469	3	Intro General Relativity
PHYS 472	3	Quantum Theory II

!! = The MATH Minor requires MATH 313 (or 310) plus one MATH 3/400 level minor elective.

11/30/17