Bachelor of Science in Physics: Concentration in Astrophysics

Undergraduate Programs in Physics and Astronomy

High school preparation for these programs should include two years of algebra, one year of geometry, one-half year of trigonometry, one year of chemistry, and one year of physics. Some experience in computer programming is valuable. All students, especially those who have not completed a substantial chemistry course in high school, are strongly urged to take CHEM 115 and CHEM 215–CHEM 216 in their first year of college.

It is suggested that students in these programs consult with their advisor before selecting courses to meet General Education requirements. Unnecessary repetition of elementary topics might be avoided by careful selection of courses. A plan of study prepared in consultation with a department advisor is a prerequisite to entry into upper division study. Students who are considering teaching physics at the secondary school level should see a credential advisor in the department before planning the major since specific courses. A competency assessment is required for admission to the credential program.

• A maximum of 6 units taken CR/NC may be counted toward any undergraduate degree.

• All prerequisites for upper division courses must be completed with a grade of C– or better. See course descriptions for prerequisite requirements.

Physics (B.S.): Concentration in Astrophysics — 71 units

Prerequisites (27 units)

MATH 226 Calculus I 4
MATH 227 Calculus II 4
MATH 228 Calculus III 4
MATH 245 Elementary Differential Equations and Linear Algebra 3
or MATH 376 Ordinary Differential Equations I
PHYS 220 General Physics with Calculus I 4
PHYS 222 General Physics with Calculus I Laboratory 4
PHYS 230 General Physics with Calculus II 4
PHYS 232 General Physics with Calculus II Laboratory 4
PHYS 240 General Physics with Calculus III 4
PHYS 242 General Physics with Calculus III Laboratory 4

Upper Division Requirements (44 units)

ASTR 300 Stars, Planets, and the Milky Way 3
ASTR 301 Observational Astronomy Laboratory 2
ASTR/PHYS 340GW The Big Bang - GWAR 3
ASTR 400 Stellar Astrophysics 3
ASTR 470 Observational Techniques in Astronomy 3
ASTR 498 Astronomy Research Literature 3
& PHYS 695 and Culminating Experience in Physics

or ASTR 697 Senior Project
CSC 309 Computer Programming for Scientists and Engineers 3
PHYS 320 Modern Physics I 3
PHYS 330 Analytical Mechanics I 3
PHYS 360 Electricity and Magnetism I 3
PHYS 370 Thermodynamics and Statistical Mechanics 3
PHYS 385 Introduction to Theoretical Physics I 3
PHYS 430 Quantum Mechanics I 3

Electives 1 6

1 Chosen from upper division courses in Physics or Astronomy with consent of an advisor. Three of the six units must be in a course(s) numbered 400–499. Up to one unit of a 600 level course in ASTR may count toward this requirement.

General Education Requirements

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Course Level</th>
<th>Units</th>
<th>Area Designation</th>
</tr>
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<tbody>
<tr>
<td>Oral Communication</td>
<td>LD</td>
<td>3</td>
<td>A1</td>
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<tr>
<td>Written English Communication I</td>
<td>LD</td>
<td>3</td>
<td>A2</td>
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<tr>
<td>Critical Thinking</td>
<td>LD</td>
<td>3</td>
<td>A3</td>
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<tr>
<td>Written English Communication II</td>
<td>LD</td>
<td>3</td>
<td>A4</td>
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<tr>
<td>Physical Science</td>
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<td>B1</td>
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<tr>
<td>Life Science</td>
<td>LD</td>
<td>3</td>
<td>B2</td>
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<tr>
<td>Lab Science</td>
<td>LD</td>
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<td>B3</td>
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<tr>
<td>Mathematics/Quantitative Reasoning</td>
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<td>LD</td>
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<td>C1</td>
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<td>Arts or Humanities</td>
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<td>C1 or C2</td>
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<tr>
<td>Humanities: Literature</td>
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<td>3</td>
<td>C3</td>
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<td>D1</td>
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<td>Social Sciences: US History</td>
<td>LD</td>
<td>3</td>
<td>D2</td>
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<tr>
<td>Social Sciences: US &amp; CA Government</td>
<td>LD</td>
<td>3</td>
<td>D3</td>
</tr>
<tr>
<td>Lifelong Learning and Self-Development (LLD)</td>
<td>LD or UD</td>
<td>3</td>
<td>E</td>
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<tr>
<td>Physical and/or Life Science</td>
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<td>3</td>
<td>UD-B</td>
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<td>3</td>
<td>UD-C</td>
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<tr>
<td>Social Sciences</td>
<td>UD</td>
<td>3</td>
<td>UD-D</td>
</tr>
</tbody>
</table>

SF State Studies

Courses certified as meeting the SF State Studies requirements may be upper or lower division in General Education (GE), in a major or minor, or an elective.

American Ethnic and Racial Minorities (AERM) | LD or UD | 3 |
Students

General Advising Information for Transfer Students

Students who have earned an ADT should seek advising in the major department in a “similar” major at SF State is available on the Roadmaps tab and displays:

A sample advising roadmap for students who have earned an ADT and continue in a “similar” major at SF State is available on the Roadmaps tab and displays:

• How many lower-division units required for the major have been completed upon entry based on award of a specific ADT;
• Which lower-division requirements are considered complete upon entry based on award of a specific ADT;
• How to complete the remaining 60 units for the degree in four semesters.

Students who have earned an ADT should seek advising in the major department during the first semester of attendance.

General Advising Information for Transfer Students

1. Before transfer, complete as many lower division requirements or electives for this major as possible.
course, with a focus on writing, reading and critical analytical skills for academic purposes, and developing skills in composing, revising, and the use of rhetorical strategies.

Waiting until after transfer to take a single course at SF State that meets both US and CA/local government requirements may be an appropriate option, particularly if transferring from outside of California.

**All students must meet the transfer eligibility requirements outlined below for admission. For more information, visit the Undergraduate Admissions section.**

- Complete 60 or more transferable semester units or 90 or more quarter units
- Earn a college grade point average of 2.00 or better in all transferable courses. Non-local area residents may be held to a higher GPA standard.
- Be in good standing at the last college or university attended
- Complete 30 semester units (45 quarter units) of general education, including four basic skills courses:
  a. One course in oral communication (same as CSU GE area A1)
  b. One course in written composition (same as CSU GE area A2)
  c. One course in critical thinking (same as CSU GE area A3)
  d. One course in mathematics or quantitative reasoning, with intermediate algebra as a prerequisite (same as CSU GE area B4)

- The four basic skills courses and a minimum of 60 transferable semester units (90 quarter units) must be completed by the spring semester prior to fall admission, or by the fall semester prior to spring admission. Earn a "C" or better grade in each basic skills course.