

# BACHELOR OF SCIENCE IN PHYSICS ROADMAP – 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
		<b>Units 15</b>
<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
		<b>Units 15</b>
<b>Third Semester</b>		
MATH 226	Calculus I (Major Lower-Division Prerequisite, B4) <sup>2,3</sup>	4
GE Area B: Life Science (B2)		3
GE Area C		3
GE Area E		3
		<b>Units 13</b>
<b>Fourth Semester</b>		
CSC 309	Computer Programming (Major Lower-Division Prerequisite) <sup>5</sup>	3

MATH 227	Calculus II (Major Lower-Division Prerequisite)	4
PHYS 220 & PHYS 222	General Physics with Calculus I and General Physics with Calculus I Laboratory (Major Lower-Division Prerequisite, B1, B3)	4
GE Area F		3
		<b>Units 14</b>
<b>Fifth Semester</b>		
MATH 228	Calculus III (Major Lower-Division Prerequisite)	4
PHYS 230 & PHYS 232	General Physics with Calculus II and General Physics with Calculus II Laboratory (Major Lower-Division Prerequisite)	4
GE Area UD-B: Upper-Division Physical and/or Life Sciences (Consider SF State Studies Course) <sup>6</sup>		3
Select One:		3
SF State Studies or University Elective (if selecting MATH 245)		
MATH 325	Linear Algebra (if selecting MATH 376)	
		<b>Units 14</b>
<b>Sixth Semester</b>		
Select One (Major Lower-Division 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 Lower-Division Prerequisite)	4
GE Area UD-C: Upper-Division Arts and/or Humanities (Consider SF State Studies Course) <sup>6</sup>		3
GE Area UD-D: Upper-Division Social Sciences (Consider SF State Studies Course) <sup>6</sup>		3
		<b>Units 13</b>
<b>Seventh Semester</b>		
PHYS 320 & PHYS 321	Modern Physics I and Modern Physics Laboratory (Major Upper-Division Core)	5

PHYS 330	Analytical Mechanics I (Major Upper-Division Core)	3
PHYS 385	Introduction to Theoretical Physics I (Major Upper-Division Core)	3
<b>Units</b>		<b>11</b>
<b>Eighth Semester</b>		
PHYS 360	Electricity and Magnetism I (Major Upper-Division Core)	3
PHYS 370	Thermodynamics and Statistical Mechanics (Major Upper-Division Core)	3
PHYS 457	Introduction to Analog Electronics (Major Upper-Division Core)	4
<b>Units</b>		<b>10</b>
<b>Ninth Semester</b>		
PHYS 430	Quantum Mechanics I (Major Upper-Division Core)	3
PHYS 460	Electricity and Magnetism II (Major Upper-Division Core)	3
PHYS 490	Physics Project Laboratory (Major Upper-Division Core)	2
Major Elective (10 units total) - Take One <sup>7</sup>		3
<b>Units</b>		<b>11</b>
<b>Tenth Semester</b>		
PHYS 491GW	Advanced Laboratory II - GVAR (Major Upper-Division Core)	1
PHYS 695	Culminating Experience in Physics (Major Upper-Division Core)	1
Major Elective (10 units total) - Take Two <sup>7</sup>		7
<b>Units</b>		<b>9</b>
<b>Total Units</b>		<b>125</b>

<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/>).

<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 the **SF State Studies** (AERM, GP, ES, SJ) requirements within your GE or major.

<sup>5</sup> Additional upper-division elective units in astronomy, mathematics, or physics may be substituted for CSC 309 by students proficient in computer programming, subject to approval by the department chair.

<sup>6</sup> To avoid taking additional units, it is recommended that you meet **U.S. and California Government** (USG/CSLG) within Upper-Division GE.

<sup>7</sup> **Major Electives (10 units)**  
Upper-division astronomy, physics, mathematics, or related sciences courses.

<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.