

BACHELOR OF SCIENCE IN PHYSICS: CONCENTRATION IN ASTROPHYSICS ROADMAP – QUANTITATIVE REASONING CATEGORY III/IV

120 Total Units Required

Minimum Number of Units in the Major: 72

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		
MATH 197	Prelude to Calculus I (Prerequisite for MATH 226) ¹	3
PHYS 200	Planning for Success as a Physics & Astronomy Major (Major Prerequisite)	1
GE Area 1: English Communication		3
GE Area 3: Arts and Humanities		3
GE Area 4: Social and Behavioral Sciences ²		3
Units		13
Second Semester		
MATH 198	Prelude to Calculus II (Prerequisite for MATH 226, GE 2) ¹	3
GE Area 1A: English Composition ³		3
GE Area 1: English Communication		3
GE Area 3: Arts and Humanities		3
Units		12
Third Semester		
MATH 226	Calculus I (Major Prerequisite, GE 2) ¹	4
GE Area 4: Social and Behavioral Sciences ²		3
GE Area 5B: Biological Science		3
U.S. and California Government (https://bulletin.sfsu.edu/undergraduate-education/american-institutions/#usg)		3
Units		13
Fourth Semester		
Select One (Major Upper-Division Core):		3
CSC 309	Computer Programming	
MATH 209	Mathematical Computing	
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, GE 5A, GE 5C)	4
GE Area 6: Ethnic Studies (https://bulletin.sfsu.edu/undergraduate-education/general-education/areasix/)		3
Units		14

Fifth 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 5UD or 2UD: Upper-Division Sciences or Upper-Division Mathematical Concepts		3
GE Area 3UD: Upper-Division Arts or Humanities		3
Units		14

Sixth Semester		
ASTR 300	Stars, Planets, and the Milky Way (Major Upper-Division Core)	3
Select One (Major Prerequisite):		3
MATH 225	Introduction to Linear Algebra	
MATH 245	Elementary Differential Equations and Linear Algebra	
PHYS 240 & PHYS 242	General Physics with Calculus III and General Physics with Calculus III Laboratory (Major Prerequisite)	4
GE Area 4UD: Upper-Division Social and Behavioral Sciences		3
Units		13

Seventh Semester		
ASTR 301	Observational Astronomy Laboratory (Major Upper-Division Core)	2
Select One (Major Prerequisite):		3
MATH 376	Ordinary Differential Equations I (if MATH 225 taken)	
SF State Studies or University Elective (if MATH 245 taken)		
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
Units		14
Eighth Semester		
ASTR 340GW	The Big Bang - GVAR (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
Units		12
Ninth Semester		
ASTR 400	Stellar Astrophysics (Major Upper-Division Core)	3
ASTR 697	Senior Project (Major Upper-Division Core)	3
PHYS 430	Quantum Mechanics I (Major Upper-Division Core)	3
Major Elective (3-6 Units Total) ⁴		3
Select One:		3
Major Elective (if MATH 245 taken) ⁴		
SF State Studies or University Elective (if MATH 225/MATH 376 taken)		
Units		15
Total Units		120

for the major, which can be an additional 3 upper-division units in PHYS and/or ASTR, or a course outside of PHYS or ASTR with prior permission of a faculty advisor.

¹ Students should use their Pathway/Category (<https://gatorsmartstart.sfsu.edu/pathways/>) to determine the appropriate GE 2 course option. For directions on how to view your Pathway/Category, visit [how to find your pathway \(https://gatorsmartstart.sfsu.edu/howtofindyourpathways/\)](https://gatorsmartstart.sfsu.edu/howtofindyourpathways/). Questions? Contact Gator Smart Start. (<https://gatorsmartstart.sfsu.edu/>)

² First-time freshmen must take one lower-division Area 4 course that meets US History (USH).

³ Students should use their Pathway/Category (<https://gatorsmartstart.sfsu.edu/pathways/>) to determine the appropriate GE 1A course option. For directions on how to view your Pathway/Category, visit [how to find your pathway \(https://gatorsmartstart.sfsu.edu/howtofindyourpathways/\)](https://gatorsmartstart.sfsu.edu/howtofindyourpathways/). Questions? Contact Gator Smart Start. (<https://gatorsmartstart.sfsu.edu/>)

⁴ **Major Electives (3-6 units)**
Students must take one 400-level PHYS and/or ASTR course. Student who take MATH 245 must take additional electives to reach 72 units