

Physics

COLLEGE OF ARTS AND SCIENCES

The Department of Physics at Kent State University offers four-year programs with various options leading to the Bachelor of Science and Bachelor of Arts degrees. Advanced students can pursue graduate programs leading to the Master of Science, Master of Arts and Ph.D. degrees.

The total physics program at Kent State is small enough to ensure individualized attention to each student, yet large enough to offer the full spectrum of courses and opportunities characterizing a graduate research institution. Advanced undergraduate physics majors work alongside doctoral-level graduate students and faculty researchers of international reputation in such fields as condensed matter physics and nuclear physics. Research grant support and recent state excellence grants have further enhanced Kent State University's Liquid Crystal Institute® and its Center for Nuclear Research, in addition to supporting an initiative in high-temperature superconductivity.

DESCRIPTION OF PROGRAMS

The undergraduate physics programs are built around core courses that provide solid preparation in the fundamentals of math and physics but still allow elective selections. Several degree programs are offered.

BACHELOR OF SCIENCE

This professionally oriented degree serves as preparation either for graduate work in physics or for entrance into positions in a variety of industries and government service. Following are the core mathematics and physics courses for the Bachelor of Science program:

MATHEMATICS CORE	PHYSICS CORE
Analytic Geometry and Calculus I	General University Physics I, II
Analytic Geometry and Calculus II	Mechanics I
Linear Algebra with Applications	Introductory Modern Physics
Analytic Geometry and Calculus III	Electromagnetic Theory I
Introduction to Ordinary Differential Equations	Thermodynamics
	Quantum and Atomic Physics

Additionally, students in the Bachelor of Science degree program must complete requirements from one option chosen from either of the two concentrations below:

PHYSICS CONCENTRATION GENERAL PHYSICS OPTION

This general option is the primary track toward graduate work in physics, astronomy, astrophysics, engineering, materials science and other closely related fields.

APPLIED PHYSICS OPTION

This option emphasizes applications of physics, particularly in modern optics, including electro-optic devices and lasers.

PHYSICS INTERDISCIPLINARY CONCENTRATION

CHEMISTRY OPTION

This option is designed for students with a strong interest in both physics and chemistry who may wish to prepare for graduate study in chemical physics or for work in a high-technology materials-related research and development laboratory. This program satisfies requirements for a minor in chemistry.

BIOLOGICAL SCIENCES OPTION

This option is designed for students, with a strong interest in both physics and biological sciences, who may wish to prepare for graduate study in biophysics or for work in a biotechnology company. This program satisfies requirements for a minor in biological sciences.

APPLIED MATHEMATICS AND COMPUTER SCIENCE OPTION

The emphasis of this option is on preparing physics majors to become computer professionals in scientifically oriented organizations. This program satisfies requirements for both a minor in applied mathematics and a minor in computer science.

MATHEMATICS OPTION

Physics majors who wish to become part of a technical team in a research and development laboratory should consider the mathematics option. This program satisfies requirements for a minor in mathematics.

BACHELOR OF ARTS

Such varied fields as secondary education, patent law or interdisciplinary science can be approached with the Bachelor of Arts degree. A large proportion of elective courses allows the student to complete a second major in such fields as biology, botany, chemistry, English, geography, geology, mathematics, philosophy, political science or psychology in preparation for an interdisciplinary career. It is also possible to enter graduate work in physics after completing this program.

GENERAL UNIVERSITY REQUIREMENTS

All students pursuing bachelor's degrees at Kent State University complete a series of Liberal Education Requirements. Physics majors take courses in the areas of English composition, mathematics, foreign language, humanities, fine arts, social sciences and basic sciences.

SPECIAL DEPARTMENTAL PROGRAMS

LIQUID CRYSTAL INSTITUTE®

Some physics faculty are part of Kent State University's Liquid Crystal Institute®, the only one of its kind devoted exclusively to research on the liquid crystalline state of matter. The research program is interdisciplinary and involves some 50 researchers who study the basic properties of liquid crystals and their use in displays and optical devices. Physics faculty also address other systems within the wider field of complex fluids, including films, foams and biological systems. Experimental, theoretical and computational research complement each other in all of these fields.

CENTER FOR NUCLEAR RESEARCH

Nuclear physics research at Kent State University is coordinated through the physics department's Center for Nuclear Research. Two main thrusts are studies of the quark-gluon basis of nuclear particles and studies of nuclear matter at high temperature and density where a quark-gluon plasma may form. This is an excellent environment for the training of young physicists in experimental, theoretical and computational techniques.

HIGH-TEMPERATURE SUPERCONDUCTIVITY AND LOW-TEMPERATURE PHYSICS

Theoretical and experimental studies of the new "high-temperature" superconductors and experimental studies approaching absolute zero provide other forefront areas of research in which undergraduates may become involved through individual investigations or senior honors projects.

PLANETARIUM

The physics building houses the Planetarium which provides public shows, shows for special groups and presentations for undergraduate classes.

KENT STATE/NASA TELESCOPE

A 12-inch telescope is available for public observing on clear Friday evenings. The telescope is operated by the physics department and the College of Education. It is housed in an observatory located on campus near the WKSU-FM Broadcast Center.

SOCIETY OF PHYSICS STUDENTS

Social and intellectual activity is provided by the Society of Physics Students, a professional association designed for students. Typically meetings are held weekly with refreshments provided by the Department of Physics. The physics department also provides physics students with a computer room and a spacious study room.

SCHOLARSHIP AWARDS

A four-year renewable Honors Scholarship in Physics is awarded annually to an entering freshman physics major. Other awards include the John Wiley Award for outstanding performance in introductory physics and the Addison Wesley Award for the outstanding graduating physics major.

CAREER OPPORTUNITIES

Most physicists are employed by educational institutions, industrial firms, government laboratories or federally funded research and development centers. By combining the study of physics with another field or related science, graduates can pursue careers in administration, astrophysics, biophysics, the chemical industry, computer technology, cosmetic industries, education, electronics, engineering, environmental industries, food processing/packaging, geophysics, governmental services/agencies, health services, industry, instrument design, laser technology, liquid crystal technology, manufacturing, marketing, medical physics, medical technology, metallurgy, nuclear studies, petroleum industries, radiation safety, research and development, science writing, technical management and university professor/graduate studies. Vocations in physics fall into three major categories:

RESEARCH AND DEVELOPEMNT

Basic research has as its goal the understanding of physical phenomena without a specific application in mind. Applied research leads to the solution of problems of national importance or significant commercial value. Work in development and design utilizes both basic and applied research to improve existing products, processes and instruments and to develop new ones.

TEACHING

Many physicists are employed in academic settings, including high schools, two- and four-year colleges and universities. In the latter settings, research and teaching are often combined.

MANAGEMENT AND OTHER AREAS

Physicists can be found in such areas as research administration, university administration, science reporting and technical management or marketing and in such fields as metallurgy, electronics, food processing and packaging, health and radiation safety, pollution control and computer technology.

FOR MORE INFORMATION

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