

PHYSICS and OPTICS

CAREER OPPORTUNITIES

Physics

Students with a degree in physics can work in a surprisingly wide range of fields. The latest statistics from the American Institute of Physics has the following breakdown

- 28% computer software
- 19% management
- 17% engineering
- 12% education
- 10% research/lab technician
- 9% service or non-technical
- 5% military

Students with a background in physics can find careers in

- Operational planning
- Product design
- Software development
- Consulting
- Programming
- Marketing
- Teaching
- Modeling/Simulation

Physics students have ample opportunities to pursue research and internships both within the department and with local industries.

Optics

Imagine a future in which all information travels the Internet cheaply and nearly instantaneously, supercomputers that solve everyday problems fit in the palm of your hand, smart cars minimize pollution and prevent accidents before they occur, and at-home sensors track your health and prevent disease. These are just a few of the many technologies made possible by optics. And optics is not just limited to those students who are technically inclined. For example, businesses of the future will need optics-savvy managers and executives who are able to anticipate future technologies and use them to their company's advantage. Career opportunities in optics are highly rewarding, unusually diverse, and virtually unlimited.

Students with a background in optics find careers in

- Information technology & telecommunications
- Health care & life sciences
- Optical sensing, lighting and energy
- Manufacturing
- National defense
- Optics research and education

Optics students at Albright have ample opportunities for internships while in school and are well positioned to move ahead as leaders in the information age.

PHYSICS & OPTICS



The Physics & Optics Department at Albright College is a small dynamic department that emphasizes close interaction between students and faculty. The low student-to-faculty ratio means that students are provided with very personal attention to pursue their interests and achieve their career goals. The advanced equipment in our state-of-the-art laboratories is available to all students for use in coursework and undergraduate research.

The Academic Program

The Physics & Optics Department offers three paths (tracks) that lead to a degree in physics: general physics, teacher certification and optics. The optics track, which is substantially different from the first two tracks, is described below.

Physics

Students who wish to work in industry or go to graduate school follow the traditional physics track, which includes 10 courses in physics, four courses in mathematics and the general studies requirements. Required upper-level physics courses include classical mechanics, electromagnetism, quantum mechanics, electronics and a senior capstone laboratory. With advice from faculty, students create a course of study to match their career goals.

Students who are interested in becoming high school physics teachers follow the teacher certification track. This program prepares students to pass the PRAXIS test required to be certified in Pennsylvania. In addition to their course work in the Physics Department, students work closely with the Education Department to complete the requirements for certification.

Optics

Optics Defined: Optics is the field of science and engineering that involves the generation, propagation and detection of light, especially the interaction of light with materials and the development of technologies that use light.

Optics, the science of light and its applications, plays an essential role in nearly every area of society, from telecommunications and manufacturing to music, medicine and art. Ideas inspired by the study of light continue to make important contributions to the social sciences and humanities. Thus optics is unique among the sciences in its ability to form connections between diverse subjects and to provide a versatile, broad-based education.

Optics Track: The versatility of optics fits well with the multidisciplinary, liberal arts emphasis of Albright College, where students are encouraged to combine majors to suit their intellectual interests. Students at Albright may easily combine optics with physics, biology, chemistry, computer science, digital media or mathematics. Other combinations may include business, education and art. Opportunities for teacher certification are also available.

Research Opportunities

Students in the department participate every year in independent research experiences with the department faculty, either during the academic year or through Albright's collaborative summer research program.

Recent projects include one by physics/digital media major Adam Forrer '05, who worked with Professor Devon Mason on "Applications of Computer Animation in Physics Education." Combining their programming and design skills, they developed computer animations based on three physics problems: relativity; classical, or Newtonian mechanics; and projectile motion and collisions. "These concepts are much easier to understand when you can visualize them," said Forrer.

Physics major Darren Stoltzfus '06 worked with Professor Brian Buerke on a collaborative project called "Optical Symbol Recognition Using Holography." The pair tested the ability of holograms to recognize smaller, simple objects such as letters. "Getting to work one-on-one with faculty is a great experience. It's always good to get to know the professors better. You learn a lot that way," said Stoltzfus.

Honors Program

Students who meet the academic qualifications may also participate in the Honors Program in physics and optics. The program includes freshman honors courses, honors modules and courses for sophomore and junior students, as well as independent research leading to departmental distinction and college honors for seniors.

Facilities

The optics program has a \$130,000 state-of-the-art advanced optics lab in Merner-Pfeiffer Hall of Science. The laboratory houses a fully equipped darkroom, optical tables, an ultrafast pulsed laser system, a variety of lasers (such as diode and helium-neon), several types of photodetectors, spectrometers, laser pulse shaping & measurement equipment, fiber optic equipment and a substantial amount of support equipment.

The laboratory anchors the optics program and introduces students to such advanced topics as holography, DWDM fiber optic communication, ultrafast lasers, remote sensing & imaging, atom cooling & trapping, and optical tweezers for biological applications, among others. The lab provides ample opportunity for collaborative research between students and faculty.

Faculty

Brian J. Buerke, Ph.D. - assistant professor of physics; B.S., Villanova University; M.S., Miami University; M.A., Ph.D. University of Rochester

Devon B. Mason, Ph.D. - assistant professor of physics; B.S., Mansfield University; B.S., Air Force Institute of Technology; M.A., Ph.D., University at Albany, SUNY