PHYSICS MAJOR (B.A.)

https://ceps.unh.edu/physics/program/ba/physics-major

Description

This program provides an opportunity for a broad and liberal education, which in some cases may be sufficient for graduate work. This program can also be excellent preparation for middle and high school physics teachers, pre-med and pre-law students, and those wishing to pursue a technical career in industry. Because there are fewer required courses than for a B.S., you have time to pursue other academic interests. A judicious choice of electives may also prepare students for interdisciplinary programs that require proficiency in a specialized area of physics.

Requirements

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS 400</td>
<td>Freshman Seminar</td>
<td>1</td>
</tr>
<tr>
<td>PHYS 407</td>
<td>General Physics I</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 408</td>
<td>General Physics II</td>
<td>4</td>
</tr>
<tr>
<td>CS 410P</td>
<td>Introduction to Scientific Programming/Python</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 505</td>
<td>General Physics III</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 506</td>
<td>and General Physics III Laboratory</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 508</td>
<td>Thermodynamics and Statistical Mechanics</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 601</td>
<td>Computational Physics Recitation I</td>
<td>1</td>
</tr>
<tr>
<td>PHYS 602</td>
<td>Computational Physics Recitation II</td>
<td>1</td>
</tr>
<tr>
<td>PHYS 605</td>
<td>Experimental Physics I</td>
<td>5</td>
</tr>
<tr>
<td>PHYS 615</td>
<td>Classical Mechanics and Mathematical Physics I</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 616</td>
<td>Classical Mechanics and Mathematical Physics II</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 701</td>
<td>Quantum Mechanics I</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 703</td>
<td>Electricity and Magnetism I</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 705</td>
<td>Experimental Physics II</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 706 &amp; PHYS 708</td>
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<td>4-6</td>
</tr>
<tr>
<td>MATH 425</td>
<td>Calculus I</td>
<td>4</td>
</tr>
<tr>
<td>MATH 426</td>
<td>Calculus II</td>
<td>4</td>
</tr>
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<td>Select one of the following Options</td>
<td>8-12</td>
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</tr>
<tr>
<td>Option A:</td>
<td></td>
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<tr>
<td>MATH 527 &amp; MATH 528</td>
<td>Differential Equations with Linear Algebra and Multidimensional Calculus</td>
<td>4</td>
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<tr>
<td>Option B:</td>
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<td></td>
</tr>
<tr>
<td>MATH 525 &amp; MATH 526</td>
<td>Linearity I and Linearity II</td>
<td>4</td>
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</tbody>
</table>

Capstone: 2 A capstone experience is required of all physics majors during their senior year. The Physics Department encourages students to write a senior thesis (PHYS 799 Thesis) for their capstone experience. Other options include independent study research projects (PHYS 795 Independent Study or INCO 590 Student Research Experience) or a special project as part of senior lab (PHYS 705 Experimental Physics II). All capstone experiences must be approved by the undergraduate committee during the student’s penultimate semester.

Degree Plan

Suggested Curriculum for B.A. in Physics

In the following table, “other required courses” include Discovery courses, writing-intensive courses, language courses required for the B.A., and free-choice electives.

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PHYS 400</td>
<td>Freshman Seminar</td>
<td>1</td>
</tr>
<tr>
<td>PHYS 407</td>
<td>General Physics I</td>
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</tr>
<tr>
<td>MATH 425</td>
<td>Calculus I</td>
<td>4</td>
</tr>
<tr>
<td>Other Required Courses</td>
<td></td>
<td>8</td>
</tr>
<tr>
<td>Credits</td>
<td></td>
<td>17</td>
</tr>
<tr>
<td>Spring</td>
<td></td>
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</tr>
<tr>
<td>PHYS 408</td>
<td>General Physics II</td>
<td>4</td>
</tr>
<tr>
<td>MATH 426</td>
<td>Calculus II</td>
<td>4</td>
</tr>
<tr>
<td>ENGL 401</td>
<td>First-Year Writing</td>
<td>4</td>
</tr>
<tr>
<td>CS 410P &amp; IAM 550</td>
<td>Introduction to Scientific Programming/Python or Introduction to Engineering Computing</td>
<td>4</td>
</tr>
<tr>
<td>Credits</td>
<td></td>
<td>16</td>
</tr>
<tr>
<td>Second Year</td>
<td></td>
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</tr>
<tr>
<td>Fall</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PHYS 505 &amp; PHYS 506</td>
<td>General Physics III and General Physics III Laboratory</td>
<td>4</td>
</tr>
<tr>
<td>MATH 525 or MATH 527</td>
<td>Linearity I or Differential Equations with Linear Algebra</td>
<td>4-6</td>
</tr>
<tr>
<td>PHYS 601</td>
<td>Computational Physics Recitation I</td>
<td>1</td>
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<tr>
<td>Other Required Courses</td>
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<td>8</td>
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<tr>
<td>Credits</td>
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<td>17-19</td>
</tr>
<tr>
<td>Spring</td>
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</tr>
<tr>
<td>PHYS 615</td>
<td>Classical Mechanics and Mathematical Physics I</td>
<td>4</td>
</tr>
<tr>
<td>MATH 526 or MATH 528</td>
<td>Linearity II or Multidimensional Calculus</td>
<td>4-6</td>
</tr>
<tr>
<td>PHYS 602</td>
<td>Computational Physics Recitation II</td>
<td>1</td>
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<tr>
<td>Other Required Courses</td>
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<tr>
<td>Credits</td>
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<td>17-19</td>
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<tr>
<td>Third Year</td>
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<td>Fall</td>
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</tr>
<tr>
<td>PHYS 616</td>
<td>Classical Mechanics and Mathematical Physics II</td>
<td>4</td>
</tr>
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</table>

1 Note that no physics course can satisfy these requirement for a physics major. The rationale behind this is that a course in physics does not broaden the education of a physics major.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>PHYS 701</td>
<td>Quantum Mechanics I</td>
<td>4</td>
</tr>
<tr>
<td>Other Required Courses</td>
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<tr>
<td><strong>Credits</strong></td>
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**Spring**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
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<tbody>
<tr>
<td>PHYS 703</td>
<td>Electricity and Magnetism I</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 605</td>
<td>Experimental Physics I</td>
<td>5</td>
</tr>
<tr>
<td>Other Required Courses</td>
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**Fourth Year**

**Fall**

<table>
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<tr>
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<th>Course Title</th>
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<tbody>
<tr>
<td>PHYS 705</td>
<td>Experimental Physics II</td>
<td>4</td>
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<tr>
<td>PHYS 508</td>
<td>Thermodynamics and Statistical</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Mechanics</td>
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</tr>
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<td>Other Required Courses</td>
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</tr>
<tr>
<td>Capstone</td>
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<td></td>
</tr>
<tr>
<td><strong>Credits</strong></td>
<td><strong>16</strong></td>
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**Spring**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other Required Courses</td>
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</tr>
<tr>
<td>Capstone</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td><strong>Credits</strong></td>
<td><strong>16</strong></td>
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</table>

**Total Credits** 132-136

**Student Learning Outcomes**

- Students will master the fundamentals of mechanics, electricity and magnetism, quantum mechanics, and thermodynamics.
- Students will have a solid understanding of calculus and differential equations and be able to use mathematics to solve physics problems.
- Students will be proficient at taking measurements in a physics lab and analyzing measurements to draw valid conclusions.
- Students will be able to integrate competently the knowledge and skills acquired in the major and have adequate preparation to succeed in post-undergraduate studies or a professional career.
- Students develop and execute plans for post-graduation to establish their careers. Student will understand the variety of career paths and opportunities that are open to students who have majored in physics.
- Students will be able to present scientific ideas effectively in both written and oral form.