Applied Physics, B.S.

Requirements

The Bachelor of Science with a major in applied physics requires a minimum of 120 s.h., including at least 59-87 s.h. of work for the major. Total credit required for the major depends on a student's choice of concentration. Students must maintain a g.p.a. of at least 2.00 in all courses for the major and in all UI courses for the major. They also must complete the College of Liberal Arts and Sciences GE CLAS Core.

The major in applied physics is intended primarily for students interested in a broad program of study in physics combined with a significant concentration of courses in a field that has immediate application to high-technology industry. The degree provides a foundation for a wide range of employment opportunities in high-technology industries, including research and development, product design and testing, sales, and quality control. It also is designed to include exposure to physics sufficient to allow students to continue with graduate studies in either physics or astronomy.

An essential component of each concentration is successful completion of a related one-semester internship or practicum experience in a research laboratory (an applied physics research report is required for the latter option). Well-prepared students will be able to complete the degree in four years. Students should work closely with their advisors on a graduation plan.

All applied physics students complete a common set of courses that includes calculus, linear algebra, physics, and an experiential learning course. They also complete the courses required for their chosen concentration. The department encourages students to take additional coursework; advisors can suggest electives that will enrich programs and help students prepare for graduate work.

Students who want to earn a double major in applied physics and astronomy must choose their coursework carefully; see "Double Major in Applied Physics and Astronomy" below.

Students who earn a B.S. in applied physics may not earn a B.A. or B.S. in physics.

The B.S. with a major in applied physics requires the following courses. Many upper-level physics courses have prerequisites; students should consult their advisors when choosing courses numbered 3000 or above.

Common Requirements

Students in all concentrations must successfully complete the following courses or their equivalents.

Mathematics

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH:1850 &amp; MATH:1860</td>
<td>Calculus I-II</td>
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Physics

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
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<tbody>
<tr>
<td>PHYS:1611- PHYS:1612</td>
<td>Introductory Physics I-II</td>
<td>8</td>
</tr>
<tr>
<td>PHYS:1701 &amp; PHYS:1702 &amp; PHYS:2703</td>
<td>Physics I-II - Physics III (strongly preferred)</td>
<td>12</td>
</tr>
<tr>
<td>PHYS:2704</td>
<td>Physics IV</td>
<td>4</td>
</tr>
<tr>
<td>PHYS:3710</td>
<td>Intermediate Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>PHYS:3741</td>
<td>Introduction to Quantum Mechanics I</td>
<td>3</td>
</tr>
<tr>
<td>PHYS:3811</td>
<td>Electricity and Magnetism I</td>
<td>3</td>
</tr>
</tbody>
</table>

Experiential Learning

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
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<tbody>
<tr>
<td>One of these:</td>
<td>A one-semester industrial internship (requires a research report)</td>
<td></td>
</tr>
<tr>
<td>One of these:</td>
<td>A one-semester practicum in a research laboratory (requires a research report)</td>
<td></td>
</tr>
</tbody>
</table>

Concentrations

Students select one of the four concentration areas below.

Computer Science Concentration

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS:3730</td>
<td>Statistical Physics</td>
<td>3</td>
</tr>
<tr>
<td>PHYS:3756</td>
<td>Intermediate Laboratory</td>
<td>3</td>
</tr>
<tr>
<td>PHYS:3812</td>
<td>Electricity and Magnetism II</td>
<td>3</td>
</tr>
<tr>
<td>PHYS:3850</td>
<td>Electronics</td>
<td>4</td>
</tr>
<tr>
<td>CS:1210</td>
<td>Computer Science I: Fundamentals</td>
<td>4</td>
</tr>
<tr>
<td>CS:2210</td>
<td>Discrete Structures</td>
<td>3</td>
</tr>
<tr>
<td>CS:2230</td>
<td>Computer Science II: Data Structures</td>
<td>4</td>
</tr>
</tbody>
</table>

Optics Concentration

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS:3730</td>
<td>Statistical Physics</td>
<td>3</td>
</tr>
<tr>
<td>PHYS:3756</td>
<td>Intermediate Laboratory</td>
<td>3</td>
</tr>
<tr>
<td>PHYS:3812</td>
<td>Electricity and Magnetism II</td>
<td>3</td>
</tr>
<tr>
<td>PHYS:3850</td>
<td>Electronics</td>
<td>4</td>
</tr>
<tr>
<td>PHYS:4720</td>
<td>Introductory Optics</td>
<td>3</td>
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</tbody>
</table>

All of these: 8
### Solid-State Electronics Concentration

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS:3730</td>
<td>Statistical Physics</td>
<td>3</td>
</tr>
<tr>
<td>PHYS:4728</td>
<td>Introductory Solid State Physics</td>
<td>3</td>
</tr>
<tr>
<td>ECE:2400</td>
<td>Linear Systems I</td>
<td>3</td>
</tr>
<tr>
<td>ECE:2410</td>
<td>Principles of Electronic Instrumentation</td>
<td>4</td>
</tr>
<tr>
<td>ECE:3320</td>
<td>Introduction to Digital Design</td>
<td>3</td>
</tr>
<tr>
<td>ECE:3410</td>
<td>Electronic Circuits</td>
<td>4</td>
</tr>
<tr>
<td>ENGR:1300</td>
<td>Introduction to Engineering Computing</td>
<td>3</td>
</tr>
<tr>
<td>ENGR:2120</td>
<td>Electrical Circuits</td>
<td>3</td>
</tr>
<tr>
<td>ENGR:2730</td>
<td>Computers in Engineering</td>
<td>3</td>
</tr>
<tr>
<td>One of these:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PHYS:3742</td>
<td>Introduction to Quantum Mechanics II</td>
<td>3</td>
</tr>
<tr>
<td>PHYS:3812</td>
<td>Electricity and Magnetism II</td>
<td>3</td>
</tr>
</tbody>
</table>

### Medical Physics Concentration

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS:3756</td>
<td>Intermediate Laboratory</td>
<td>3</td>
</tr>
<tr>
<td>PHYS:3850</td>
<td>Electronics</td>
<td>4</td>
</tr>
<tr>
<td>BIOL:1411-1412</td>
<td>Foundations of Biology - Diversity of Form and Function</td>
<td>8</td>
</tr>
<tr>
<td>CHEM:1110 &amp; CHEM:1120</td>
<td>Principles of Chemistry I-II</td>
<td>8</td>
</tr>
<tr>
<td>CHEM:2210 &amp; CHEM:2220</td>
<td>Organic Chemistry I-II</td>
<td>6</td>
</tr>
<tr>
<td>CHEM:2410</td>
<td>Organic Chemistry Laboratory</td>
<td>3</td>
</tr>
<tr>
<td>Two additional biology courses numbered 2000 or above</td>
<td></td>
<td></td>
</tr>
<tr>
<td>One of these:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIOS:4120</td>
<td>Introduction to Biostatistics</td>
<td>3</td>
</tr>
<tr>
<td>STAT:3510</td>
<td>Biostatistics</td>
<td>3</td>
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</tbody>
</table>

Undergraduate majors who plan to pursue graduate study are advised to go as far as they can beyond the minimum requirements listed above, including further work in mathematics. In planning this work, they should be guided by the College of Liberal Arts and Sciences maximum hours rule: Students earning a B.S. may apply a maximum of 56 s.h. earned in one department to the minimum 120 s.h. required for graduation, whether or not the coursework is accepted toward requirements for the major. Students who earn more than 56 s.h. from one department may use the additional semester hours to satisfy requirements for the major (if the department accepts them), and the grades they earn become part of their grade-point average, but they cannot apply the additional semester hours to the minimum 120 s.h. required for graduation.

### Double Major in Applied Physics and Astronomy

Students working toward a Bachelor of Science with a double major in applied physics and in astronomy must complete all requirements for both majors and must earn a minimum of 56 s.h. outside the Department of Physics and Astronomy in order to graduate. Students interested in earning a double major should consult with their advisors. See Requirements for a Bachelor’s Degree on the College of Liberal Arts and Sciences website.