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.

NOTE: This Catalog describes Weinberg College BA requirements that pertain to students who matriculated at Northwestern after spring quarter 2023. Refer to the Archives (https://catalogs.northwestern.edu/archives/) if you are following BA requirements described in the 2018-2019 through 2022-2023 editions.

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.

Course	Title
Prerequisites	
MATH 220-1 & MATH 220-2	Single-Variable Differential Calculus and Single-Variable Integral Calculus
or MATH 218-1 & MATH 218-2 & MATH 218-3	Single-Variable Calculus with Precalculus and Single-Variable Calculus with Precalculus and Single-Variable Calculus with Precalculus
PHYSICS 140-1 & PHYSICS 140-2 & PHYSICS 140-3 & PHYSICS 126-1 & PHYSICS 126-2 & PHYSICS 126-3	Fundamentals of Physics and Fundamentals of Physics and Fundamentals of Physics and Fundamentals of Physics Laboratory and Fundamentals of Physics Laboratory and Fundamentals of Physics Laboratory
or PHYSICS 135-1 & PHYSICS 135-2 & PHYSICS 135-3 & PHYSICS 136-1 & PHYSICS 136-2 & PHYSICS 136-3	General Physics and General Physics and General Physics and General Physics Laboratory and General Physics Laboratory and General Physics Laboratory
or PHYSICS 125-1 & PHYSICS 125-2 & PHYSICS 125-3 & PHYSICS 126-1 & PHYSICS 126-2 & PHYSICS 126-3	General Physics ISP and General Physics for ISP and General Physics for ISP and Fundamentals of Physics Laboratory and Fundamentals of Physics Laboratory and Fundamentals of Physics Laboratory
Placement decisions by the Math department may qualify some students for waivers or substitutions of certain mathematics courses. Courses designated as equivalent to required Math courses also substitute in place of these requirements.	
Major Requirements (units vary, depending on math courses and concentration selected)	
10–11 core courses (depending on math sequence)	
Core mathematics and mathematical tools courses listed below or equivalent courses approved by the department: [1]	
MATH 230-1 & MATH 230-2	Multivariable Differential Calculus and Multivariable Integral Calculus [1]
PHYSICS 311-1 & PHYSICS 311-2	Mathematical Tools for the Physical Sciences and Mathematical Tools for the Physical Sciences [2]
or MATH 240-0 & MATH 250-0 & MATH 351-0	Linear Algebra and Elementary Differential Equations and Fourier Analysis and Boundary Value Problems
Core physics courses:	
PHYSICS 239-0	Foundations of Modern Physics
PHYSICS 330-1	Classical Mech
PHYSICS 332-0	Statistical Mechanics
PHYSICS 333-1	Advanced Electricity & Magnetism
PHYSICS 339-1	Quantum Mechanics
1 lab course chosen from:	
ASTRON 321-0	Observational Astrophysics
PHYSICS 357-0	Optics Laboratory
PHYSICS 359-0	Electronics
PHYSICS 360-0	Advanced Physics Laboratory (may not also count toward the concentration)
5–6 courses in the chosen concentration (A course may not be counted toward more than one requirement.)	
Advanced Physics (p. 1)	
Astronomy (p. 1)	
Flexible (p. 2)	

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.

2 PHYSICS 311-1 & PHYSICS 311-2 content is equivalent to some content of MENU sequence. Students should complete one of these two full sequences; switching from one to the other is discouraged due to the duplication.

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	Optics Laboratory
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 and Mathematical Tools for the Physical Sciences
PHYSICS 312-0	Scalar and Vector Field Methods in Physics
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 220-1	Introduction to Astrophysics I: Life Cycle of Stars and Planets
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)

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	Supramolecular Design of Materials and Nanostructures
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
MAT_SCI 351-2	Introductory Physics of Materials
MAT_SCI 361-0	Crystallography & Diffraction
MAT_SCI 376-0	Nanomaterials
MECH_ENG 346-0	Introduction to Tribology
Any 300-level physics or astronomy lecture or lab course that is not otherwise required	
Other 300- and 400 level physics-related courses beyond the list above may also qualify as electives; check with the Director of Undergraduate Studies.	
May not count toward any of these requirements:	
PHYSICS 311-1 & PHYSICS 311-2	Mathematical Tools for the Physical Sciences and Mathematical Tools for the Physical Sciences
PHYSICS 312-0	Scalar and Vector Field Methods in Physics
PHYSICS 398-0	Independent Thesis Research
PHYSICS 399-0	Independent Study
ASTRON 398-0	Honors Independent Study
ASTRON 399-0	Independent Study

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 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).