

The Department of Physics

Physics Major (BS)

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About

Physics is the human endeavor to understand the nature of matter, energy, and their governing interactions from the scale of subatomic particles to that of the cosmos. Through the interplay of theoretical effort and experimentation, physics strives to discover the mathematical laws of nature. As such, it both forms a foundation for a liberal arts education and provides a framework to address key challenges in our ever-changing technical world.

The Department of Physics at Villanova University is a nurturing, supportive, and inclusive academic community that strives to reflect the values of the University. We undertake our mission to educate undergraduate students in a broad range of experimental, theoretical, and computational methods through classroom and laboratory experiences. Our students address fundamental questions of nature through meaningful participation in faculty-led research that connects them with physicists around the world. The critical thinking and problem-solving skills learned by our students enable them to engage the diverse world beyond Villanova, whether they continue in the field of physics or choose to apply their educational experience to the challenges of another field.

Required Major Courses (B.S.) (69 credits)

The BS program consists of a rigorous and focused curriculum that provides a deep background in fundamental physics. The BS is excellent preparation for the student who aspires to graduate studies in Physics, but also provides comprehensive training in problem solving and critical thinking that are applicable to a wide range of career paths.

| Course | Title | Credits |
|---------------|--------------------------------|----------------|
| PHY 2420 | Matter and Interactions I | 3 |
| PHY 2421 | Lab: Matter and Interactions I | 1 |
| PHY 2422 | Matter and Interactions II | 3 |
| PHY 2423 | Lab:Matter and Interactions II | 1 |
| PHY 2601 | Computational Phy Lab I | 2 |
| PHY 2603 | Computational Phy Lab II | 2 |
| MAT 1500 | Calculus I | 4 |
| MAT 1505 | Calculus II | 4 |
| MAT 2500 | Calculus III | 4 |
| MAT 2705 | Diff Equation with Linear Alg | 4 |
| PHY 3200 | Thermo, Optics and Waves | 3 |
| PHY 3400 | Modern Physics | 3 |
| PHY 3310 | Electronics | 3 |
| PHY 3311 | Electronics Lab | 1 |
| PHY 4000 | Elec & Magnetism I | 3 |
| PHY 4100 | Mechanics I | 3 |
| PHY 4200 | Mathematical Physics I | 3 |
| PHY 4801 | Experimental Physics I | 2 |
| PHY 4803 | Experimental Physics II | 2 |
| PHY 5100 | Quantum Mechanics | 3 |
| PHY 5200 | Thermo/Statistical Mech | 3 |
| PHY 5801 | Research Experience I | 3 |
| PHY 5803 | Research Experience II | 3 |
| | PHY Electives for B.S. | 6 |

Core Curriculum Requirements (33 credits)

Physics BS Majors meet the following core requirements in the major and therefore are omitted from the summary below:

- Core Math (3 cr)
- Natural Science (8 cr)

| Course | Title | Credits |
|---------------|-------------------------------------------|----------------|
| ACS 1000 | Ancients | 3 |
| ACS 1001 | Moderns | 3 |
| THL 1000 | Faith, Reason, and Culture | 3 |
| PHI 1000 | Knowledge, Reality, Self | 3 |
| ETH 2050 | The Good Life:Eth & Cont Prob | 3 |
| | Literature and Writing Seminar (1 course) | 3 |
| | History (1 course) | 3 |
| | Social Sciences (2 courses) | 6 |
| | Fine Arts (1 course) | 3 |
| | Upper-Level Theology (1 course) | 3 |
| | Language Requirement | |
| | Diversity Requirement (2 courses) | |

Free Elective Requirement (21 credits)

Students with a Physics BS primary major have twenty-one (21) required free elective credits.

Degree Credit Summary

- **Major Credits:** 69 credits
- **Core Credits:** 33 credits
- **Free Electives Credits:** 21 credits
- **Total Required Credits:** 123 Credits

Note: The above credit totals are based on the minimum number of required credits in each degree area. The minimum number of required credits in each area listed above must be met. Credits taken beyond the required minimum for one area may not be applied to another area.

SECONDARY MAJOR

Students who declare Physics BS as a **secondary major** must complete the Required Major Courses to achieve this major. Students are able to count any eligible course taken in their primary major, the core curriculum, minors, concentrations, or free electives toward these requirements.