BACHELOR OF SCIENCE IN PHYSICS: CONCENTRATION IN PHYSICS FOR TEACHING ROADMAP – QUANTITATIVE REASONING CATEGORY 3/4

120 Total Units Required
Minimum Number of Units in the Major: 66

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 your Degree Planner (https://registrar.sfsu.edu/degreeplanner/) and an advisor for further guidance.

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

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		
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
SF State Studies or University Elective		3
	Units	**14**
Fifth Semester		
Select One (Major Upper-Division Core):		3
CSC 309	Computer Programming	
MATH 209	Mathematical Computing	
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
	Units	**14**
Sixth Semester		
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 3UD: Upper-Division Arts or Humanities		3
GE Area 4UD: Upper-Division Social and Behavioral Sciences		3
	Units	**13**
Seventh Semester		
PHYS 320	Modern Physics I (Major Upper-Division Core)	3
PHYS 321	Modern Physics Laboratory (Major Upper-Division Core)	2
PHYS 330	Analytical Mechanics I (Major Upper-Division Core)	3

PHYS 385	Introduction to Theoretical Physics I (Major Upper-Division Core)	3
Select One:		3
MATH 376	Ordinary Differential Equations I (if MATH 225 taken)	
SF State Studies or University Elective (if MATH 245 taken)		
	Units	**14**
Eighth Semester		
PHYS 360	Electricity and Magnetism I (Major Upper-Division Core)	3
PHYS 370	Thermodynamics and Statistical Mechanics (Major Upper-Division Core)	3
Major Elective (9-12 Units Total) - Take Three [4]		9
	Units	**15**
Ninth Semester		
Select One (Major Upper-Division Core):		3
E ED 655	Hands-on Undergraduate Science Education Experience	
MATH 375	Field Study for Secondary Teachers	
PHYS 491GW	Advanced Laboratory Techniques I - GWAR	3
Select One:		3
Major Elective (9-12 Units Total) (if MATH 245 taken) [4]		
SF State Studies or University Elective (if MATH 225/MATH 376 taken)		
SF State Studies or University Elective		3
	Units	**12**
	Total Units	**120**

[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/). 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/). Questions? Contact Gator Smart Start. (https://gatorsmartstart.sfsu.edu/)

[4] **Major Electives (9-12 units)**
For students who choose MATH 245, 12 units of electives are required, whereas for students who choose MATH 225 & MATH 376, 9 units of electives are required. Selected in consultation with a faculty advisor to prepare to teach a second subject in addition to physics or general science at a 9th-grade level. Electives may be lower-division or upper-division courses.