

BACHELOR OF SCIENCE IN PHYSICS: CONCENTRATION IN ASTROPHYSICS ROADMAP – QUANTITATIVE REASONING CATEGORY I/II AND ENG 114

120 Total Units Required

Minimum Number of Units in the Major: 71

This roadmap is a suggested plan of study and does not replace meeting with an advisor. Please note that students may need to adjust the actual sequence of courses based on course availability. Please consult an advisor in your major program for further guidance.

Course	Title	Units
First Semester		
ENG 114	Writing the First Year: Finding Your Voice (A2) ¹	3
MATH 226	Calculus I (Major Prerequisite, B4) ²	4
GE Area A ³		3
GE Area C		3
GE Area D		3
Units		16
Second Semester		
CSC 309	Computer Programming (Major Upper-Division Core)	3
MATH 227	Calculus II (Major Prerequisite)	4
PHYS 220 & PHYS 222	General Physics with Calculus I and General Physics with Calculus I Laboratory (Major Prerequisite, B1, B3)	4
GE Area A		3
GE Area E		3
Units		17
Third Semester		
MATH 228	Calculus III (Major Prerequisite)	4
PHYS 230 & PHYS 232	General Physics with Calculus II and General Physics with Calculus II Laboratory (Major Prerequisite)	4
GE Area B: Life Science (B2)		3
Select One:		3

SF State Studies or University Elective (if selecting MATH 245)

MATH 325	Linear Algebra (if selecting MATH 376)	
Units		14
Fourth Semester		
ASTR 300	Stars, Planets, and the Milky Way (Major Upper-Division Core)	3
Select One (Major Prerequisite):		3
MATH 245	Elementary Differential Equations and Linear Algebra	
MATH 376	Ordinary Differential Equations I	
PHYS 240 & PHYS 242	General Physics with Calculus III and General Physics with Calculus III Laboratory (Major Prerequisite)	4
GE Area C - Take Two		6
Units		16
Fifth Semester		
ASTR 301	Observational Astronomy Laboratory (Major Upper-Division Core)	2
PHYS 320	Modern Physics I (Major Upper-Division Core)	3
PHYS 330	Analytical Mechanics I (Major Upper-Division Core)	3
PHYS 385	Introduction to Theoretical Physics I (Major Upper-Division Core)	3
GE Area D		3
Units		14
Sixth Semester		
ASTR 340GW	The Big Bang - GWAR (Major Upper-Division Core)	3
PHYS 360	Electricity and Magnetism I (Major Upper-Division Core)	3
PHYS 370	Thermodynamics and Statistical Mechanics (Major Upper-Division Core)	3
GE Area F		3
GE Area UD-B: Upper-Division Physical and/or Life Sciences (Consider SF State Studies Course)		3
Units		15

Seventh Semester

ASTR 400	Stellar Astrophysics (Major Upper-Division Core)	3
PHYS 430	Quantum Mechanics I (Major Upper-Division Core)	3
Major Elective (6 Units Total) – Take One ⁴		3
GE Area UD-D: Upper-Division Social Sciences (Consider SF State Studies Course)		3
GE Area UD-C: Upper-Division Arts and/or Humanities (Consider SF State Studies Course)		3

Units 15

Eighth Semester

ASTR 470	Observational Techniques in Astronomy (Major Upper-Division Core)	3
Select One (Major Culminating Experience):		3
ASTR 498 & PHYS 695	Astronomy Research Literature and Culminating Experience in Physics	
ASTR 697	Senior Project	
Major Elective (6 Units Total) – Take One ⁴		3
U.S. and California Government (http://bulletin.sfsu.edu/undergraduate-education/american-institutions/#usg)		4

Units 13

Total Units 120

¹ ENG 114 can only be taken if you complete Directed Self-Placement (DSP) and select ENG 114; if you choose ENG 104/ENG 105 through DSP you will satisfy A2 upon successful completion of ENG 105 in the second semester; multilingual students may be advised into alternative English courses.

² Depending on courses completed through Early Start, students in Pathway/Category III or IV may be required to enroll in a support course to complement their Quantitative Reasoning/B4 requirement. There are multiple course options for this pathway. Before enrolling in a B4 course, students should verify their MATH Pathway/Category in their Student Center (<http://cms.sfsu.edu/content/student-center/>). Information regarding the courses that correspond with your MATH Pathway/Category can be found on the Developmental Studies Office Website (<http://developmentalstudies.sfsu.edu/>).

³ To avoid taking additional units, it is recommended that you meet the **SF State Studies** (AERM, GP, ES, SJ) requirements within your GE or major.

⁴ **Major Electives (6 units)**

Chosen from upper-division courses in Physics or Astronomy with consent of an advisor. Three of the 6 units must be in a course(s) numbered 400–499. Up to 1 unit of a 600 level course in ASTR may count toward this requirement.