Physics majors enjoy discovering how things happen and speculating about why things happen. They learn to approach new problems confidently—to identify general features of these problems, apply appropriate methods to their solutions, and communicate the consequences of such solutions effectively. Many of our students may not become professional physicists, but they will be able to apply their problem-solving skills in any career.

The physics major at Bowdoin includes a rigorous introduction to the mathematics and physics common to all subfields of physics within the framework of a strong liberal arts education. Students should include upper-level courses in the humanities as well as upper-level courses in mathematics and physics in their studies. A strong preparation for advanced work, coupled with general intellectual growth and good scholarship, is our goal.

In addition to a major and minor in physics, Bowdoin offers an interdisciplinary major in geology and physics, an interdisciplinary major in chemical physics, and engineering programs in partnership with other schools. The department also offers a range of astronomy courses.

The physics program is academically challenging but also flexible— geared toward the student’s own scholarly interests and professional goals. Students who intend to do graduate work in physics or a related field should complete an honors project. Students with an interest in interdisciplinary areas, such as geophysics, biophysics, or oceanography, will choose appropriate courses in related departments. For a career in industrial management, some courses in economics and government should be included. A path toward secondary school teaching requires a broad base in science courses, as well as the necessary courses for teacher certification.

One of the greatest benefits of majoring in physics (or any science for that matter) at a small college like Bowdoin is the opportunity to do serious research that would only be available to graduate students at a large university.

**Physics Major & Minor**

The physics major consists of ten courses, including Introductory Physics I and II, Electric Fields and Circuits, Statistical Physics, Differential Calculus, and Integral Calculus. The remaining courses may be chosen among many mid- and upper-level courses in the department, and may include one additional approved math class. Students interested in interdisciplinary work may, with permission, substitute courses from other departments.

The physics minor consists of four courses numbered 103 or higher, one of which must be Introductory Physics II.

**Geology and Physics Major**

This interdisciplinary major combines courses from the physics and astronomy, geology, chemistry, and mathematics departments. The major requires four core geology courses: Introduction to Physical Geology, Mineralogy, Structural Geology, and Geophysics; Introductory Physics I and II, and Electric Fields and Circuits, and either Physical Oceanography or Methods of Theoretical Physics; Differential Calculus and Integral Calculus; and one introductory chemistry course; as well as three additional courses in geology and/or physics at the 200-level or above.

**Chemical Physics Major**

The interdisciplinary major in chemical physics combines at least 12 courses from the physics and astronomy, chemistry, and mathematics departments. Requirements include: Introductory Physics I and II, Electric Fields and Circuits, and Statistical Physics; General Chemistry and
Independent Study and Honors Projects

Recent independent study projects by majors in the department have included:

- Black Hole-Neutron Star Binaries in General Relativity: Effects of Black Hole Rotation
- Phonon Propagation in GaN
- A Chandra Study of Abell 85
- A Matrix Model Approach to the Calculation of Wilson Loops in SU(2) Gauge Theory
- Biases in Inferred Inter-Annual Variability of Atmospheric CO₂ due to Selective Sampling of Transport Models
- Numerical Models of Black Hole-Neutron Star Binaries
- The Quasi-Equilibrium Approximation for Binary Inspiral: Analytical and Numerical Model Calculations in Scalar Gravity
- Inferring Temperature Records from Phenology Data by Means of Time Series Analysis

Honors Projects

To graduate with honors in physics, a student is expected to complete: Introductory Physics I and II, Electric Fields and Circuits, Statistical Physics, Methods of Theoretical Physics, Introductory Quantum Mechanics; Differential Calculus, Integral Calculus, and Multivariate Calculus; four more approved courses, one of which may be a math course above 181; and a physics honors project. Project work may focus on semiconductor physics, microfabrication, superconductivity and superfluidity, general relativity, nuclear physics, particle physics, or another topic approved by members of the department. Work done on these topics normally serves as the basis for an honors paper as well as an oral presentation to students, faculty, and a few invited guests from the area who have some background in physics.

Faculty

Mark O. Battle, associate professor of physics, B.S. (Tufts), B.M. (New England Conservatory), M.A., Ph.D. (Rochester), specializes in how carbon and other compounds move through the environment from one reservoir to another.

Thomas Baumgarte, associate professor of physics, Diplom, Ph.D. (Ludwig-Maximilians-Universität, Munich), specializes in the electronic conduction of confined systems.

Madeleine E. Msall, associate professor of physics, B.A. (Oberlin), M.A., Ph.D. (Illinois-Urbana-Champaign), an experimental physicist, specializes in research on the low-temperature thermal properties of semiconductors and insulators.


Dale A. Syphers, professor of physics, B.S., M.Sc. (Massachusetts), Ph.D. (Brown), an experimental condensed-matter physicist, specializes in the electronic conduction of confined systems.

Karen Topp, lecturer in physics, B.Sc. (Queen’s University, Kingston, Ontario), Ph.D. (Cornell), specializes in experimental solid-state physics and ultrasonic research.

After Bowdoin

Recent graduate school choices for Bowdoin’s physics majors have included Caltech, Brown, Berkeley, Boston University, Columbia, Tufts, Dartmouth, Princeton, and the universities of Illinois, North Carolina, and Pennsylvania. Bowdoin physics graduates are on the faculty of other colleges and universities, including Princeton, Rensselaer Polytechnic Institute, the universities of Chicago and Maine, and the U.S. Naval Academy, as well as a large number of private and public secondary schools.

Other graduates are currently working as research assistants and researchers in physics, astronomy, oceanography, and renewable energy, as biologists, physicians, dentists, computer engineers, electrical engineers, mechanical engineers, system engineers, financial analysts, investment bankers, and lawyers.

For more information, visit:
http://academic.bowdoin.edu/physics/

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For more information about Bowdoin, please write or call:
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In its employment and admissions practices Bowdoin is in conformity with all applicable federal and state statutes and regulations. It does not discriminate on the basis of age, race, color, sex, sexual orientation, marital status, religion, creed, ancestry, national or ethnic origin, or physical or mental handicap.

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