

# BACHELOR OF ARTS IN PHYSICS: CONCENTRATION IN ASTRONOMY ROADMAP – QUANTITATIVE REASONING CATEGORY III/IV AND ENG 114

120 Total Units Required

Minimum Number of Units in the Major: 52

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 114   | Writing the First Year: Finding Your Voice (A2) <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</b>  |   | <b>15</b> |
| <b>Second Semester</b>  |   |           |
| 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         |
| GE Area E   |   | 3         |
| <b>Units</b>  |   | <b>15</b> |
| <b>Third Semester</b>   |   |           |
| ASTR 115  | Introduction to Astronomy (Major Lower-Division Prerequisite, B1)     | 3         |
| MATH 226  | Calculus I (Major Lower-Division Prerequisite, B4) <sup>2,3</sup>     | 4         |
| GE Area C   |   | 3         |
| SF State Studies or University Elective - Take Two <sup>5</sup> |   | 6         |
| <b>Units</b>  |   | <b>16</b> |
| <b>Fourth Semester</b>  |   |           |
| 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 B: Life Science (B2)   |  | 3         |
| SF State Studies or University Elective <sup>5</sup>   |  | 3         |
| <b>Units</b>   |  | <b>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 F <sup>±</sup>   |  | 3         |
| GE Area UD-B: Upper-Division Physical and/or Life Sciences (Consider SF State Studies Course)  |  | 3         |
| <b>Units</b>   |  | <b>14</b> |
| <b>Sixth Semester</b>  |  |           |
| ASTR 300   | Stars, Planets, and the Milky Way (Major Upper-Division Core)  | 3         |
| MATH 245   | Elementary Differential Equations and Linear Algebra (Hidden Prerequisite for PHYS 320)                                    | 3         |
| 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)   |  | 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         |
| <b>Units</b>   |  | <b>16</b> |
| <b>Seventh Semester</b>  |  |           |
| ASTR 301   | Observational Astronomy Laboratory (Major Upper-Division Core)   | 2         |
| PHYS 320 & PHYS 321  | Modern Physics I and Modern Physics Laboratory (Major Upper-Division Core)   | 5         |
| Major Elective - Take Two <sup>6</sup>   |  | 6         |

|   |  |            |
|---|--|------------|
| GE Area UD-D: Upper-Division Social Sciences (Consider SF State Studies Course) |  | 3          |
| <b>Units</b>  |  | <b>16</b>  |
| <b>Eighth Semester</b>  |  |            |
| ASTR 340GW  | The Big Bang -<br>GWAR (Major Upper-<br>Division Core)                     | 3          |
| ASTR 470  | Observational<br>Techniques in<br>Astronomy (Major<br>Upper-Division Core) | 3          |
| PHYS 695  | Culminating<br>Experience in<br>Physics (Major<br>Upper-Division Core)     | 1          |
| Major Elective - Take One <sup>6</sup>  |  | 3          |
| SF State Studies or University Elective <sup>5</sup>                            |  | 4          |
| <b>Units</b>  |  | <b>14</b>  |
| <b>Total Units</b>  |  | <b>120</b> |

<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> To determine the best B4 course option, students should complete the online advising activity at mathadvising.sfsu.edu (<https://mathadvising.sfsu.edu/>). Questions? Contact Gator Smart Start. (<https://gatorsmartstart.sfsu.edu/>)

<sup>3</sup> 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> **Complementary Studies**

Upon completion of the B.A. in Physics program, students will have taken 12 units of Calculus courses that satisfy the Complementary Studies requirement for a B.A. degree.

Students who have earned AA-T or AS-T degrees and are pursuing a similar B.A. degree at SF State are required to fulfill the Complementary Studies requirement as defined by the major department. Students should consult with a major advisor about how transfer units and/or SF State units can best be applied to this requirement in order to ensure degree completion within 60 units.

<sup>6</sup> **Major Elective (8 units)**

At least 8 units of upper-division courses in astronomy, physics, geosciences, mathematics or related subjects, selected on advisement. No more than 3 units of 600 level courses may count toward this requirement.

± Given catalog rights, fall 2022 transfer students do not need to complete an Area F course.