

PHYSICS, BACHELOR OF ARTS - PHYS

Program Description

The program in physics allows students to investigate the microscopic and the macroscopic through courses covering topics such as astronomy, nuclear physics, classical mechanics, modern physics, and quantum mechanics.

The B.A. in Physics is highly flexible, making it possible to combine studies in physics with other programs, thereby supporting careers in biophysics, computational modeling, economic modeling, history of science, medicine, philosophy of science, physical chemistry and teaching high school science.

For those interested in a career in aerospace, structural civil, electrical, or mechanical engineering, the degrees offered in Physics, both B.A. and B.S., nicely complement the Five-Year Dual Degree Program in Engineering with the University of Notre Dame.

Major Requirements (38-42 Hours)

| Code | Title | Credits |
|--|---|--------------|
| Required | | |
| PHYS 121 | General Physics I: Mechanics and Waves | 4 |
| PHYS 122 | General Physics II: Temperature, Electricity, and Light | 4 |
| PHYS 253 | General Physics III: Modern Physics | 3 |
| PHYS 495 | Senior Seminar | 1 |
| Select two of the following: | | 2 |
| PHYS 272L | Computational Physics Laboratory | |
| PHYS 282L | Modern Experimental Laboratory | |
| PHYS 292L | Wave Mechanics Laboratory | |
| Select three of the following: | | 9 |
| PHYS 323 | Classical Mechanics | |
| PHYS 343 | Thermodynamics | |
| PHYS 424 | Quantum Mechanics | |
| PHYS 444 | Electricity and Magnetism | |
| Select one additional 200+ level PHYS course | | 3 |
| Required Supporting Courses | | |
| Select one of the following: | | 4-8 |
| MATH 131 & MATH 132 | Calculus I and Calculus II | |
| MATH 133 | Theory and Application of Calculus | |
| MATH 231 | Calculus III | 4 |
| MATH 326 | Linear Algebra and Differential Equations | 4 |
| Total Credits | | 38-42 |

Senior Comprehensive

The Senior Comprehensive requirement in Physics is fulfilled by successfully completing two presentations, one in a poster format and one 15 minute oral presentation. Both are given in the second semester of the senior year and include a question and answer period with faculty. The topic of the presentation may be based on experimental laboratory research performed at Saint Mary's or at another institution, or literature research on an approved topic. Emphasis is placed on explaining the

physics of the research. An abstract of the topic is also required prior to the oral presentation.

Advanced Writing Proficiency

Each student writes a formal paper consisting of a technical discussion of the relevant physical principles, mathematics and methods related to her oral comprehensive presentation. These are normally submitted during the first semester of the senior year.

Student Learning Outcomes

Upon graduation, students will be able to:

- **create** a conceptual framework for modeling a system using laws of nature, physical principles, and other practical constraints.
- **produce** concise solutions to physical problems.
- **apply** knowledge of physics and mathematics to real world situations.
- **demonstrate** essential research skills including: practicing laboratory safety and performing error analysis.
- critically **evaluate** scientific literature.
- effectively **communicate** scientific results.