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 Thermodynamics and Statistical Mechanics
- PHYS 601 Computational Physics I
- PHYS 602 Computational Physics II
- PHYS 605 Experimental Physics I
- PHYS 615 Classical Mechanics and Mathematical Methods
- 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:

- 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 options:

- Option A:
  - MATH 526 Linear Algebra I
  - MATH 526 Linear Algebra II

- Option B:
  - MATH 508 Multidimensional Calculus
  - MATH 545 Introduction to Linear Algebra
  - MATH 645 Linear Algebra for Applications

Chemistry:

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

Mathematics:

- MATH 425 Calculus I
  - or MATH 426 Calculus II

Select one of the following options:

1. Option A:
   - MATH 525 Linear Algebra I
   - MATH 526 Linear Algebra II

2. Option B:
   - MATH 508 Multidimensional Calculus
   - MATH 545 Introduction to Linear Algebra
   - MATH 645 Linear Algebra for Applications

Computer Programming:

- CS 410P Introduction to Scientific Programming/Python
  - or CS 550 Introduction to Engineering Computing

Capstone:

- PHYS 795 Independent Study and Thesis
- PHYS 799 Senior Project

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>PHYS 708</td>
<td>Optics</td>
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<tr>
<td>PHYS 710</td>
<td>Astrophysics I</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 712</td>
<td>Space Plasma Physics</td>
<td>4</td>
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<tr>
<td>PHYS 718</td>
<td>Condensed Matter Physics</td>
<td>4</td>
</tr>
<tr>
<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>
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Degree Plan

Suggested Curriculum for B.S. in Physics

In this degree plan, "electives" include Discovery courses, Writing Intensive Courses, Physics electives, or electives required to meet 128 credit graduation requirement.

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>First Year</td>
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<tr>
<td>Fall</td>
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<tr>
<td>PHYS 400</td>
<td>Freshman Seminar</td>
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<td>PHYS 407</td>
<td>General Physics I</td>
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<td>MATH 425</td>
<td>Calculus I</td>
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<td>ENGL 401</td>
<td>First-Year Writing</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>
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<thead>
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<tbody>
<tr>
<td>17</td>
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Spring |

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<thead>
<tr>
<th>Course</th>
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<th>Credits</th>
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<tbody>
<tr>
<td>PHYS 408</td>
<td>General Physics II</td>
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<tr>
<td>MATH 426</td>
<td>Calculus II</td>
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<tr>
<th>Credits</th>
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<tbody>
<tr>
<td>4</td>
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</tbody>
</table>
CS 410P or IAM 550  Introduction to Scientific Programming/Python or Introduction to Engineering Computing  

Discovery Elective  4

**Second Year**

**Fall**

PHYS 505 & PHYS 506  General Physics III and General Physics III Laboratory  4

PHYS 508  Thermodynamics and Statistical Mechanics  4

MATH 528 or MATH 525  Multidimensional Calculus or Linearity I  0-6

PHYS 601  Computational Physics Recitation I  1

Discovery Elective  4

**Credits**  16

**Spring**

PHYS 615  Classical Mechanics and Mathematical Physics I  4

PHYS 605  Experimental Physics I  5

PHYS 602  Computational Physics Recitation II  1

Select one of the following two options:  8 or 6

(1) For students who took MATH 528:

MATH 527 & MATH 645  Differential Equations with Linear Algebra and Linear Algebra for Applications

(2) For students who took MATH 525:

MATH 526  Linearity II

**Credits**  18-16

**Third Year**

**Fall**

PHYS 616  Classical Mechanics and Mathematical Physics II  4

PHYS 701  Quantum Mechanics I  4

Discovery or Major Electives  8

**Credits**  16

**Spring**

PHYS 702  Quantum Mechanics II  4

PHYS 703  Electricity and Magnetism I  4

Discovery or Major Electives  8

**Credits**  16

**Fourth Year**

**Fall**

PHYS 704  Electricity and Magnetism II  4

PHYS 705  Experimental Physics II  4

Discovery or Major Elective  4

Capstone  4

**Credits**  16

**Spring**

Electives  12

**Total Credits**  128-132

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**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.