

# PHYSICS MAJOR

## Department Advanced Placement Policy

Students who scored 4 or 5 on the AP Physics C: Mechanics exam may receive advanced standing in the Physics curriculum. Contact the department chair to discuss this option.

## Requirements

The requirements for a major in physics are the following:

### Code Title

#### Required Math courses:

|          |   |
|----------|---|
| MATH 135 | Calculus 1  |
| MATH 136 | Calculus 2  |
| MATH 241 | Multivariable Calculus (or the equivalent) <sup>1</sup> |

#### Required Physics courses:

|                     |  |
|---------------------|--|
| PHYS 115 & PHYS 116 | Introductory Physics 1: Mechanics, Fluids and Waves and Introductory Physics 2: Electromagnetism, Optics and Modern Physics <sup>2,3</sup> |
| PHYS 221            | Mathematical Methods and Scientific Computing in Physics <sup>1,4</sup>  |
| PHYS 223            | Modern Physics   |
| PHYS 225            | Modern Physics Lab   |
| PHYS 342            | Classical Mechanics  |
| PHYS 344            | Thermal Physics  |
| PHYS 351            | Electromagnetic Theory   |
| PHYS 353            | Quantum Mechanics  |

**Three elective courses: at least on lab-based physics elective (200 level or above), at least one lecture-based elective (200 level or above), and up to one course from outside the physics department (CHEM 181, CSCI 131, or any chair-approved course at the 200 level or above).**

|          |                                |
|----------|--------------------------------|
| PHYS 255 | Quantum Computing              |
| PHYS 275 | Intermediate Topics in Physics |
| PHYS 355 | Introduction To Astrophysics   |

See other course offerings in the schedule of classes.<sup>5</sup>

- <sup>1</sup> MATH 241 Multivariable Calculus and PHYS 221 Mathematical Methods and Scientific Computing in Physics are prerequisites for most 300 level physics courses.
- <sup>2</sup> PHYS 115 Introductory Physics 1: Mechanics, Fluids and Waves and PHYS 116 Introductory Physics 2: Electromagnetism, Optics and Modern Physics are prerequisites for all 200 level physics courses.
- <sup>3</sup> A minimum grade of C in PHYS 115 Introductory Physics 1: Mechanics, Fluids and Waves and PHYS 116 Introductory Physics 2: Electromagnetism, Optics and Modern Physics is required to continue in the major.
- <sup>4</sup> Physics majors, who are also Mathematics majors, can take PHYS 221 Mathematical Methods and Scientific Computing in Physics or CSCI 131 Techniques of Programming.
- <sup>5</sup> Experimental Optics in fall 2024 and Experimental Electronics offered in spring 2025 will count for the electives.

Students may take PHYS 461 Independent Study under faculty guidance to pursue topics of interest that fall outside the regularly offered courses. Programs of supervised research in theoretical or experimental physics (PHYS 471 Undergraduate Research, PHYS 472 Undergraduate Research)

are available for qualified physics majors. In addition, summer research positions with a stipend are usually available, on a competitive basis.

**Notes:** Three special academic programs may be of interest to Physics majors.

1. Two engineering programs, one held jointly between Holy Cross and Columbia University, the other between Holy Cross and WPI, provide the opportunity to combine the study of physics with training in engineering.
2. The Teacher Education Program leads to state licensure as a secondary school teacher of physics.

Students interested in one of these programs should consult early in their career with the department chair and either the engineering programs advisor or the director of the Teacher Education Program.