

# IOWA STATE UNIVERSITY

# Biological Sciences

Agricultural Biochemistry

Athletic Training

Biochemistry

Bioinformatics & Computational

Biology

Biological/Premedical Illustration

Biological Systems Engineering

Biology

Biophysics

Culinary Science

Diet and Exercise

Dietetics

Environmental Science

and Environmental Studies

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Genetics

Global Resource Systems

Kinesiology and Health

Microbiology

Nutritional Science

Pre-medical and Pre-health

Professional Programs

**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.**

## How do we define life?

That's one of the questions you will explore as you study the processes of life in plant and animal cells and microorganisms. During the course of your college career, you will also be figuring out how to define your future professional life. Iowa State has developed resources for helping you do just that. Career fairs, hands-on research, internships, and student clubs are just a few of the tools that will be available to you.

Iowa State has a reputation for student success. The undergraduate placement rate for students in biological sciences is 95 percent within six months of graduation. With a major in biological sciences, you are prepared to pursue professional study in human or veterinary medicine and biotechnology or careers in pharmaceuticals, agriculture, genetic research, conservation, or government regulation.

## Faculty are your guides

Faculty participate in more than 180 ongoing research projects, providing you with unique opportunities to participate in cutting-edge research that impacts our understanding of the world. Small class sizes and one-on-one advising give you and the faculty and staff a chance to know each other well. Many of our faculty have been cited nationally and locally for excellence in teaching and advising.

## A world of opportunities

Hands-on learning opportunities such as cooperative work environments, learning communities, internships, and study abroad programs provide the vehicles for you to practice the science that you are learning. Our students conduct summer research projects at national and local field stations like the Gulf Coast or the Iowa Lakeside Laboratories.

Students participate in learning communities, living and studying with like-minded students. They study unique plants in our on-campus greenhouses and herbariums, where rare and endangered plants are rescued and maintained.

Design an education to meet your career goals!

# Biological Sciences

## Selecting a program that supports your interests

Majoring in the disciplines listed in this brochure will provide you with a versatile background as you consider your future academic and professional goals. Your faculty adviser will encourage you to explore options and help you design a curriculum that takes advantage of

the opportunities Iowa State offers—specialized courses, cooperative learning programs, internships, research projects, student support groups, and learning communities.

### 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 work in a variety of agricultural and medical industries, government service, business, and education.

### Athletic Training

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As an athletic training major students will study the prevention, assessment, treatment, and rehabilitation of injuries to athletes and others who are engaged in everyday physical activities.

Your coursework will include studies in anatomy, physiology, nutrition, chemistry, biomechanics, and evaluation, treatment, rehabilitation and use of therapeutic modalities in the care of athletic injuries. While enrolled in the accredited Athletic

Training Program at Iowa State, students will have the opportunity to gain hands-on experience through clinical rotations in areas such as the ISU athletic training rooms, local high schools, physical therapy clinics, physician clinics, emergency rooms, campus recreation services, surgical observations, and Drake University; these clinical rotations will be supervised by certified athletic trainers, physicians, and other allied health care professionals.

### 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 modern concepts and research methodologies and is designed to offer various opportunities to work with faculty in an active biomedical or plant science research laboratory, providing 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 & 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/Premedical Illustration

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Iowa State offers one of the best undergraduate scientific illustration programs in the nation. As a biological and premedical illustration major you will combine your interest and aptitude in science and art to become a biocommunications specialist. You will learn professional illustration and visual communication techniques and master the use of technology as applied to scientific visualization.

You will also complete an internship, which allows you to produce artwork suitable for print or digital media. You may illustrate publications written by campus biologists, create animations

and websites to support campus courses, or intern with a professional communication firm or museum.

This major will prepare you for a career in scientific illustration or graduate education in medical illustration. With a degree in biological and premedical illustration you will have the skills necessary to work in fields such as biocommunications, medical illustration and animation, environmental display design, scientific publication, and museum display design.

## Biological Systems Engineering

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and Biosystems Engineering  
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www.abe.iastate.edu/biological-systems-  
engineering

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

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. You will experience all the subjects in a hands-on teaming environment using modern engineering tools and equipment. Many opportunities also exist for studying and working abroad in countries such as Brazil, Germany, Poland, Taiwan, China, and Uganda.

## Biology

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Iowa State University is a major center for research and education in the biological sciences. Students have the opportunity to learn from some of the nation's leaders in biological research and teaching and to participate in innovative programs.

You may develop your program of study to target your goals by choosing from a wide variety of advanced courses in areas such as animal biology, plant biology, ecology, evolution, biodiversity, genetics, development and cell biology. You will also have the opportunity to study abroad, take courses at field stations around North America, and participate in North American or

international field trips in biology. In addition, you may explore the frontiers of biology by doing research on campus or through summer field courses at Iowa Lakeside Laboratory or one of our affiliated institutes including the Organization for Tropical Studies or the Gulf Coast Research Laboratory.

Iowa State's high-quality academic program will prepare you for further studies in graduate school in a diverse range of biological fields or to continue on to professional training in environmental biology, human medicine, veterinary medicine, dentistry, optometry, physical therapy, chiropractic or pharmacy.

## 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.

## Culinary Science

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As a culinary science student you will explore the chemical and physical interactions of food and develop basic culinary skills. This rapidly growing major is the only one of its kind in the state of Iowa.

Your coursework will include studies in food ingredient interactions and formulations, food sensory evaluation, and food quality assurance.

As a graduate you will combine food product development skills and entrepreneurial talents with scientific and technological knowledge to meet the demands of consumers and the food industry.

A degree in culinary science will prepare you for employment in unique careers in product development, research and development, food sensory evaluation, and test kitchens.

## Diet and Exercise

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Diet and exercise is an accredited program for students interested in earning concurrent bachelor's and master's degrees. To pursue this program you will start as a pre-diet and exercise major, and at the beginning of your junior year you will apply for admission to the accelerated program.

Your coursework will include studies in biology, anatomy, fitness, nutrition, and physiology. This program will prepare you for admission to

accredited dietetic internships. Upon completion of an internship you will be eligible to take the national exam to become a registered dietitian.

You will then be prepared for career positions in cardiac rehabilitation programs, school nutrition/wellness programs, corporate health programs, health clubs, public health programs and clinics, preventative health programs, and sport enhancement programs.

## Dietetics

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The dietetics degree at Iowa State is an accredited science- and health-related program that emphasizes food and nutrition.

As a dietetics major you will take courses in nutrient metabolism, community nutrition, counseling and educational methods, medical nutrition therapy, and food service management. You will also have the opportunity to apply for an accredited dietetic internship, which provides

supervised practice for qualified students. After completion of the internship you will be eligible for the national registration exam, taken to become a registered dietitian.

Registered dietitians are prepared for employment in hospitals and health-care facilities, sports nutrition and wellness programs, business and industry, community and public health settings, education, research, and private practice.

## Environmental Science and Environmental Studies

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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.

## Food Science

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Food science includes everything that happens to food, from the time it leaves the farm to the time the consumer purchases it.

As a food science major you will learn about the application of the basic principles of biology, chemistry, and physics in studying the quality, processing, preservation, preparation, safety, and development of foods.

You will focus on one of the following Institute of Food Technologists approved programs: Food Science and Technology or Food Science and Industry.

A degree in food science will prepare you for a wide variety of career areas such as product development, food quality & safety, food sales and technical services, and production and management.

## Genetics

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As a genetics major you will explore the characteristics of living organisms to determine how they are passed from generation to generation. Understanding heredity is fundamental to all the biological sciences, particularly animal science as it relates to production and the study of disease.

The department offers a broad range of courses in every aspect of genetics, from molecular genetics

of microorganisms to population genetics. You may also consider minoring in genetics to complement a major in another field of science, mathematics, or computer science.

A degree in genetics will prepare you for a career in research and development, teaching, biotechnology, health, and graduate or professional study in science, medicine, or veterinary medicine.

## Global Resource Systems

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As a global resource systems major you will explore global food and agriculture, international resource issues, international development, and resource-related businesses worldwide.

Your coursework will emphasize global and cross-cultural engagement, while equipping you with strong technical competency in a resource area of your choosing.

As a graduate in global resource systems you will be prepared for leadership positions in international non-governmental organizations; global businesses; government agencies engaged in international trade and development; and globally engaged foundations, educational institutions, and volunteer organizations.

## Kinesiology and Health

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When you enroll in kinesiology and health at Iowa State you will study the physiological and behavioral aspects of physical activity and human movement through disciplines such as biomechanics, exercise physiology, motor control, and exercise psychology.

There are four areas of specialization to choose from: community and public health, exercise science, physical education teacher education (K-12), and pre-health professions. You can also pick up an endorsement to teach health or coach interscholastic athletics.

Your education will include exposure to well-equipped human movement labs as well as state-of-the-art athletic training facilities.

These programs prepare you to work as a community health specialist or wellness coach, exercise leader or personal trainer, a physical education teacher and coach, or an athletic trainer for various sports teams.

The pre-health professions specialization can prepare you for entry into graduate school or professional schools such as physical therapy, medical school, or other health care professions.

In addition to your coursework, you will have the opportunity to complete a semester-long field experience within health or fitness facilities or work as a student athletic trainer with high school, college, and even professional athletes.

## Microbiology

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Microbiology is the study of living organisms and infectious agents. Microbiologists study the interaction of microorganisms with people, investigating how microbes exist and affect the ecosystem and our lives.

As a microbiology major you will study genetics, chemistry, biochemistry, physiology, physics, ecology, and pathology. With a degree in microbiology you may develop vaccines for

infectious diseases, test for infections, conduct research to determine how microorganisms cause disease, harness microbes to recycle waste, improve livestock production, or make food taste better and prevent spoilage.

Your degree will prepare you for professional study in human or veterinary medicine or for a career in clinical, food, industrial, or environmental technologies.

## Nutritional Science

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When you major in nutritional science you will look at the connection between diet and health; effects of various nutrients in the cause, treatment, and prevention of many diseases; and maintenance of normal health, growth, and development.

As a nutritional science major you will select either the pre-health professional and research option or the nutrition and wellness option. The pre-health professional and research option will

provide a strong science and nutrition education, preparing you for graduate school, research, or professional programs such as medical, pharmaceutical, or dental schools.

The nutrition and wellness option will provide education about the role of nutrition and healthy eating for disease prevention and wellness, preparing you for a career in community nutrition, public health, or related programs.

## Pre-medical and Pre-health Professional Programs

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Iowa State offers a variety of preprofessional programs that will prepare you for advanced study in professional health programs, such as human and veterinary medicine, physical therapy, clinical laboratory science and medical technology, dentistry, optometry, pharmacy, and podiatry.

While the requirements for admission to professional programs vary, our advisers will help

you carefully plan your program of study to meet your career goals.

As you prepare for a health profession you can major in any area at Iowa State University. You will be encouraged to participate in health care related experiences, assist Iowa State scientists with research, and take part in a variety of student organizations and leadership opportunities.

# Biological Sciences

## Unique learning environment

Outstanding faculty and facilities in the biological sciences provide opportunities you won't find anywhere else. The biochemistry faculty received federal funding for research in such areas as nutrition, x-ray crystallography of proteins, nuclear magnetic resonance spectroscopy, and modern biotechnology procedures.

Iowa State University recently has been designated as a Collaborating Center for the World Health Organization in the area of food safety and research.

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

Established in 1997, the Laurence H. Baker Center for Bioinformatics and Biological Statistics develops computational, graphical, or algorithmic methods to interpret information from molecular, cellular, anatomical, physiological, population, and ecological studies.

Students in kinesiology and health are able to work with movement analysis in state-of-the-art biomechanics and motor behavior laboratories. Exercise physiology laboratories are equipped with treadmills, metabolic carts, and underwater weighing tanks. A muscle biochemistry lab utilizes muscle biopsy and blood/urine analysis techniques. Immune function improvement is being examined in relation to exercise adherence.

Iowa State's laboratories offer summer employment and part-time research development opportunities for students. For example, you may work in one of our biotechnology instrumentation facilities, such as those for protein, nucleic acid, cell sorting, or macromolecular structure investigations.

## Unique learning opportunities

As an Iowa State undergraduate, you will have the option of participating in a wide variety of social, academic, and professional activities outside of the classroom. Often it's these activities that create lasting professional and personal support systems. Some of these activities may include:

- Iowa Lakeside Laboratory—a biological field station on West Lake Okoboji, Iowa, where students conduct summer research or take courses
- Learning communities—such as the BEST program (Biology Education Success Teams)—residence-based communities for new freshmen studying similar subjects
- Honors program—recognizing academic excellence by permitting students to customize their programs of study and complete independent research projects
- Undergraduate research opportunities—work with faculty participating in hundreds of ongoing research projects
- International field trips—scheduled trips to places such as Australia, Costa Rica, Honduras, Kenya, Central Europe, and the Galapagos Islands
- Study abroad opportunities—at affiliate universities in Australia, Britain, and Europe
- Internships—at partnering university research laboratories, wildlife foundations, zoos, field stations, cancer centers, medical schools and centers, marine laboratories, and pharmaceutical companies
- High-tech computer laboratories—featuring microcomputers, CAD stations, high-quality printers, plotters, and video projectors

## 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.

- Beta Beta Beta
- Biochem & Biophys/Mol. Bio. Undergrad Club
- Biological/Premedical Illustration Club
- Biology/Genetics Club
- Biological Sciences Club
- Biological Systems Engineering Club
- Block and Bridle
- Culinary Science Club
- Entomology Club
- Food Science Club
- Genetics Club
- Kinesiology & Health Club
- Microbiology Club
- Leaders for a Sustainable Community
- Nutrition Club
- Pre-med Club
- Pre-Physical Therapy Club
- Soil and Water Conservation Club
- Student Dietetic Association

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## 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.

Material in this brochure was accurate at the time of printing. For the most up-to-date information, visit our Web site at [www.iastate.edu](http://www.iastate.edu).

Iowa State University does not discriminate on the basis of race, color, age, ethnicity, religion, national origin, pregnancy, sexual orientation, gender identity, genetic information, sex, marital status, disability, or status as a U.S. veteran. Inquiries can be directed to the Office of Equal Opportunity and Compliance, 3280 Beardshear Hall, 515 294-7612.