PHYSICS MAJOR (B.S.)

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

Description

The bachelor of science degree in physics prepares students for professional work as physicists, and is the first step toward graduate work in physics. It is also excellent preparation for graduate programs in medicine, law, or engineering, as well as for technical jobs in industry. The required courses are those typically necessary for admission to graduate study in physics or astronomy. The interdisciplinary options require fewer physics courses combined with a concentration in another area (chemistry or materials science). The astronomy option emphasizes courses that help prepare a student for advanced studies in astronomy.

Requirements

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>University Discovery requirements ¹</td>
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</tr>
<tr>
<td>Bachelor of Science requirements</td>
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<tr>
<td>Minimum physics requirements:</td>
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</tr>
<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>PHYS 505</td>
<td>General Physics III</td>
<td>4</td>
</tr>
<tr>
<td>&amp; PHYS 506</td>
<td>General Physics III Laboratory</td>
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</tr>
<tr>
<td>PHYS 508</td>
<td>Thermodynamics and Statistical Mechanics</td>
<td>4</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 702</td>
<td>Quantum Mechanics II</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 703</td>
<td>Electricity and Magnetism I</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 704</td>
<td>Electricity and Magnetism II</td>
<td>4</td>
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<tr>
<td>PHYS 705</td>
<td>Experimental Physics II</td>
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<td>Select two electives from the following:</td>
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<tr>
<td>PHYS 708</td>
<td>Optics</td>
<td></td>
</tr>
<tr>
<td>PHYS 710</td>
<td>Modern Astrophysics</td>
<td></td>
</tr>
<tr>
<td>PHYS 712</td>
<td>Space Plasma Physics</td>
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</tr>
<tr>
<td>PHYS 718</td>
<td>Condensed Matter Physics</td>
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</tr>
<tr>
<td>PHYS 720</td>
<td>Nuclear Physics</td>
<td></td>
</tr>
<tr>
<td>PHYS 764</td>
<td>General Relativity and Cosmology</td>
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<tr>
<td>MATH 747</td>
<td>Introduction to Nonlinear Dynamics and Chaos</td>
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<tr>
<td>MATH 753</td>
<td>Introduction to Numerical Methods I</td>
<td></td>
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<tr>
<td>Chemistry:</td>
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</tr>
<tr>
<td>CHEM 403</td>
<td>General Chemistry I</td>
<td>4</td>
</tr>
<tr>
<td>or CHEM 405</td>
<td>Chemical Principles for Engineers</td>
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<tr>
<td>Mathematics:</td>
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</tr>
<tr>
<td>MATH 425</td>
<td>Calculus I</td>
<td>8</td>
</tr>
<tr>
<td>&amp; MATH 426</td>
<td>and Calculus II</td>
<td></td>
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<tr>
<td>Select one of the following options: ²</td>
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<td>12</td>
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<tr>
<td>Option A:</td>
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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.
² The Department generally recommends MATH 645 Linear Algebra for Applications over MATH 545 Introduction to Linear Algebra for physics majors.
³ 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.

By the end of the spring semester of the sophomore year, a student must have a minimum grade of C in each 400- or 500-level course specifically required for the B.S. degree and an overall grade-point average of at least 2.33 in these courses in order to continue in the B.S. program.

Physics Electives

In the following table, “electives” include Discovery courses, writing-intensive courses, physics electives, and free-choice electives. Note that physics electives can only be taken in the junior or senior year because of prerequisites, and are in general offered every other year.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>MATH 525</td>
<td>Linearity I</td>
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<tr>
<td>&amp; MATH 526</td>
<td>and Linearity II</td>
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<tr>
<td>Option B:</td>
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<tr>
<td>MATH 528</td>
<td>Multidimensional Calculus</td>
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<tr>
<td>MATH 527</td>
<td>Differential Equations with Linear Algebra</td>
<td></td>
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<tr>
<td>MATH 545</td>
<td>Introduction to Linear Algebra</td>
<td></td>
</tr>
<tr>
<td>or MATH 645</td>
<td>Linear Algebra for Applications</td>
<td></td>
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<tr>
<td>Computer Programming:</td>
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<tr>
<td>CS 410P</td>
<td>Introduction to Scientific Programming/Python</td>
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<tr>
<td>or IAM 550</td>
<td>Introduction to Engineering Computing</td>
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<tr>
<td>Capstone: ³</td>
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<tr>
<td>PHYS 795</td>
<td>Independent Study</td>
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<tr>
<td>&amp; PHYS 799</td>
<td>and Thesis</td>
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<tr>
<td>or PHYS 798</td>
<td>Senior Project</td>
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Notes:

1. University Discovery requirements.
2. Bachelor of Science requirements.
3. Minimum physics requirements.
4. Option A:
5. Option B:
6. Select two electives from the following:
7. Chemistry:
8. Mathematics:
9. Select one of the following options:
10. Computer Programming:
11. Capstone:
12. Notes:
13. Notes:
### Suggested Curriculum for B.S. in Physics

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<thead>
<tr>
<th>Course</th>
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<td><strong>First Year</strong></td>
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<td>Freshman Seminar</td>
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<td>General Physics I</td>
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<td>MATH 425</td>
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<td>ENGL 401</td>
<td>First-Year Writing</td>
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<td>CHEM 403</td>
<td>General Chemistry I</td>
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<td>or CHEM 405</td>
<td>Chemical Principles for Engineers</td>
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<td>PHYS 408</td>
<td>General Physics II</td>
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<td>MATH 426</td>
<td>Calculus II</td>
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<td>CS 410P or IAM 550</td>
<td>Introduction to Scientific Programming/Python or Introduction to Engineering Computing</td>
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<td><strong>Second Year</strong></td>
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<td>Thermodynamics and Statistical Mechanics</td>
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<td>MATH 528</td>
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<td>or MATH 525</td>
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<td>Elective</td>
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<td><strong>Credits</strong></td>
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<td>PHYS 615</td>
<td>Classical Mechanics and Mathematical Physics I</td>
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<td><strong>Spring</strong></td>
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