

# BACHELOR OF SCIENCE IN PHYSICS: CONCENTRATION IN ASTROPHYSICS - QUANTITATIVE REASONING CATEGORY III/IV AND STRETCH ENGLISH

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
<b>First Semester</b>		
ENG 104	Writing the First Year: Finding Your Voice Stretch I <sup>1</sup>	3
MATH 197	Prelude to Calculus I (Prerequisite for MATH 226) <sup>2,3</sup>	3
GE Area A <sup>4</sup>		3
GE Area C		3
GE Area D		3
Units		15
<b>Second Semester</b>		
ENG 105	Writing the First Year: Finding Your Voice Stretch II (A2) <sup>1</sup>	3
MATH 198	Prelude to Calculus II (Prerequisite for MATH 226, B4) <sup>2,3</sup>	3
GE Area A		3
GE Area C		3
GE Area D		3
Units		15
<b>Third Semester</b>		
MATH 226	Calculus I (Major Prerequisite, B4) <sup>2,3</sup>	4
GE Area B: Life Science (B2)		3
GE Area C		3
GE Area E		3
Units		13
<b>Fourth Semester</b>		
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 D		3
Units		14
<b>Fifth Semester</b>		
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 UD-B: Upper-Division Physical and/or Life Sciences (Consider SF State Studies Course)		3
SF State Studies or University Elective (if selecting MATH 245) or		3
MATH 325	Linear Algebra (if selecting MATH 376)	
Units		14
<b>Sixth Semester</b>		
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 UD-C: Upper-Division Arts and/or Humanities (Consider SF State Studies Course)		3
GE Area UD-D: Upper-Division Social Sciences (Consider SF State Studies Course)		3
Units		16
<b>Seventh Semester</b>		
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
Units		11
<b>Eighth Semester</b>		
ASTR 340GW	The Big Bang - GVAR (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		9
<b>Ninth Semester</b>		
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 <sup>5</sup>		3
Units		9
<b>Tenth Semester</b>		
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 <sup>5</sup>		3
Units		9
Total Units		125

<sup>3</sup> QR Category III students with a grade of B or higher in high school pre-calculus in the past year may be able to enroll in MATH 226. Please see a department advisor.

<sup>4</sup> To avoid taking additional units, it is recommended that you meet **SF State Studies** requirements (AERM, GP, ES, SJ) within your GE or major.

<sup>5</sup> **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.

<sup>1</sup> 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.

<sup>2</sup> 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/>).