

BACHELOR OF SCIENCE IN PHYSICS: CONCENTRATION IN ASTROPHYSICS - QUANTITATIVE REASONING CATEGORY I/II AND STRETCH ENGLISH

120 Total Units Required

Minimum Number of Units in the Major: 71

Course	Title	Units
First Semester		
ENG 104	Writing the First Year. Finding Your Voice Stretch I 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 for Scientists and Engineers (Major Upper-Division Core)	3
ENG 105	Writing the First Year. Finding Your Voice Stretch II (A2) ¹	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
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
GE Area E		3
SF State Studies or University Elective (if selecting MATH 245) or		3

MATH 325	Linear Algebra (if selecting MATH 376)	Units	17
Fourth Semester			
ASTR 300	Stars, Planets, and the Milky Way (Major Upper-Division Core)		3
MATH 245 or MATH 376	Elementary Differential Equations and Linear Algebra (Major Prerequisite) or Ordinary Differential Equations I		3
PHYS 240 & PHYS 242	General Physics with Calculus III and General Physics with Calculus III Laboratory (Major Prerequisite)		4
GE Area C			3
GE Area D			3
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 - GEAR (Major Upper-Division Core)		3
ASTR 470	Observational Techniques in Astronomy (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 C		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		
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
GE Area UD-B: Upper-Division Physical and/or Life Sciences (Consider SF State Studies Course)		3
SF State Studies or University Elective		1
	Units	10
	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 **SF State Studies** requirements (AERM, GP, ES, SJ) 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 six units must be in a course numbered 400–499. Up to 1 unit of a 600 level course in ASTR.