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 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, ES, SJ) requirements within your GE or major.

Course	Title	Units
First Year		
Fall Semester		
MATH 226	Calculus I (Major Prerequisite, GE 2) [1]	4
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
SF State Studies or University Elective		3
	Units	**17**
Spring 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 1A: English Composition [3]		3
GE Area 1: English Communication		3
	Units	**14**
Second Year		
Fall Semester		
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 5B: Biological Science		3
	Units	**14**
Spring Semester		
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 3: Arts and Humanities		3
GE Area 4: Social and Behavioral Sciences [2]		3
	Units	**16**
Third Year		
Fall Semester		
ASTR 301	Observational Astronomy Laboratory (Major 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 Core)	3
PHYS 330	Analytical Mechanics I (Major Core)	3
PHYS 385	Introduction to Theoretical Physics I (Major Core)	3
	Units	**14**
Spring Semester		
ASTR 340GW	The Big Bang - GWAR (Major Core)	3
PHYS 360	Electricity and Magnetism I (Major Core)	3

PHYS 370	Thermodynamics and Statistical Mechanics (Major Core)	3
GE Area 6: Ethnic Studies (https://bulletin.sfsu.edu/undergraduate-education/general-education/areasix/)		3
U.S. and California Government (https://bulletin.sfsu.edu/undergraduate-education/american-institutions/#usg)		3
	Units	**15**

Fourth Year

Fall Semester

PHYS 430	Quantum Mechanics I (Major Core)	3
ASTR 700	Stellar Astrophysics (Graduate Elective, Major Core) [4]	3
Graduate Core [4,5]		3
Graduate General Elective [6]		3
GE Area 3UD: Upper-Division Arts or Humanities		3
	Units	**15**

Spring Semester

ASTR 697	Senior Project (Major Upper-Division Core)	3
ASTR 770	Observational Techniques in Astronomy Research (Graduate Core, Major Core) [4]	3
Graduate Elective [4,7]		3
GE Area 5UD or 2UD: Upper-Division Sciences or Upper-Division Mathematical Concepts		3
GE Area 4UD: Upper-Division Social and Behavioral Sciences		3
	Units	**15**

Fifth Year

Fall Semester

ASTR 897	Research (Graduate Research)	2
Graduate Core [5]		3
Graduate General Elective [6]		3
SF State Studies or University Elective		3
	Units	**11**

Spring Semester

Select One (Culminating Experience):		3
ASTR 895	Culminating Project	
ASTR 896EXM	Culminating Experience Examination (and additional Graduate General Elective)	
ASTR 898	Master's Thesis	
ASTR 897	Research (Graduate Research)	1
Graduate Core [5]		3
	Units	**7**
	Total Units	**138**

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 **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

5 **Graduate Core**

A full list of courses that can fulfill this requirement can be found in the Degree Requirements (https://bulletin.sfsu.edu/colleges/science-engineering/physics-astronomy/ms-astronomy-astrophysics/#degreerequirementstext).

6 **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 896EXMASTR 896EXMASTR 896EXMASTR 896EXM for their culminating experience must complete 9 units of electives.
Students who select ASTR 895ASTR 895ASTR 895ASTR 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).

7 **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 (https://bulletin.sfsu.edu/colleges/science-engineering/physics-astronomy/ms-astronomy-astrophysics/#degreerequirementstext).