BACHELOR OF SCIENCE IN PHYSICS: CONCENTRATION IN ASTROPHYSICS – PHYS
ASSOCIATE DEGREE FOR TRANSFER (ADT) ROADMAP

This is a sample pathway for students who transfer to San Francisco State University in the current Bulletin year with an AS-T in Physics. Twenty-four units in the major (MATH 226, MATH 227, MATH 228, PHYS 220, PHYS 222, PHYS 230, PHYS 232, PHYS 240, and PHYS 242) and all lower-division GE requirements have been satisfied. Additional units in the major may have been satisfied. Check with a major advisor about the most appropriate course sequence. Degree completion guaranteed in 60 units; see the Associate Degree for Transfer (ADT) section for more information (http://bulletin.sfsu.edu/undergraduate-admissions/transfer-students/).

To Do at SF State:

Enough total units to reach 120 minimum for graduation; 30 units minimum at the upper-division level; to include the following:

University-Wide Requirements: 9-15 Units

- American Institutions (0-6 units) - US History, US Government, California State and Local Government. See next bullet if not completed before transfer.
- Upper division GE (9 units): Courses approved for both UD GE and American Institutions may double-count.
- Students entering the major with the AS-T in Physics are not required to fulfill SF State Studies or Complementary Studies requirements.

Physics B.S. (Astrophysics) Major: 44-47 units

MATH 226, MATH 227, MATH 228, PHYS 220, PHYS 222, PHYS 230, PHYS 232, PHYS 240, and PHYS 242 met in transfer.

- Prerequisites (3 units if MATH 245 equivalent not completed before transfer; see note 3 above)
- Upper-division Requirements (38 units)
- Upper-division Electives (6 units): Units in physics or astronomy selected with the consent of advisor. Three of the six elective units must be in courses numbered 400-499. No more than one unit of a 600-level ASTR course may count towards the electives.

University Electives: 4 or More Units

Depends on course choices made at the community college, how transferred units are applied to the requirements above, and course choices at SF State. Some courses may meet more than one requirement, e.g., both in UD GE and the major.

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Semester</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Select One (UD-C, USH, CSLG):</td>
<td></td>
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</tr>
<tr>
<td>HIST 470</td>
<td>The U.S. Constitution to 1896 (AERM, SJ)</td>
<td>3</td>
</tr>
<tr>
<td>HIST 471</td>
<td>The U.S. Constitution Since 1896 (AERM, SJ)</td>
<td>3</td>
</tr>
<tr>
<td>Select One:</td>
<td></td>
<td></td>
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<tr>
<td>University Elective (if selecting MATH 245)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MATH 325</td>
<td>Linear Algebra (if selecting MATH 376)</td>
<td>3</td>
</tr>
<tr>
<td>GE Area UD-B: Upper-Division Physical and/or Life Sciences</td>
<td>Units</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Second Semester</td>
<td></td>
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<tr>
<td>ASTR 300</td>
<td>Stars, Planets, and the Milky Way (Major Upper-Division Core)</td>
<td>3</td>
</tr>
<tr>
<td>CSC 309</td>
<td>Computer Programming (Major Upper-Division Core)</td>
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</tr>
<tr>
<td>Select One (Major Lower-Division Prerequisite):</td>
<td></td>
<td>3</td>
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</tbody>
</table>
### Bachelor of Science in Physics: Concentration in Astrophysics – PHYS

#### Associate Degree for Transfer (ADT) Roadmap

<table>
<thead>
<tr>
<th>MATH 245</th>
<th>Elementary Differential Equations and Linear Algebra</th>
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</thead>
<tbody>
<tr>
<td>MATH 376</td>
<td>Ordinary Differential Equations I</td>
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<tr>
<td>GE Area UD-D: Upper-Division Social Sciences</td>
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<tr>
<td><strong>Units</strong></td>
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<tr>
<td><strong>Third Semester</strong></td>
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<td>ASTR 301</td>
<td>Observational Astronomy Laboratory (Major Upper-Division Core)</td>
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<tr>
<td>PHYS 320</td>
<td>Modern Physics I (Major Upper-Division Core)</td>
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<tr>
<td>PHYS 330</td>
<td>Analytical Mechanics I (Major Upper-Division Core)</td>
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<td>PHYS 385</td>
<td>Introduction to Theoretical Physics I (Major Upper-Division Core)</td>
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<td><strong>Units</strong></td>
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<tr>
<td><strong>Fourth Semester</strong></td>
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</tr>
<tr>
<td>ASTR 340GW</td>
<td>The Big Bang - GWAR (Major Upper-Division Core)</td>
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<tr>
<td>PHYS 360</td>
<td>Electricity and Magnetism I (Major Upper-Division Core)</td>
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<tr>
<td>PHYS 370</td>
<td>Thermodynamics and Statistical Mechanics (Major Upper-Division Core)</td>
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<tr>
<td><strong>Units</strong></td>
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<tr>
<td><strong>Fifth Semester</strong></td>
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<tr>
<td>ASTR 400</td>
<td>Stellar Astrophysics (Major Upper-Division Core)</td>
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<tr>
<td>PHYS 430</td>
<td>Quantum Mechanics I (Major Upper-Division Core)</td>
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<tr>
<td>Major Elective - Take One</td>
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<tr>
<td><strong>Units</strong></td>
<td><strong>3</strong></td>
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<tr>
<td><strong>Sixth Semester</strong></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><strong>Select One (Major Culminating Experience):</strong></td>
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<tr>
<td>ASTR 498 &amp; PHYS 695</td>
<td>Astronomy Research Literature and Culminating Experience in Physics</td>
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<td>ASTR 697</td>
<td>Senior Project</td>
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<td>Major Elective - Take One</td>
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<td>University Elective</td>
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<tr>
<td><strong>Units</strong></td>
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</tr>
<tr>
<td><strong>Total Units</strong></td>
<td><strong>60</strong></td>
</tr>
</tbody>
</table>

1 **Major Electives (6 units)**

Chosen from upper-division courses in Physics or Astronomy with consent of an advisor. Three of the 6 units must be in a course(s) numbered 400–499. Up to 1 unit of a 600 level course in ASTR may count toward this requirement. If MATH 325 was taken, those units can be applied to this requirement.