



PHYSICS AT CLARK

OPPORTUNITIES AVAILABLE TO YOU AS AN UNDERGRADUATE STUDENT OF PHYSICS

WHAT SETS CLARK APART?

There are many excellent physics departments in the United States, but Clark is unique among them. At Clark you will be part of a small department that is working at the vanguard of physics. We are large enough to offer B.A., M.S., and Ph.D. degrees, but small enough to also offer personal, individualized instruction. You soon will know everyone on a first-name basis.

You will find yourself in an intellectually stimulating and supportive environment, discussing new ideas with faculty members, graduate students and other physics majors. From the faculty you will learn much about physics and other areas of mutual interest. Our graduate students will show you what they are doing and offer an even easier entry into our various research groups. You are invited to attend our weekly colloquium series, held every Wednesday at 12:00 pm, where visiting scientists from around the world discuss their latest research. You will be encouraged to become an active, contributing member by participating as an intern in one of our research groups, as soon as you are interested.

THE MAJOR

The Physics Department offers three tracks leading to the B.A. in physics: The **Comprehensive Physics track**, the **Applied Physics track**, and the **General Physics track**. The requirements for the three tracks will enable the students to choose their courses in line with their specific career goals. Please contact the physics faculty to learn about these three physics tracks.

In contrast to the way physics frequently is taught in high school, physics at the college level is more challenging and involves little memorization. You will spend much time in the laboratory discovering how physical systems work. You will use sophisticated mathematical and computational methods as you learn about physical concepts. You will come to think deeply about physics, rather than just hearing about it. You will be prepared to do physics and apply your own knowledge of physics and mathematics to study real and unsolved problems in physics and beyond as soon as possible.

The physics major at Clark is flexible and allows you to pursue your own interests. Physics is an excellent major for a liberal arts education. You will improve both your qualitative and quantitative reasoning skills and learn how to solve problems that will challenge your critical thinking skills.

You will take courses in other disciplines to ensure that you have a broad perspective. Physics is fun, but we do not claim that it is easy.

In addition to being an excellent choice for a liberal arts major, the physics major is a good introduction to many careers. Some of our majors have gone on to:

- graduate study in physics
- engineering
- education
- computer science and software development
- medicine or other health sciences
- technology assessment and environmental science
- finance

Our faculty have professional interests in all of these areas. In particular, Physics is an excellent choice of major if you intend to become an engineer.

Clark also offers a **3/2 Engineering program** in which students major in physics or a related area at Clark for three years and then study engineering for two additional years. At the end of five years, students receive a B.A. degree from Clark, and receive a B.S. degree in engineering from the partner institution.

The sequence of formal courses that constitute the physics major are similar at all universities. However, each physics department imparts its own flavor to its curriculum. At Clark our philosophy is that the best way to learn physics is to do physics in the context of research. Our goal is to encourage you to become active learners as soon as possible. Our courses are an efficient way of learning the basic principles of physics. Some of the physics courses that are special include our sophomore laboratory course on quantum physics, our laboratory oriented course on computer simulation, and our electronics course. We also are proud of our courses on Astronomy and Discovering Physics, oriented toward nonscience majors, and learning modules for those planning a career as science teachers.

The three physics tracks provide the ability and flexibility to tailor the major to accomplish your particular career goals. Your advisor will help you choose courses and additional electives (normally in science, computer science, mathematics or education), based on the track you pursue. Our majors typically conduct a capstone project in their senior year. This project may be experimental or theoretical in nature or it may be a research paper on a topic of individual interest.

The relatively modest course requirements for the physics major allow the possibility of also majoring in a second area. We encourage you to experience the rich diversity found at Clark. Study art, computer science, math, history, language, music, philosophy - any subjects that will increase your understanding and enjoyment of the world in which you live.

FUTURE PROSPECTS

In the first year a typical program of courses for a physics major might include:

First Semester

Physics 120, Introductory Physics (with calculus)
Mathematics 120 (or 124), Calculus I
Elective (English 20)
Elective (or a perspective)

Second Semester

Physics 121, Introductory Physics II (with Calculus)
Mathematics 121 (or 125), Calculus II
Elective
Elective (or another perspective)

If you indicate an interest in physics, you will be assigned a faculty advisor from the physics department.

THE SCIENCE FACILITIES

Our most important resources are our outstanding faculty and our motivated students. Without them, our well-equipped teaching laboratories in electronics, optics, atomic and nuclear physics, materials science, and computer simulation would be worthless. Much of the equipment used in these courses has been purchased with teaching grants from the National Science Foundation or has been used in our research laboratories. In addition to the teaching laboratories, our majors participate in one of our well-equipped research laboratories.

Personal computers are used extensively in our teaching and research. Computer clusters are available for students to use in all our teaching laboratories.

OPPORTUNITIES FOR RESEARCH

Research in the department is broadly concentrated in the experimental and theoretical study of condensed matter physics – a general term for the physics of solids, gases and liquids. Experimental work focuses on complex matter and nonlinear physics, soft matter, high magnetic field, low temperature studies of superconductivity, biophysics, nanoscience, and electronic materials. Theoretical research includes the study of biological systems and computer simulation studies of phase transitions. Several members of the department are also involved in interdisciplinary research on environmental problems.

How soon you become involved in research depends on your ability and your motivation. Most majors start after their fifth or sixth semester, but our research groups are open to sophomore and first year students. The earlier you begin, the more rewarding your project will be. It is common for our undergraduates to publish papers in refereed journals along with their faculty advisor and other collaborators.

Many of our physics majors go onto graduate studies in physics and engineering. If you do well in your undergraduate physics studies at Clark, you are assured of admission to a top-rank graduate physics program. Our graduates succeed because of their successful track record in research and the fact that our faculty are well known at other universities. Recent graduates have gone to the University of Chicago, Stanford University, University of British Columbia, University of Maryland, Northeastern University, Boston University, and Texas A&M. Other physics majors have gone to medical or other professional schools or have found employment or furthered their education in related fields such as computer science, education, and engineering.

Each year about eight thousand people in the United States graduate with a bachelors degree in physics. Yet, if you were to look in the classified advertisements of your local newspaper, you would not find many advertisements for physicists. Are there really jobs for physicists? The answer is yes and they are among the highest paid majors. Physics is an excellent choice for maximizing your career options. It is remarkable how many successful engineers, computer scientists, financial analysts, and economists have a background in physics. Your liberal arts background will give you an edge in convincing prospective employers that they need your skills.

ADVISING

Students interested in majoring in physics are urged to discuss their plans with the physics faculty as soon as possible. The undergraduate physics advisor is Professor Charles Agosta. He will discuss with you the various course and research options, and will (when appropriate) authorize exceptions to the normal course requirements. Students who wish to accelerate their programs (for example, by skipping the first-year physics course) should see him for permission. Professor Charles Agosta is also the Chair of the 3/2 Engineering Program Committee and should be also consulted for advice about engineering requirements.

DEPARTMENTAL DIRECTORY

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