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.

### Requirements

**Bachelor of Science requirements**

- Minimum physics requirements:
  - PHYS 400 Freshman Seminar
  - PHYS 407 General Physics I
  - PHYS 408 General Physics II
  - PHYS 505 General Physics III & PHYS 506 and General Physics III Laboratory
  - PHYS 508 Thermodynamics and Statistical Mechanics
  - PHYS 601 Computational Physics Recitation I
  - PHYS 602 Computational Physics Recitation II
  - PHYS 605 Experimental Physics I
  - PHYS 615 Classical Mechanics and Mathematical Physics I
  - PHYS 616 Classical Mechanics and Mathematical Physics II
  - PHYS 701 Quantum Mechanics I
  - PHYS 702 Quantum Mechanics II
  - PHYS 703 Electricity and Magnetism I
  - PHYS 704 Electricity and Magnetism II
  - PHYS 705 Experimental Physics II
  - Select two electives from the following: 8
    - PHYS 708 Optics
    - PHYS 710 Astrophysics I
    - PHYS 712 Space Plasma Physics
    - PHYS 718 Condensed Matter Physics
    - PHYS 720 Nuclear Physics
    - PHYS 764 General Relativity and Cosmology

- Select two electives from the following: 8
  - PHYS 708 Optics
  - PHYS 710 Astrophysics I
  - PHYS 712 Space Plasma Physics
  - PHYS 718 Condensed Matter Physics
  - PHYS 720 Nuclear Physics
  - PHYS 764 General Relativity and Cosmology

- **Chemistry:**
  - CHEM 403 General Chemistry I
  - or CHEM 405 Chemical Principles for Engineers

- **Mathematics:**
  - MATH 425 Calculus I and Calculus II
  - MATH 426 Calculus I

- **Computer Programming:**
  - CS 410P Introduction to Scientific Programming/Python
  - or UAM 550 Introduction to Engineering Computing

**Capstone:** 2-8

- PHYS 799 Independent Study and Thesis

**Suggested Curriculum for B.S. in Physics**

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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<tr>
<td>PHYS 708</td>
<td>Optics</td>
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<td>PHYS 710</td>
<td>Astrophysics I</td>
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<td>PHYS 712</td>
<td>Space Plasma Physics</td>
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<td>PHYS 718</td>
<td>Condensed Matter Physics</td>
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<td>PHYS 720</td>
<td>Nuclear Physics</td>
<td>4</td>
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<tr>
<td>PHYS 764</td>
<td>General Relativity and Cosmology</td>
<td>4</td>
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<tr>
<td>CHEM 403</td>
<td>General Chemistry I</td>
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<tr>
<td>or CHEM 405</td>
<td>Chemical Principles for Engineers</td>
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<tr>
<td>MATH 425</td>
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<tr>
<td>&amp; MATH 426</td>
<td>Calculus II</td>
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**Degree Plan**

- **Freshman Seminar:** Fall
- **General Physics I:** Fall
- **General Physics II:** Spring
- **Calculus I:** Fall
- **Calculus II:** Spring
- **First-Year Writing:** Fall
- **First-Year Writing:** Spring
- **Experimental Physics I:** Fall
- **Experimental Physics II:** Spring
- **Mathematics and Calculus:** Fall and Spring
- **Physics Electives:** Fall and Spring
- **Chemistry:** Fall and Spring
- **Computer Programming:** Fall
- **Capstone:** Fall and Spring
- **Senior Thesis:** Fall

**Total Credits:** 90-96

- **Notes:**
  1. Note that no physics course can satisfy this 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.
<table>
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<tr>
<th>Second Year Fall</th>
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<th>Credits</th>
<th>Third Year Fall</th>
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<th>Spring</th>
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<th>Spring</th>
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<td>PHYS 615</td>
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<td>PHYS 616</td>
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<td>PHYS 702</td>
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<td>PHYS 605</td>
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<td>Quantum Mechanics I</td>
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<td>Thermodynamics and Statistical Mechanics</td>
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<tr>
<td>Discovery Elective</td>
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**Capstone**

**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, differential equations, and linear algebra and be able to use mathematics to solve physics problems.
- Students will be able to solve physics problems using computational methods.
- Students will be proficient at taking measurements in a physics lab and analyzing measurements to draw valid conclusions.
- Students will be well prepared for graduate study in physics and related disciplines.
- Students will be well prepared for technical careers.
- Students will be able to present scientific ideas effectively in both written and oral form.