BA PHYSICS

Program Learning Objectives
1. Demonstrate a good understanding of both the theoretical concepts and mathematical techniques of the major fields of physics: classical mechanics, electromagnetism, thermodynamics, and quantum physics.
2. Work safely with modern laboratory equipment to carry out measurements and analyze data.
3. Use computers to perform numerical computations, to simulate physical phenomena, and to collect and analyze data in the laboratory.
4. Communicate effectively, both orally and in writing.
5. Move successfully into graduate school or a career in teaching or industry.

Degree Requirements and Curriculum
In addition to the program requirements listed on this page, students must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation (http://catalog.calpoly.edu/generalrequirementsbachelorsdegree/#generaleducationtext) section of this catalog, including:

• 60 units of upper division courses
• Graduation Writing Requirement (GWR)
• 2.0 GPA
• U.S. Cultural Pluralism (USCP)

Note: No major courses with a lab component may be selected as credit/no credit.

MAJOR COURSES
PHYS 141 General Physics IA 4
PHYS 132 General Physics II (B3 & B4) 1,2 4
PHYS 133 General Physics III 1 4
PHYS 206 Experimental Physics 1 4
or PHYS 202 Physics on the Computer 4
PHYS 211 Modern Physics I 4
PHYS 212 Modern Physics II 4
PHYS 301 Thermal Physics I 4
PHYS 302 Classical Mechanics I 4
PHYS 322 Vibration and Waves 3
PHYS 405 Quantum Mechanics I 4
PHYS 408 Electromagnetic Fields and Waves I 4
PHYS 461 Senior Project I 2
or PHYS 463 Senior Project - Laboratory Research I 2
MATH 141 Calculus I (B1) 2 4
MATH 142 Calculus II (B1) 2 4
MATH 143 Calculus III 4
MATH 241 Calculus IV 4
MATH 244 Linear Analysis I 4
MATH 304 Vector Analysis 4

Upper-division Electives
Select from the following: 23

Laboratory Electives

Select one from the following: 1

- ASTR 444 Observational Astronomy
- PHYS 323 Optics
- PHYS 340 Quantum Physics Laboratory I
- PHYS 341 Quantum Physics Laboratory II
- PHYS 357 Advanced Instrumentation in Experimental Physics
- PHYS 417 Nonlinear Dynamical Systems
- PHYS 422 Polymer Electronics Laboratory
- PHYS 423 Advanced Optics
- PHYS 452 Solid State Physics Laboratory

Technical Electives
Select 15 units from the following: 1

- Any 300-400 level courses with PHYS, ASTR, or GEOL prefix
- OR one of the following:
  - HIST 350 The Scientific Revolution, c. 1500-1800
  - PHIL 321 Philosophy of Science
  - PHIL 421 Philosophy of Space, Time and Matter
  - SCM 451 Ethics in the Sciences

Breadth Electives
Select 7 units from any 300-400 level course.

GENERAL EDUCATION (GE)
(See GE program requirements below.) 60

FREE ELECTIVES
Free Electives (CHEM 124 & CHEM 125 recommended) 28

Total units 180

1 Major courses with lab component may not be taken as CR/NC grading:
PHYS 132, PHYS 133, PHYS 206, PHYS 323, PHYS 340, PHYS 341, PHYS 342, PHYS 357, PHYS 417, PHYS 422, PHYS 423, PHYS 452, ASTR 444.
2 Required in Major; also satisfies GE.
3 Total combined elective credit in PHYS 400, PHYS 404, ASTR 400, ASTR 404, GEOL 400, and GEOL 404 limited to 8 units, with a maximum of 2 units per quarter.

General Education (GE) Requirements

• 72 units required, 12 of which are specified in Major and/or Support.
• See the complete GE course listing (http://catalog.calpoly.edu/generalrequirementsbachelorsdegree/#generaleducationtext).
• Minimum of 12 units required at the 300 level.

Area A
Communication
A1 Expository Writing 4
A2 Oral Communication 4
A3 Reasoning, Argumentation and Writing 4

Area B
Science and Mathematics
B1 Mathematics/Statistics (8 units in Major) 1 0
B2 Life Science 4
<table>
<thead>
<tr>
<th>Area</th>
<th>Content</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>B3</td>
<td>Physical Science (4 units in Major)</td>
<td>4</td>
</tr>
<tr>
<td>B4</td>
<td>One lab taken with either a B2 or B3 course</td>
<td>4</td>
</tr>
<tr>
<td>Area C</td>
<td>Arts and Humanities</td>
<td></td>
</tr>
<tr>
<td>C1</td>
<td>Literature</td>
<td>4</td>
</tr>
<tr>
<td>C2</td>
<td>Philosophy</td>
<td>4</td>
</tr>
<tr>
<td>C3</td>
<td>Fine/Performing Arts</td>
<td>4</td>
</tr>
<tr>
<td>C4</td>
<td>Upper-division elective</td>
<td>4</td>
</tr>
<tr>
<td>Area C elective</td>
<td>(Choose one course from C1-C5)</td>
<td>4</td>
</tr>
<tr>
<td>Area D/E</td>
<td>Society and the Individual</td>
<td></td>
</tr>
<tr>
<td>D1</td>
<td>The American Experience (Title 5, Section 40404 requirement)</td>
<td>4</td>
</tr>
<tr>
<td>D2</td>
<td>Political Economy</td>
<td>4</td>
</tr>
<tr>
<td>D3</td>
<td>Comparative Social Institutions</td>
<td>4</td>
</tr>
<tr>
<td>D4</td>
<td>Self Development (CSU Area E)</td>
<td>4</td>
</tr>
<tr>
<td>D5</td>
<td>Upper-division elective</td>
<td>4</td>
</tr>
<tr>
<td>Area F</td>
<td>Technology</td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>Upper-division elective</td>
<td>4</td>
</tr>
</tbody>
</table>

Total units: 60

1 Required in Major; also satisfies GE.