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 courses approved by the department; and completing a course concentration.

Course Prerequisites

MATH 220-1 & MATH 220-2
or MATH 218-1 & MATH 218-2 & MATH 218-3
PHYSICS 140-1 or PHYSICS 135-1 & PHYSICS 135-2 & PHYSICS 135-3 & PHYSICS 136-1 & PHYSICS 136-2 & PHYSICS 136-3 & PHYSICS 312-1 & PHYSICS 312-2 & PHYSICS 312-3 & PHYSICS 315-1 & PHYSICS 315-2

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

MATH 230-1 & MATH 230-2
PHYSICS 311-1 & PHYSICS 311-2 & PHYSICS 240-0 & PHYSICS 250-0 & PHYSICS 351-0

Core physics courses:

PHYSICS 239-0 & PHYSICS 330-1 & PHYSICS 332-0 & PHYSICS 333-1 & PHYSICS 339-1

1 lab course chosen from:

PHYSICS 398-0 & PHYSICS 399-0 & ASTRON 398-0 & ASTRON 399-0

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

10–11 core courses (depending on math concentration)

Core mathematics and mathematical tools courses listed below or equivalent courses approved by the department: ¹

MATH 230-1 & MATH 230-2
PHYSICS 311-1 & PHYSICS 311-2 & PHYSICS 240-0 & PHYSICS 250-0 & PHYSICS 351-0

Core physics courses:

PHYSICS 239-0 & PHYSICS 330-1 & PHYSICS 332-0 & PHYSICS 333-1 & PHYSICS 339-1

1 lab course chosen from:

PHYSICS 398-0 & PHYSICS 399-0 & ASTRON 398-0 & ASTRON 399-0

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)

Course Title
PHYSICS 330-2 Classical Mechanics
PHYSICS 333-2 Advanced Electricity & Magnetism
PHYSICS 339-2 Quantum Mechanics

1 lab course from:

ASTRON 321-0 Observational Astrophysics
PHYSICS 357-0 Nanolithography
PHYSICS 359-0 Electronics
PHYSICS 360-0 Advanced Physics Laboratory

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

PHYSICS 311-1 & PHYSICS 311-2 Mathematical Tools for the Physical Sciences
PHYSICS 312-0 Scalar and Vector Field Methods in Physics
PHYSICS 335-0 Physics of Magic
PHYSICS 398-0 Independent Thesis Research
PHYSICS 399-0 Independent Study
ASTRON 398-0 Honors Independent Study
ASTRON 399-0 Independent Study

Astronomy (6 units)

Course Title
PHYSICS 330-2 Classical Mechanics
PHYSICS 333-2 Advanced Electricity & Magnetism
PHYSICS 339-2 Quantum Mechanics

ASTRON 220-0 Introduction to Astrophysics

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

Flexible (5 units)

Course Title
3 300-level physics or astronomy lecture or lab courses
2 courses from the following:

BMD_ENG 327-0 Magnetic Resonance Imaging
CHEM 307-0 Materials and Nanochemistry
ELEC_ENG 360-0 Introduction to Feedback Systems
ELEC_ENG 381-0 Electronic Properties of Materials
ES_APPM 322-0 Applied Dynamical Systems
MAT_SCI 315-0 Phase Equilibria & Diffusion of Materials
MAT_SCI 331-0 Soft Materials
MAT_SCI 351-1 Introductory Physics of Materials
<table>
<thead>
<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>MAT_SCI 361-0</td>
<td>Crystallography &amp; Diffraction</td>
</tr>
<tr>
<td>MAT_SCI 376-0</td>
<td>Nanomaterials</td>
</tr>
<tr>
<td>MECH_ENG 346-0</td>
<td>Introduction to Tribology</td>
</tr>
<tr>
<td>MECH_ENG 385-0</td>
<td>Nanotechnology</td>
</tr>
<tr>
<td>Any 300-level physics or astronomy lecture or lab course that is not otherwise required.</td>
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May not count toward any of these requirements:

<table>
<thead>
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<tbody>
<tr>
<td>PHYSICS 311-1 &amp; PHYSICS 311-2</td>
<td>Mathematical Tools for the Physical Sciences and Mathematical Tools for the Physical Sciences</td>
</tr>
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**Honors in Physics and Astronomy**

Majors with strong records in their physics, astronomy, and mathematic 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 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).