PHYSICS MAJOR

Students must also complete the Undergraduate Registration Requirement (https://catalogs.northwestern.edu/undergraduate/requirements-policies/undergraduate-registration-requirement/) and the degree requirements of their home school.

The physics major is designed to help students acquire a broad and varied background in physics and related fields; it provides an excellent intellectual foundation for many careers. The three basic steps toward completing the major are fulfilling prerequisites in introductory physics and calculus; taking a core sequence (common to all concentrations) of classical physics, modern physics, and mathematics; and completing a course concentration.

### Major Requirements (units vary, depending on math courses and concentration selected)

10–11 core courses (depending on math courses and concentration selected)

Core mathematics and mathematical tools courses listed below or equivalent courses approved by the department:  

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 230-1</td>
<td>Multivariable Differential Calculus</td>
</tr>
<tr>
<td>&amp; MATH 230-2</td>
<td>Multivariable Integral Calculus</td>
</tr>
<tr>
<td>PHYSICS 311-1</td>
<td>Mathematical Tools for the Physical Sciences</td>
</tr>
<tr>
<td>&amp; PHYSICS 311-2</td>
<td>Mathematical Tools for the Physical Sciences</td>
</tr>
<tr>
<td>or MATH 240-0</td>
<td>Linear Algebra</td>
</tr>
<tr>
<td>&amp; MATH 250-0</td>
<td>and Elementary Differential Equations</td>
</tr>
<tr>
<td>&amp; MATH 350-1</td>
<td>and Fourier Analysis and Boundary Value Problems</td>
</tr>
</tbody>
</table>

Core physics courses:

<table>
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<tr>
<th>Course</th>
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</thead>
<tbody>
<tr>
<td>PHYSICS 239-0</td>
<td>Foundations of Modern Physics</td>
</tr>
<tr>
<td>PHYSICS 330-1</td>
<td>Classical Mech</td>
</tr>
<tr>
<td>PHYSICS 332-0</td>
<td>Statistical Mechanics</td>
</tr>
<tr>
<td>PHYSICS 333-1</td>
<td>Advanced Electricity &amp; Magnetism</td>
</tr>
<tr>
<td>PHYSICS 339-1</td>
<td>Quantum Mechanics</td>
</tr>
</tbody>
</table>

1 lab course chosen from:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASTRON 321-0</td>
<td>Observational Astrophysics</td>
</tr>
<tr>
<td>PHYSICS 357-0</td>
<td>Optics Laboratory</td>
</tr>
</tbody>
</table>

5–6 courses in the chosen concentration (A course may not be counted toward more than one requirement.)

1 PHYSICS 312-0 Scalar and Vector Field Methods in Physics may be used in place of MATH 230-2 Multivariable Integral Calculus with department permission.

### Concentrations

#### Advanced Physics (6 units)

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYSICS 330-2</td>
<td>Classical Mechanics</td>
</tr>
<tr>
<td>PHYSICS 333-2</td>
<td>Advanced Electricity &amp; Magnetism</td>
</tr>
<tr>
<td>PHYSICS 339-2</td>
<td>Quantum Mechanics</td>
</tr>
</tbody>
</table>

1 lab course from:

<table>
<thead>
<tr>
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<tbody>
<tr>
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<td>Observational Astrophysics</td>
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<tr>
<td>PHYSICS 357-0</td>
<td>Optics Laboratory</td>
</tr>
<tr>
<td>PHYSICS 358-0</td>
<td>Nanolithography</td>
</tr>
<tr>
<td>PHYSICS 359-0</td>
<td>Electronics</td>
</tr>
<tr>
<td>PHYSICS 360-0</td>
<td>Advanced Physics Laboratory (may not also count toward the concentration)</td>
</tr>
</tbody>
</table>

2 other 300-level physics or astronomy courses other than:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYSICS 311-1</td>
<td>Mathematical Tools for the Physical Sciences</td>
</tr>
<tr>
<td>&amp; PHYSICS 311-2</td>
<td>and Mathematical Tools for the Physical Sciences</td>
</tr>
<tr>
<td>PHYSICS 312-0</td>
<td>Scalar and Vector Field Methods in Physics</td>
</tr>
<tr>
<td>PHYSICS 335-0</td>
<td>Physics of Magic</td>
</tr>
<tr>
<td>PHYSICS 398-0</td>
<td>Independent Thesis Research</td>
</tr>
<tr>
<td>PHYSICS 399-0</td>
<td>Independent Study</td>
</tr>
<tr>
<td>ASTRON 398-0</td>
<td>Honors Independent Study</td>
</tr>
<tr>
<td>ASTRON 399-0</td>
<td>Independent Study</td>
</tr>
</tbody>
</table>

#### Astronomy (6 units)

<table>
<thead>
<tr>
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<th>Title</th>
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<tbody>
<tr>
<td>PHYSICS 330-2</td>
<td>Classical Mechanics</td>
</tr>
<tr>
<td>PHYSICS 333-2</td>
<td>Advanced Electricity &amp; Magnetism</td>
</tr>
<tr>
<td>PHYSICS 339-2</td>
<td>Quantum Mechanics</td>
</tr>
</tbody>
</table>

or ASTRON 220-2 Introduction to Astrophysics II: Galactic Evolution and Cosmology

2 other 300-level astronomy classes other than ASTRON 398-0 or ASTRON 399-0

#### Flexible (5 units)

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMD_ENG 327-0</td>
<td>Magnetic Resonance Imaging</td>
</tr>
<tr>
<td>CHEM 307-0</td>
<td>Materials and Nanochemistry</td>
</tr>
<tr>
<td>ELEC_ENG 360-0</td>
<td>Introduction to Feedback Systems</td>
</tr>
<tr>
<td>ELEC_ENG 381-0</td>
<td>Electronic Properties of Materials</td>
</tr>
<tr>
<td>ES_APPM 322-0</td>
<td>Applied Dynamical Systems</td>
</tr>
<tr>
<td>MAT_SCI 315-0</td>
<td>Phase Equilibria &amp; Diffusion of Materials</td>
</tr>
</tbody>
</table>

3 300-level physics or astronomy lecture or lab courses

2 courses from the following:

<table>
<thead>
<tr>
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</tr>
</thead>
</table>
### Honors in Physics and Astronomy

Majors with strong records in their physics, astronomy, and mathematics courses and an interest in pursuing honors should notify the director of undergraduate studies in October of senior year. Eligible students must enroll for 2 units of PHYSICS 398-0 Independent Thesis Research or PHYSICS 399-0 Independent Study by the time of graduation. They participate in research culminating in a written report.

Students whose research reports and grades meet department criteria are recommended to the college for graduation with honors. For more information consult the director of undergraduate studies and see Honors in the Major (https://catalogs.northwestern.edu/undergraduate/arts-sciences/#academicoptionstext).