BA IN PHYSICS

Units required for Major: 65-67
Total units required for BA: 120

Program Description

The BA degree is recommended for students who are interested in teaching Physics in high school or who want a liberal arts education with an emphasis in Physics. Physics majors are encouraged to take additional mathematics and to develop skills in the use of computers.

Program Requirements

Required Lower Division Courses (37 Units)

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 1A</td>
<td>General Chemistry I</td>
<td>5</td>
</tr>
<tr>
<td>CHEM 1B</td>
<td>General Chemistry II</td>
<td>5</td>
</tr>
<tr>
<td>MATH 30</td>
<td>Calculus I</td>
<td>4</td>
</tr>
<tr>
<td>MATH 31</td>
<td>Calculus II</td>
<td>4</td>
</tr>
<tr>
<td>MATH 32</td>
<td>Calculus III</td>
<td>4</td>
</tr>
<tr>
<td>MATH 45</td>
<td>Differential Equations for Science and Engineering</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 11A</td>
<td>General Physics: Mechanics</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 11B</td>
<td>General Physics: Heat, Light, Sound, Modern Physics</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 11C</td>
<td>General Physics: Electricity and Magnetism</td>
<td>4</td>
</tr>
</tbody>
</table>

Required Upper Division Courses (20-22 Units)

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS 105</td>
<td>Mathematical Methods in Physics</td>
<td>3 -</td>
</tr>
<tr>
<td></td>
<td>or MATH 105A Advanced Mathematics for Science and Engineering</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 106</td>
<td>Introduction to Modern Physics</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 110</td>
<td>Classical Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 115</td>
<td>Electronics and Instrumentation</td>
<td>3 -</td>
</tr>
<tr>
<td></td>
<td>or PHYS 145 Optics</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 124</td>
<td>Thermodynamics and Statistical Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 135</td>
<td>Electricity And Magnetism</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 175</td>
<td>Advanced Physics Laboratory</td>
<td>2</td>
</tr>
</tbody>
</table>

Elective Upper Division Requirements (8 Units)

Select 8 units of Physics electives in consultation with a Physics advisor.

Physics Colloquium Attendance

Fulfill a minimum attendance requirement.

Total Units: 65-67

1. Course also satisfies General Education (GE)/Graduation Requirement.
2. See list below for a list of Department approved electives.
3. Majors must fulfill a minimum attendance requirement at Department Colloquia. Students should consult with their advisor (and/or Department Chair) during their mandatory advising appointments to find out the number of colloquia that are required to satisfy this requirement.

Elective List

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS 115</td>
<td>Electronics and Instrumentation</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 116</td>
<td>Advanced Electronics and Instrumentation</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 130</td>
<td>Acoustics</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 136</td>
<td>Electrodynamics of Waves, Radiation,and Materials</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 145</td>
<td>Optics</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 150</td>
<td>Quantum Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 151</td>
<td>Advanced Modern Physics</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 156</td>
<td>Classical and Statistical Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 162</td>
<td>Scientific Computing: Basic Methods</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 163</td>
<td>Scientific Computing: Modeling, Simulation, and Visualization</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 195</td>
<td>Teaching Internship</td>
<td>1 -</td>
</tr>
<tr>
<td>PHYS 196 Series</td>
<td>Laboratory Teaching Assistant</td>
<td>1 -</td>
</tr>
<tr>
<td>PHYS 199</td>
<td>Special Problems</td>
<td>1 -</td>
</tr>
<tr>
<td>ASTR 150</td>
<td>Dark Matter and Dark Energy</td>
<td>3</td>
</tr>
<tr>
<td>MATH 105B</td>
<td>Advanced Mathematics for Science and Engineering II</td>
<td>4</td>
</tr>
</tbody>
</table>

4. If not used to satisfy other requirement of the degree (Example: PHYS 115 or PHYS 145 are required for the Bachelor of Science. If both are taken, one will count as an elective).

General Education Requirements

<table>
<thead>
<tr>
<th>Area A: Basic Subjects (9 Units)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1 - Oral Communication</td>
</tr>
<tr>
<td>A2 - Written Communication</td>
</tr>
<tr>
<td>A3 - Critical Thinking</td>
</tr>
</tbody>
</table>

Area B: Physical Universe and Its Life Forms (6 Units)

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>B1 - Physical Science</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>B2 - Life Forms</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>B3 - Lab (Note: Lab experience to be taken with one of the following: B1, B2 or B5)</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>B4 - Math Concepts</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>B5 - Additional Course (Any B to reach 12 units) - Take upper-division course to complete Area &amp; upper division requirements.</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

Area C: Arts and Humanities (12 Units)

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1 - Arts</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>C2 - Humanities</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>C1/C2 - Area C Course</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>C1/C2 - Area C Course - Take upper-division course to complete Area &amp; upper division requirements.</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

Area D: The Individual and Society (9 Units)

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area D Course</td>
<td></td>
<td>3</td>
</tr>
</tbody>
</table>

Area D Course - Take upper-division course to complete Area & upper division requirements.
<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Graduation Requirements</strong> (required by CSU) (9 Units)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>American Institutions: U.S. History</td>
<td>3</td>
</tr>
<tr>
<td>A</td>
<td>American Institutions: U.S. Constitution &amp; CA Government</td>
<td>3</td>
</tr>
<tr>
<td>A</td>
<td>Writing Intensive (WI)</td>
<td>3</td>
</tr>
<tr>
<td><strong>Graduation Requirements</strong> (required by Sacramento State) (12 Units)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>English Composition II</td>
<td>3</td>
</tr>
<tr>
<td>E</td>
<td>Race and Ethnicity in American Society (RE)</td>
<td>3</td>
</tr>
<tr>
<td>E</td>
<td>Foreign Language Proficiency Requirement ²</td>
<td>6</td>
</tr>
</tbody>
</table>

¹ To help you complete your degree in a timely manner and not take more units than absolutely necessary, there are ways to use single courses to meet more than one requirement (overlap). For further information, please visit the General Education page (http://catalog.csus.edu/colleges/academic-affairs/general-education/).

Note: There is no way to list all possible overlaps so please consult with a professional advisor. The Academic Advising Center can be visited online (http://www.csus.edu/acad/), by phone (916) 278-1000, or email (advising@csus.edu).

² Required in Major; also satisfies GE.