# Bachelor of Science in Physics – Phys Associate Degree for Transfer 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.

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>First Semester</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HIST 470</td>
<td>The U.S. Constitution to 1896 ¹</td>
<td>3</td>
</tr>
<tr>
<td>or HIST 471</td>
<td>or The U.S. Constitution Since 1896</td>
<td></td>
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<tr>
<td>MATH 245</td>
<td>Elementary Differential Equations and Linear Algebra ²,³</td>
<td>3</td>
</tr>
<tr>
<td>or MATH 376</td>
<td>or Ordinary Differential Equations I</td>
<td></td>
</tr>
<tr>
<td>PHYS 320</td>
<td>Modern Physics I</td>
<td>5</td>
</tr>
<tr>
<td>&amp; PHYS 321</td>
<td>and Modern Physics Laboratory ⁴</td>
<td></td>
</tr>
<tr>
<td><strong>GE Area UD–B: Upper Division Physical and/or Life Sciences</strong> ⁵</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td><strong>Units</strong></td>
<td></td>
<td>14</td>
</tr>
<tr>
<td><strong>Second Semester</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CSC 309</td>
<td>Computer Programming for Scientists and Engineers ⁶</td>
<td>3</td>
</tr>
<tr>
<td>RRS 600/HIST 466</td>
<td>History of People of Color in the U.S. ⁷</td>
<td>3</td>
</tr>
<tr>
<td>or AIS 460</td>
<td>or Power and Politics in American Indian History</td>
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<tr>
<td>PHYS 360</td>
<td>Electricity and Magnetism I ⁸,⁹</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 370</td>
<td>Thermodynamics and Statistical Mechanics ⁸</td>
<td>3</td>
</tr>
<tr>
<td><strong>University Elective</strong></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td><strong>Units</strong></td>
<td></td>
<td>15</td>
</tr>
<tr>
<td><strong>Third Semester</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PHYS 430</td>
<td>Quantum Mechanics I ⁴</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 460</td>
<td>Electricity and Magnetism II ⁴</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 490</td>
<td>Physics Project Laboratory ⁴</td>
<td>2</td>
</tr>
<tr>
<td><strong>Major Elective – Take Two</strong></td>
<td></td>
<td>7</td>
</tr>
<tr>
<td><strong>Units</strong></td>
<td></td>
<td>15</td>
</tr>
<tr>
<td><strong>Fourth Semester</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PHYS 431</td>
<td>Quantum Mechanics II ⁸</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 457</td>
<td>Introduction to Analog Electronics ⁸</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 491GW</td>
<td>Advanced Laboratory II – GWAR ⁸</td>
<td>1</td>
</tr>
<tr>
<td>PHYS 695</td>
<td>Culminating Experience in Physics ⁹</td>
<td>1</td>
</tr>
<tr>
<td><strong>GE Area UD–B: Upper Division Physical and/or Life Sciences</strong></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>or University Elective if UD-B was already satisfied</td>
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<td></td>
</tr>
<tr>
<td><strong>University Elective</strong></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td><strong>Units</strong></td>
<td></td>
<td>16</td>
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<tr>
<td><strong>Total Units</strong></td>
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<td>60</td>
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</tbody>
</table>
1. HIST 470 and HIST 471 satisfy GE UD-C and US/CA Government.
2. Take PHYS 330 if MATH 245 complete.
3. A course in differential equations and linear algebra is required before taking PHYS 330 and PHYS 385. Students transferring in without an equivalent to MATH 245 must delay taking PHYS 330 and PHYS 385 until the following Fall semester, which will affect other elements of this sample advising plan. Overall time for degree completion will be extended. Students in this situation should consult with a department advisor for an alternate advising plan.
4. Take PHYS 385 if MATH 245 complete.
5. Students proficient in computer programming may substitute upper division units in astronomy, mathematics, or physics, subject to department chair’s approval. PHYS 325, offered in spring semesters, is a recommended substitute.
6. AIS 460 and RRS 600/HIST 466 also satisfy Upper Division GE: UD-D and US History.
7. PHYS 360, PHYS 370, PHYS 431, PHYS 457 and PHYS 695 offered spring semesters only.
8. PHYS 385 must be taken before PHYS 360.

To Do at SF State:

Enough total units to reach 120 minimum for graduation; 40 units minimum at the upper-division level; to include the following:

University-Wide Requirements: 9-15 Units
- American Institutions (0-6 units): If not met before transfer, refer to next bullet for advice.
- Upper-Division GE (9 units): Courses may satisfy the US History or US/CA Government requirements, and UD-C or UD-D at the same time, if approved for multiple areas.
- 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. 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 or equivalent not completed before transfer).
- Upper-Division Requirements (34 units)
- Upper-Division Electives (10 units): May be units in astronomy, physics, mathematics, or related sciences.

University Electives: 10 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.