# Bachelor of Arts in Physics: Concentration in Astronomy - Quantitative Reasoning Category III/IV and ENG 114

120 Total Units Required  
Minimum Number of Units in the Major: 52

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>First Semester</strong></td>
<td></td>
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</tr>
<tr>
<td>ENG 114</td>
<td>First Year Composition (A2)</td>
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</tr>
<tr>
<td>MATH 197</td>
<td>Prelude to Calculus I (Prerequisite for MATH 226)</td>
<td>3</td>
</tr>
<tr>
<td>GE Area A</td>
<td></td>
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</tr>
<tr>
<td>GE Area C</td>
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<td>Units</td>
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<tr>
<td><strong>Second Semester</strong></td>
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<tr>
<td>MATH 198</td>
<td>Prelude to Calculus II (Prerequisite for MATH 226, B4)</td>
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<tr>
<td>GE Area A</td>
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<tr>
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<tr>
<td>GE Area D</td>
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<td>GE Area E</td>
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<td><strong>Third Semester</strong></td>
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<tr>
<td>ASTR 115</td>
<td>Introduction to Astronomy (Major Lower-Division Prerequisite, B1)</td>
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<tr>
<td>MATH 226</td>
<td>Calculus I (Major Lower-Division Prerequisite, B4)</td>
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<tr>
<td>GE Area C</td>
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<td>GE Area D</td>
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<tr>
<td>SF State Studies or University Elective</td>
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<tr>
<td><strong>Fourth Semester</strong></td>
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<tr>
<td>MATH 227</td>
<td>Calculus II (Major Lower-Division Prerequisite)</td>
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<tr>
<td>PHYS 220</td>
<td>General Physics with Calculus I and General Physics with Calculus I Laboratory (Major Lower-Division Prerequisite, B1, B3)</td>
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<td><strong>Fifth Semester</strong></td>
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<tr>
<td>ASTR 301</td>
<td>Observational Astronomy Laboratory (Major Upper-Division Core)</td>
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<tr>
<td>MATH 228</td>
<td>Calculus III (Major Lower-Division Prerequisite)</td>
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<tr>
<td>PHYS 230</td>
<td>General Physics with Calculus II and General Physics with Calculus II Laboratory (Major Lower-Division Prerequisite)</td>
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<td>GE Area UD-B: Upper-Division Physical and/or Life Sciences (Consider SF State Studies Course)</td>
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<td><strong>Sixth Semester</strong></td>
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<td>ASTR 300</td>
<td>Stars, Planets, and the Milky Way (Major Upper-Division Core)</td>
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<td>PHYS 240</td>
<td>General Physics with Calculus III and General Physics with Calculus III Laboratory (Major Lower-Division Prerequisite)</td>
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<tr>
<td>GE Area UD-C: Upper-Division Arts and/or Humanities (Consider SF State Studies Course)</td>
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<td>SF State Studies or University Elective - Take Two</td>
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<td><strong>Seventh Semester</strong></td>
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<td>PHYS 320</td>
<td>Modern Physics I and Modern Physics Laboratory (Major Upper-Division Core)</td>
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<td>Major Elective - Take Two</td>
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<tr>
<td>GE Area UD-D: Upper-Division Social Sciences (Consider SF State Studies Course)</td>
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<td>ASTR 340GW</td>
<td>The Big Bang - GWAR (Major Upper-Division Core)</td>
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<tr>
<td>ASTR 470</td>
<td>Observational Techniques in Astronomy (Major Upper-Division Core)</td>
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<td>PHYS 695</td>
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<td>Major Elective - Take One</td>
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<tr>
<td>SF State Studies or University Elective</td>
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<tr>
<td><strong>Total Units</strong></td>
<td><strong>120</strong></td>
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</table>

1. 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.

2. 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](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](http://developmentalstudies.sfsu.edu).

3. 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.

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

5. **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.

6. **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.