

# PHYSICS (ASTROPHYSICS) BS + ASTRONOMY AND ASTROPHYSICS MS SF SCHOLARS ROADMAP

The San Francisco State Scholars program provides undergraduate students with an accelerated pathway to a graduate degree. Students in this program pursue a bachelor's and master's degree simultaneously. This program allows students to earn graduate credit while in their junior and/or senior year, reducing the number of semesters required for completion of a master's degree.

**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 Year</b>		
<b>Fall Semester</b>		
ENG 114	Writing the First Year. Finding Your Voice (A2) <sup>1</sup>	3
MATH 226	Calculus I (Major Prerequisite, B4) <sup>2</sup>	4
PHYS 200	Planning for Success as a Physics & Astronomy Major (Major Prerequisite)	1
GE Area A <sup>3</sup>		3
GE Area C		3
GE Area D		3
<b>Units</b>		<b>17</b>
<b>Spring Semester</b>		
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
GE Area E		3
<b>Units</b>		<b>14</b>
<b>Second Year</b>		
<b>Fall Semester</b>		
Select One (Major 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 B: Life Science (B2)		3
<b>Units</b>		<b>14</b>
<b>Spring Semester</b>		
ASTR 300	Stars, Planets, and the Milky Way (Major 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 C - Take Two		6
<b>Units</b>		<b>16</b>
<b>Third Year</b>		
<b>Fall Semester</b>		
ASTR 301	Observational Astronomy Laboratory (Major Core)	2
PHYS 320	Modern Physics I (Major Core)	3
PHYS 330	Analytical Mechanics I (Major Core)	3
PHYS 385	Introduction to Theoretical Physics I (Major Core)	3
Select One (Major Prerequisite):		
MATH 376	Ordinary Differential Equations I (if MATH 225 taken)	
SF State Studies or University Elective (if MATH 245 taken)		
GE Area D		3
<b>Units</b>		<b>14</b>
<b>Spring Semester</b>		
ASTR 340GW	The Big Bang - GVAR (Major Core)	3
PHYS 360	Electricity and Magnetism I (Major Core)	3
PHYS 370	Thermodynamics and Statistical Mechanics (Major Core)	3

GE Area F <sup>±</sup>		3
GE Area UD-B: Upper-Division Physical and/or Life Sciences		3
<b>Units</b>		<b>15</b>
<b>Fourth Year</b>		
<b>Fall Semester</b>		
PHYS 430	Quantum Mechanics I (Major Core)	3
ASTR 700	Stellar Astrophysics (Graduate Elective, Major Core) <sup>4</sup>	3
Graduate Core <sup>4,5</sup>		3
GE Area UD-C: Upper-Division Arts and/or Humanities		3
GE Area UD-D: Upper-Division Social Sciences		3
<b>Units</b>		<b>15</b>
<b>Spring Semester</b>		
ASTR 697	Senior Project (Major Culminating Experience)	3
ASTR 770	Observational Techniques in Astronomy Research (Graduate Core, Major Core)	3
Graduate Elective <sup>4,6</sup>		3
U.S. and California Government ( <a href="http://bulletin.sfsu.edu/undergraduate-education/american-institutions/#usg">http://bulletin.sfsu.edu/undergraduate-education/american-institutions/#usg</a> )		3
SF State Studies or University Elective		3
<b>Units</b>		<b>15</b>
<b>Fifth Year</b>		
<b>Fall Semester</b>		
PHYS 897	Research (Graduate Research)	3
Graduate Core <sup>5</sup>		3
Graduate General Elective <sup>7</sup>		3
<b>Units</b>		<b>9</b>
<b>Spring Semester</b>		
Graduate Core <sup>5</sup>		3
Graduate General Elective <sup>7</sup>		3
Select One (Culminating Experience):		3
ASTR 895	Culminating Project	
ASTR 896EXM	Culminating Experience Examination (and additional Graduate General Elective)	
ASTR 898	Master's Thesis	
<b>Units</b>		<b>9</b>
<b>Total Units</b>		<b>138</b>

- <sup>2</sup> To determine the best B4 course option, students should complete the online advising activity at [mathadvising.sfsu.edu](https://mathadvising.sfsu.edu) (<https://mathadvising.sfsu.edu/>). Questions? Contact Gator Smart Start. (<https://gatorsmartstart.sfsu.edu/>)
- <sup>3</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>4</sup> **Double-Counting**  
For this SF Scholars program, the following graduate requirements may double-count with the listed undergraduate requirements:
- ASTR 700 also fulfills ASTR 400
  - ASTR 770 also fulfills ASTR 470
  - Up to 6 units from the Graduate Core/Electives may double-count with the undergraduate Major Electives
- <sup>5</sup> **Graduate Core:**  
ASTR 722 Radiative Processes in Astrophysics (3 units)  
ASTR 742 Galaxies and Cosmology (3 units)  
PHYS 701 Classical Mechanics (3 units)
- <sup>6</sup> **Graduate Physics and Astronomy Electives (6 units)**  
Select from graduate PHYS and ASTR courses numbered 700 to 799. A list of recommended elective options can be found in the degree requirements (<http://bulletin.sfsu.edu/colleges/science-engineering/physics-astronomy/ms-astronomy-astrophysics/#degreerequirementstext>).
- <sup>7</sup> **General Electives (6-9 units)**  
Advanced upper-division (numbered 400 and above) or graduate courses (numbered 700 to 885) in physics, astronomy, or appropriately related subjects, selected after advisement and approved by the Graduate Coordinator.  
Students who select ASTR 896EXMASTR 896EXM for their culminating experience must complete 9 units of electives. Students who select ASTR 895ASTR 895 or ASTR 898 for their culminating experience must complete 6 units of electives.  
No additional supervision units are allowed. Maximum of 3 units in related fields outside physics & astronomy.  
Students who plan to teach as Graduate Teaching Assistants (GTAs) are strongly encouraged to take PHYS 885 (Inclusive Pedagogy for the Physical Sciences).

<sup>±</sup> Given catalog rights, fall 2023 transfer students do not need to complete an Area F course.

<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.