IOWA STATE UNIVERSITY

Physical Sciences

Agricultural Biochemistry
Agronomy
Biochemistry
Bioinformatics and Computational Biology
Biological Systems Engineering
Biophysics
Chemistry
Earth Science
Environmental Science and Environmental Studies
Geology
Meteorology
Physics

Iowa State University has more than 100 majors that provide virtually unlimited academic opportunities. In this brochure you'll find information about your specific area of interest and a family of related majors that you may want to explore during your adventure here at Iowa State. Please use the contact information listed inside and let us help you discover your passions, unlock your potential, and **enjoy the adventure.**

You don't have to take the uphill path

You hear it's a tough world out there when it comes to finding the right place for your interest and skills, but it doesn't have to be tough. Our faculty, staff, alumni, and even our current students have already paved the way for you by providing expertise, academic support, professional training, and resources.

Practice with the latest technology

Prepare yourself to enter your field with competitive skills. Iowa State houses world-class laboratories that feature state-of-the-art instrumentation, including electron microprobes, infrared spectrophotometers, liquid chromatographs, microcomputers, DNA synthesizers, and experimental equipment for studying glacier sliding.

Iowa State also features two observatories, including the Whipple Observatory.

Work with faculty

Faculty instruct you in the most recent methods for investigating scientific problems and phenomena. Our faculty maintain an academic edge by contributing to their disciplines in the forms of research and development. Projects range from developing insect-resistant plants to investigating the causes for global warming.

Gain professional experience

Work as an intern with one of Iowa State's industry partners or alumni who have established themselves as industrial technicians, chemists, researchers, meteorologists, teachers, and environmental specialists.

Natural selection … finding the best program for you

If you major in any of the fields listed in this brochure, you will take courses that promote your interest in and aptitude for math, biological sciences, and physical sciences. Many of the courses you take will fulfill requirements common to several of the majors listed here. Your adviser will work with you to design your curriculum and make certain you take advantage of all the opportunities Iowa State offers—specialized courses, internships, research projects, service learning experiences, Honors courses and projects, and learning communities. Regardless of what discipline you choose to study, you will find resources that support you both as a student and as a future professional in your discipline.

Physical Sciences

Agricultural Biochemistry

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When you major in agricultural biochemistry, you explore the unknown, the unseen, and the undiscovered wonders of the natural world.

Your coursework will provide a foundation in chemistry, physics, mathematics, and biology, as those fields relate to agricultural and biological sciences. Biochemists study plant, animal, and microbial metabolism as well as the structure and biological function of nucleic acids, proteins, carbohydrates, and lipids by using modern techniques such as x-ray crystallography, mass spectrometry, and genetic engineering.

Biochemistry is fundamental to modern biotechnology. As an agricultural biochemistry student, you stand on the frontier of scientific discoveries that change our understanding of the world: new approaches to diabetes, nutrition for athletes, developments in genetically engineered, insect-resistant plants, and methods for detecting vitamin and mineral deficiencies.

Most agricultural biochemistry graduates continue their training to pursue careers in agricultural and biological sciences and in human and veterinary medicine. Others enter the workforce of a variety of agricultural and medical industries, government service, business, and education.

Agronomy

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Agronomy is the science of plants and soils for agriculture and the center of new frontiers in biotechnology, sustainable agriculture, and biorenewable fuels.

As an agronomy major you will learn about the role and diversity of plants, soils, and climates of the world. In addition to understanding ethical, cultural, and environmental issues that impact agriculture and natural resources, you will also solve problems, gain hands-on experience, and research current agricultural issues. Graduates have the theoretical and practical knowledge needed for efficient and sustainable production of food, feed, fuel, and fiber.

With a degree in agronomy from Iowa State you will be prepared for a variety of careers such as agricultural climatologist, crop consultant, seed production manager, soil and water conservationist, crop protection specialist, and field representative.

Biochemistry

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Biochemistry provides the basis for much of modern biotechnology. Biochemists seek to understand life processes in terms of chemical and physical principles. Individual members of the department form a highly interconnected and overlapping network and conduct research in areas such as the structure and function of enzymes, membranes, and hormones; cell metabolism; cell biology; structural biology and dynamics; signal transduction; reproduction; the chemical basis of heredity; nerve transmission; and the design and evaluation of drugs for the treatment of disease.

The program of study emphasizes modernconcepts and research methodologies and is designed to offer various opportunities to work with faculty in an active biomedical or plant science research laboratory. Such partnerships provide excellent training for future development in a wide variety of scientifically-based careers in universities, veterinary and medical schools, government laboratories, or the biotechnology sector.

Bioinformatics and Computational Biology

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As a bioinformatics and computational biology major you will explore the interfaces of biological, informational, and computational sciences.

Your coursework will focus on topics such as gene identification, expression, and evolution; RNA, protein, and genome structure; and molecular and cellular systems and networks.

A degree in bioinformatics and computational biology will prepare you for continued education or a broad range of research possibilities.

Biological Systems Engineering

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As a biological systems engineering (BSE) student you will learn to integrate life sciences with engineering to solve problems related to biological systems, including microbes, plants, animals, humans, and/or ecosystems. You will also learn about fundamental principles of engineering and life sciences.

You will use your understanding of engineering to analyze organisms or ecosystems, and your knowledge of biological systems to inspire and inform their designs. The BSE degree program is student-focused and derives strength from the broad, hands-on training provided to students in the program. You will learn to use engineering methods to address societal needs related to biorenewables production and processing, water quality, environmental impacts of the bioeconomy, food processing, and biosensors. In so doing you will be prepared for professional practice and post-graduate educational opportunities.

Four distinct options are available: biorenewable resources engineering, bioenvironmental engineering, food engineering, and pre-professions/pre-graduate. Many opportunities also exist for studying and working abroad in countries such as Brazil, Germany, Poland, Taiwan, China, and Uganda.

Biophysics

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The field of biophysics is part of a major scientific revolution that is occurring in the biological sciences—for the first time, scientists can study life forms at the molecular level, which means that we can explore and discover how and why organisms function as they do.

As a biophysics major you will focus on structural biology, engaging in a detailed study of atomic components of biological molecules. You will work in the laboratory using computational and physical methods to gain atomic information, which will help you better understand how organisms work and how to develop better plants, bacteria, and other organisms. Many Iowa State students take advantage of faculty/student research opportunities, sometimes co-authoring papers and publishing the results of their studies.

Your education will prepare you for graduate study in the field of science, or professional programs in dentistry, veterinary medicine, or human medicine.

Chemistry

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When you study chemistry you have the opportunity to study scientific processes and reactions that define every aspect of daily life.

As a chemistry major you will learn how to design, implement, record, and analyze the results of a chemical experiment. Your coursework will focus on the environmental and ethical dimensions of problems and issues that face professionals. You will use modern instruments and classical techniques to identify and solve chemical problems as you explore new areas of research.

A degree in chemistry from Iowa State will prepare you to continue in graduate school or professional studies, or qualify you for a career as an environmental chemist, pharmaceutical chemist, forensic scientist, science writer, technical salesperson, product development chemist, or researcher.

Earth Science

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As an earth science major you will study how to describe the natural world, investigate the environment, and understand the reasons for changes in the structure of the planet we inhabit.

The earth science major represents a broad program of study: a foundation in the physical sciences such as chemistry, physics, and mathematics, and a well-rounded background in environmental sciences, meteorology, and geology.

Your coursework will feature studies in environmental geology, earth history, environmental science, and general earth science. The department offers a bachelor of science and, for those interested in teaching earth science, a bachelor of arts.

About one third of Iowa State earth science graduates pursue careers in teaching.

Environmental Science and Environmental Studies

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Environmental Science:
www.ensci.iastate.edu
Environmental Studies:
www.envs.iastate.edu

Iowa State offers two distinct but allied undergraduate programs focused on environmental systems: environmental science and environmental studies.

The environmental science major provides a technically rigorous, quantitative, and integrated approach to the study of environmental systems. The magnitude and complexity of environmental problems are creating a growing need for scientists with interdisciplinary training in environmental science. The environmental science curriculum is designed to prepare you for a position of leadership in this rapidly changing discipline. Your coursework will provide you with a solid foundation in the biological, chemical, and physical sciences and the specialized training necessary for integrated analysis of environmental systems.

Environmental studies is an interdepartmental, secondary major serving students with primary majors ranging from architecture to zoology. Designed to work in concert with your primary major, environmental studies can add an environmental component to any program of courses. This secondary major provides you with an understanding of major regional and global environmental issues and an appreciation of different perspectives regarding these issues.

Geology

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As a geology major you will encounter much more than the study of rocks and landforms. Geology is the study of the structure and origin of the earth, and the processes that shape its interior and surface. You will learn about how different Earth systems operate and interact to shape our environment and provide the resources that sustain society.

Your coursework will include background in basic sciences, and geology courses that provide hands-on experience with microscopes, Geographic Information Systems (GIS), and equipment used to monitor Earth processes and image Earth's subsurface. Your geology courses will also include numerous field trips

and exercises, both in the Midwest and in geologically-rich, north-central Wyoming where Iowa State maintains a permanent geology field station on the western edge of the Bighorn Mountains.

A degree in geology will prepare you for a wide variety of career opportunities, including the oil and gas industry; federal, state, and local environmental agencies; environmental consulting firms; the mining industry; GIS analysis; and geoscience education.

Meteorology

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Tornadoes, hurricanes, cloud formations, and computer modeling are some of the phenomena you study when you major in meteorology. Meteorology is the study of the earth's atmosphere and the processes responsible for its behavior.

Meteorology will provide you with a background in weather observation, physics, dynamics of climate, application of new weather technologies, computer programming and modeling, and verbal and written communication. The meteorology program teaches you to use state-of-the-art equipment, so you will be competitive in the field. The atmospheric science program maintains Linux workstations linked to the global Internet. Additional computing is performed using external facilities such as the supercomputer center of the National Center for Atmospheric Research.

A meteorology degree from Iowa State will prepare you for employment in a variety of professions including television meteorology, governmental weather forecasting, the military, and professors and researchers in higher education.

Physics

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Physics provides a foundation for describing and understanding the universe and all the activities that take place within it.

When you major in physics you join other pioneers in the field who are addressing questions such as: What is the big bang theory? What is the relationship between time and space? Can the world we know be altered by our perceptions?, through a process of scientific analysis, mathematical techniques, and modern computational and technological methods.

Your coursework will include studies in fields such as mechanics, electricity and magnetism, thermodynamics, and modern physics. At Iowa State you also have the unique opportunity to major in physics and focus your studies in astronomy or astrophysics.

A degree in physics will prepare you for continued education in graduate school or for diverse areas of employment including engineering, medicine, law, or business administration.

Physical Sciences

Programs among the best nationwide

Many of Iowa State's programs have received national ranking by the Gourman Report, which monitors program excellence. The meteorology program was ranked 3rd in the nation. The undergraduate agronomy program was ranked 3rd. The earth science program was ranked 6th. The biophysics program was ranked 12th.

The Department of Chemistry has consistently ranked among the top 10 percent of programs in the nation. Chemistry faculty awards include the BF Goodrich National Collegiate Inventors Award, DOE Award for Outstanding Scientific Accomplishments in Materials Chemistry, and the Dreyfus Teacher-Scholar Award. Chemistry alumni include a co-inventor of Dial soap and a former CEO of National Starch and Chemical Company.

University Professor Lee Anne Willson combines teaching and research in her work on Internet astronomy courses development. In addition to being selected as a Master Teacher, Steven Kawaler also serves as director of the Whole Earth Telescope project. Professor Curt Struck works with some of the most beautiful pictures in the universe as a member of several collaborations studying Hubble Space Telescope images of colliding galaxies.

Faculty in biochemistry and biophysics and agricultural biochemistry have received federal funding for research in such areas as x-ray crystallography of proteins, NMR spectroscopy, and modern biotechnology procedures.

The agronomy program features two members of the National Academy of Science, and eight C.F. Curtiss Distinguished Professors. Alumni serve as presidents, corporate CEOs, and lead scientists for universities and major seed and agricultural product companies throughout the world.

Richard Schultz, professor of environmental science, has received numerous national awards for projects from water quality through improved riparian management.

State-of-the-art technology

Iowa State owns and operates some of the most advanced technology in the world. As a student, you may have the opportunity to train on many types of equipment, such as laser, NMR, and FT-IR spectroscopes, CRAY supercomputers, SGI workstations, Linux clusters, x-ray diffractometer and fluorescence units, automated electron microprobes, and instruments which analyze glacial processes.

Specialized training in off- and on-campus laboratories

Iowa State's laboratories offer summer employment and part-time research and development opportunities for students. You may work in one of our biochemistry facilities: the Protein, Nucleic Acid, Cell Sorting, or Macromolecular Structure facility. Iowa State also features the Iowa Lakeside Laboratory for environmental science, the Ames Laboratory of the Department of Energy, a hydrogeology laboratory, the Whipple Observatory, and the Erwin Fick Observatory.

Unique opportunities

- Internships—gain work experience in your discipline. Internships may include research opportunities with companies like Hach Chemical, Pioneer Hi-Bred International, or government agencies like the Department of Energy.
- Participation at national meetings—interact and form professional relationships with other experts.
- Department-based learning communities—take introductory courses with students in your major. Participate in faculty and staff seminars, field trips, and study sessions.
- Department-sponsored scholarships—financial awards for outstanding students.
- Specialized computer labs—including math and computer labs outfitted with state-of-the-art hardware and software specific to areas of study and interest.
- Study abroad programs—exposing students to global issues impacting their fields of study.

Student organizations

An important part of becoming a professional in your field is working and interacting with others in your field. Consider joining student clubs and organizations to support your academic pursuits. Here is a small sample of opportunities available to undergraduates.

- Agronomy Club
- American Meteorological Society
- Association for Women in Science
- Biochemistry, Biophysics, and Molecular Biology Club
- Geology Club
- Physics and Astronomy Club
- Soil and Water Conservation Club

Iowa State University
Office of Admissions
100 Enrollment Services Center
Ames, Iowa 50011-2011
Phone: 515 294-5836
Toll Free: 800 262-3810
Email: admissions@iastate.edu
Web: www.admissions.iastate.edu

Questions about admission

In addition to writing us at the address at left, we encourage you to visit our website, which features a course catalog, online application, and campus information.

Also, you can follow us on:

Preparing to do your best while in school

The best preparation continues to be a strong college preparatory program of study, which includes courses in English, mathematics, laboratory science, social studies, and foreign languages. If you intend to transfer credits from another institution, you may contact our Office of Admissions for assistance in selecting the best courses for your program of study.

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