



PURSuing A CAREER IN THE FIELDS OF STEM

SCIENCE · TECHNOLOGY · ENGINEERING · MATHEMATICS



MAJORS THAT CAN LEAD TO A CAREER IN...

SCIENCE • TECHNOLOGY • ENGINEERING • MATHEMATICS

The expanding fields of science, technology, engineering, and math (STEM) continually need talented and educated professionals. To stay competitive in the global economy and to fuel the innovation needed to solve world problems, the United States strives to improve the quality of and access to STEM education and create a larger and more diverse pool of potential employees trained in these fields.

The Ohio State University promotes this initiative for more, better-trained, and diverse professionals through access to outstanding faculty and state-of-the-art facilities, unique undergraduate research opportunities, collaboration with nearby scientific businesses, and programs to encourage members of underrepresented groups to pursue STEM education.

This brochure will introduce you to Ohio State degrees and programs within the fields of STEM. You will also find descriptions of possible work environments or careers that each degree may lead to. Some majors prepare graduates for a few specific careers, while other majors can result in more varied career options.

Regardless of the major you choose, here are five suggestions to keep in mind as you set goals toward a major and career in the areas of STEM.

1. Consider your interests. What aspects of STEM appeal to you? Do you enjoy working in a laboratory or conducting independent research? Are you fascinated by aerospace travel? Are you interested in solving mathematical problems? It is important to consider your specific interests and abilities as you set goals leading to a career in STEM.

2. Understand the skills you will need to be successful. Do you have an aptitude for math and science? Are you talented in design and development? Consider what courses and experiences beyond the classroom will help you develop research, computer, and analytical skills and other strengths needed for professions within the areas of science, technology, engineering, and math.

3. Consider a wide range of majors. Look into the variety of majors Ohio State offers. Determine which one is right for you based on your interests, skills, and career goals. You can find specific information about the majors listed in this brochure, and all majors offered at Ohio State, at majors.osu.edu.

4. Take advantage of co-curricular opportunities. Practical experiences are vital when preparing for a career in STEM. Many programs of study include internships or research experience. In addition to these opportunities, Ohio State is home to over 1,000 student organizations, some specifically for those pursuing degrees in math, science, or engineering.

5. Consider graduate school. Postgraduate studies may lead to more responsibility in your chosen field and open doors to research or teaching opportunities. Keep graduate school in mind when making decisions regarding your major, courses, and co-curricular activities.

Engineering

engineering.osu.edu

Engineering students at Ohio State have access to opportunities and resources that complement their academic experience. In their first year, students take a first-quarter engineering survey course that introduces them to the major. Each student is assigned an engineering academic advisor and can join organizations specifically for engineering majors. Students gain hands-on engineering experience as they work on project teams and compete in the development and design of nano-devices, autonomous aircraft, and energy-efficient cars and homes.

Majors

Career possibilities

Aeronautical and Astronautical Engineering

This major focuses on challenges of terrestrial and space flight. Through classroom, laboratory, and research activities students learn the proper aerodynamic shape, correct engine, best materials, and safest control systems necessary to produce an efficient and economical flying machine.

- Aircraft, guided missile, and space vehicle industries
- Business and engineering firms
- Commercial airlines

Aviation

Through the aviation program students have access to The Ohio State University Airport, the fifth busiest airport in Ohio and the only airport owned and operated by a university. This major prepares students to design, manage, and operate aviation systems worldwide.

- Airport and aviation support systems
- Airport planning management
- Commercial airlines

Biomedical Engineering

The biomedical engineering major combines engineering expertise with physical, chemical, and mathematical sciences to teach students to solve problems in biology, medicine, behavior, and health. Students participate in research applicable to technology and medicine.

- Hospitals and health-care facilities
- Medical equipment manufacturers
- Research at educational or medical institutions

Chemical Engineering

The chemical engineering program teaches students to design, develop, and operate chemical processes that transform raw materials into products we use every day. The program emphasizes the commercial applications of chemical reactions—to produce things people want economically and safely.

- Consulting organizations
- Department of Energy
- Petroleum, plastics, food processing, environmental, and cosmetic industries
- Pharmaceutical research

Civil Engineering

This program prepares students to serve society by improving the quality of life for people in work, leisure, and travel. Students learn to improve infrastructure through planning, designing, constructing, and operating public facilities and systems.

- Construction industry
- Oil and fuel refineries
- Transportation and infrastructure
- Utility companies

Computer Science and Engineering

The computer science major combines the study and application of computing key principles and practices. The program prepares students to identify problems in any of various domains and then design, evaluate, implement, and test computer based solutions to those problems.

- Application software development
- Database administration
- Medical industry
- Technical sales

Electrical and Computer Engineering

Electrical engineering students analyze and design electrical systems. Computer engineering students specialize in a balanced program of computer hardware and software to learn how to design and interface practical computer systems.

- Computer hardware companies
- Medical instrumentation
- Public utilities
- Manufacturing and industrial firms

Engineering Physics

This interdisciplinary program combines engineering disciplines with physics and mathematics. Through this program students can develop a strong background in one of the following engineering fields: aeronautical and astronautical engineering, computer and information science, electrical engineering, industrial and systems engineering, mechanical engineering, or nuclear engineering.

- Industry
- Manufacturing
- Research and development organizations

Environmental Engineering

The curriculum for environmental engineering includes courses in basic subject areas such as biology, ecology, chemistry, hydraulics, air and water treatment processes, risk assessment and management, and environmental modeling. The program prepares students to plan, design, construct, operate, and maintain facilities for the protection of human health and safety and the preservation of wildlife and the environment.

- Environmental consulting firms
- Government agencies
- Private industries involved in air and water pollution control, radiation protection, and hazardous waste management

Food, Agricultural, and Biological Engineering

Options: Food Engineering, Agricultural Engineering, Biological Engineering

Elective courses of this major are tailored to the specific requirements of each option. The program prepares graduates to identify and solve a range of engineering problems related to the production, processing, and distribution of food and other products or by-products of biological systems.

- Environmental and ecological consulting firms
- Food processing companies
- Government agricultural and natural resource agencies
- Heavy equipment design, testing, and manufacturing firms

Industrial and Systems Engineering

Areas of application: Manufacturing Systems, Human Factors, and Operations Engineering

The curriculum of this program includes the theory and methodology of industrial engineering. The major prepares students to design, improve, and install integrated systems of people, material, information, equipment, and energy.

- Banks and finance organizations
- Hospitals and health-care organizations
- Manufacturing industry
- Transportation industry

Materials Science and Engineering

Specializations: Biomaterials, Ceramics, Metallurgy

The materials engineering major teaches students the properties of materials and how to manipulate them for a wide range of engineering applications. Students have access to eight world-class materials research centers and extensive research facilities.

- Consulting firms
- Materials manufacturing companies
- Medical supply companies
- Research institutes

Mechanical Engineering

Areas of concentration: Biomechanical Systems, Automotive Engineering, Energy Systems

The mechanical engineering major prepares students to design, develop, and produce new technology in transportation, energy, machinery, and automatic controls. Hands-on laboratory courses are an integral part of the curriculum.

- Automotive and aerospace industries
- Manufacturing of consumer products
- Medical equipment manufacturers
- Plant operation and maintenance

Welding Engineering

The welding engineering program involves aspects of materials science, design, inspection, mechanical and electronic systems, lasers, and robots. The program is the only ABET accredited undergraduate program in welding engineering in North America. The program emphasizes hands-on and problem-solving learning experiences.

- Aerospace and transportation industries
- Construction and infrastructure design
- Design and manufacturing companies

Food, Agricultural, and Environmental Sciences

cfaes.osu.edu

The College of Food, Agricultural, and Environmental Sciences helps students turn beliefs and ideas into real-world inventions and innovations. The college provides students easy access to faculty with a 10:1 student-to-faculty ratio. Two-thirds of students in the college receive scholarships. Additionally, students are often offered research, study abroad, and internship opportunities beginning in the first year.

Majors

Career possibilities

Agricultural and Extension Education

This major focuses on education training as it relates to bioscience and includes the study of educational methods, program development, and agricultural biosciences. The program prepares students to teach plant and animal science.

- Agricultural and bioscience education
- Ohio State Extension (e.g., 4-H) program education or administration
- Soil and water conservation

Animal Sciences

Areas of interest: Genetics, Nutrition, Physiology, Behavior, Management, Food Biology

The animal sciences program offers courses in biology, chemistry, physics, economics, and social and environmental sciences as they relate to animals.

- Animal behavior
- Nutrition consulting
- Reproductive physiology

Crop Science

Specializations: Agronomy, Horticulture, Floriculture

The crop science major offers courses in biology, greenhouses and nurseries, weed science, and floriculture. The program prepares students to devise solutions to the changing problems in modern crop production and management.

- Molecular biology
- Plant genetics
- Research in breeding and genetics
- Vineyard or orchard farming

Entomology

The entomology curriculum includes courses in biology, mathematics, chemistry, physics, molecular genetics, microbiology, and entomology. Students also have opportunities for research and hands-on lab, field, and insect-rearing experience.

- Government agencies
- Pest control management
- Research

Environmental Science

Specializations: Ecosystem Restoration; Stream, Coastal, and Wetlands Science

The environmental science program allows students to explore how biology, organic chemistry, math, natural resources, and soil science all affect the environment. The major prepares students to discover natural solutions to environmental problems.

- Soil and water conservation
- Stream and coastal biology

Food Science

The food science major includes courses in microbiology, chemistry, and engineering. The program prepares students to develop new foods and new ways to manufacture and package existing food products.

- Flavor chemistry
- Food research
- Food safety
- Product development

Forestry, Fisheries, and Wildlife

This major focuses on the biological, economical, and social aspects of nature. Students learn science and management techniques used to support forests and their ecosystems.

- Wildlife biology
- Fisheries biology
- Urban forestry
- Wildlife refuge management

Plant Health Management

This major focuses on plant diseases and their management. Students learn plant pathology, encompassing microbiology, plant biology, molecular genetics, agriculture, and environmental science.

- Medicinal chemistry
- Plant breeding and genetics
- Plant pathology research or education
- Plant protection and quarantine

Natural and Mathematical Sciences

artsandsciences.osu.edu

There are fourteen majors within this grouping of biological, mathematical, and physical sciences in the College of Arts and Sciences. Numerous resources, including the Center for Life Sciences Education and the Mathematics and Statistics Learning Center, promote student success. Additionally, individual research is encouraged and showcased at research forums throughout the year. These majors not only prepare students for careers, but also are excellent preparation for graduate study which can lead to teaching and researching at the university level.

Majors

Career possibilities

Astronomy

The astronomy program is focused on astrophysics. Courses in the major include observational techniques, stellar structure and evolution, and cosmology. The major prepares students to conduct, analyze, and interpret observations of celestial bodies using the tools of modern theoretical physics.

- Observatories
- Planetariums
- Science museums

Biochemistry

The biochemistry curriculum emphasizes chemistry in the processes of living systems and allows students to gain a strong background in biotechnology, an area within biochemistry with increasingly new applications. The major is especially suitable as preparation for graduate study in biochemistry or health professions.

- Pharmaceutical companies
- Private research labs
- Research in hospitals and universities
- Sales

Biology

The biology major provides students a broad base of biological knowledge and a depth of experience in advanced topics. Students also study additional scientific disciplines that support biological endeavors.

- Health or environmental education
- Pharmaceutical companies
- Research
- Teaching and research at universities (requires graduate school)

Chemistry

The chemistry curriculum offers a number of courses in areas such as analytical, biological, inorganic, organic, physical, and theoretical chemistry. This variety gives students a broad range of education and research opportunities and prepares them for diverse career and educational experiences.

- Agriculture
- Food product companies
- Government laboratories
- Pharmaceutical companies

Computer and Information Sciences

The CIS program offers students a broad, liberal education in the physical sciences, mathematics, and humanities, along with intensive study in computer and information science.

- Computer systems analysis
- Database/network administration
- Programming
- Software engineering

Evolution and Ecology

This major focuses on the descent and interrelationships of organisms. The curriculum includes core courses in evolution, ecology, organismal diversity, molecular genetics, statistics, and a senior seminar in evolution and ecology.

- Environmental agencies
- Government agencies
- Laboratories
- Pharmaceutical companies
- Zoos

Geological Sciences

The geological sciences program offers opportunities for students to conduct field research, field observation, and geological mapping. The major prepares students to gather and interpret data about oceans, the atmosphere, and the solid earth in order to solve societal problems.

- Energy exploration
- Environmental consulting companies
- Government agencies and laboratories
- Petroleum and mining industries

Mathematics

The mathematics program provides a strong foundation in classical mathematics. The analytical and logical training of the curriculum helps students develop quantitative reasoning skills that prepare them for many diverse professions.

- Data analysis
- Education
- Federal and public administration
- Insurance and consulting firms

Microbiology

The curriculum of this program teaches how microorganisms are essential for the survival of all living organisms. Curriculum includes research and studies ranging from the structure of molecules to the analysis of whole organisms.

- Forensic science
- Hospital laboratories
- Hospital supply companies
- Pharmaceutical companies
- Research institutes

Molecular Genetics

The molecular genetics curriculum is concerned with current knowledge of the molecular nature of genes, their roles in controlling the function and development of organisms, their inheritance, and their evolution. The program prepares students to apply biological principles to practical problems in medicine, plant and animal breeding, and conservation.

- Agricultural companies
- Biotechnology industry
- Government agencies
- Pharmaceutical companies
- Research universities

Physics

The physics program includes the study of a broad range of natural phenomena, from submicroscopic elementary particles to the behavior of matter at the extremes of energy, temperature, distance, and time. This flexible major can accommodate students interested in physics as a career or those who pursue physics training to prepare for other career options.

- Design and development firms
- Government agencies

Plant Cellular and Molecular Biology

The major's core curriculum consists of plant biology, introductory biochemistry, general genetics, and laboratory experience.

- Government agencies
- Industrial or academic laboratories
- Pharmaceutical, chemical, and biotechnology companies

Zoology

The zoology major is designed for students who desire a degree in the natural sciences and whose main interest is in animals. The program provides real-world experience through field and laboratory classes as well as hands-on research. Students learn diverse approaches to thinking and problem-solving.

- Biological research
- Federal wildlife agencies
- Government agencies

Social and Behavioral Sciences

artsandsciences.osu.edu

Social and Behavioral Sciences attracts a large number of undergraduate majors at Ohio State. The Political Science, Geography, and Economics departments are among the highest ranked in their fields. The programs offer challenging curriculums, access to world-renowned faculty, and personal attention through academic advisors and clubs and organizations. Below are specific majors within Social and Behavioral Sciences that can lead to science-related career opportunities.

Majors

Career possibilities

Anthropology and Anthropological Sciences

Both of these majors provide students with an understanding and study of humankind's past, present, and future. Students gain hands-on experience through field work and research opportunities.

- Archaeology
- Education
- Forensic anthropology
- Government agencies
- Museums

Geography

Areas of study: Environment and Society; Atmospheric and Climate Studies; GIS and Spatial Analysis; Urban, Regional, and Global Studies

The geography program at Ohio State is ranked fourth among the geography programs in the nation.

- Geographic information systems (GIS)
- Meteorology
- Urban planning

Learning beyond the classroom

As one of the top public institutions in Ohio and in the nation, The Ohio State University is devoted to the success of the students who live and learn within the Ohio State community. The university recognizes that much student growth—both academic and social—takes place outside of classroom walls. To that end, Ohio State offers many opportunities that enhance classroom learning through co-curricular experiences. Some of those experiences are highlighted below.

Research opportunities at Ohio State

The Undergraduate Research Office helps students pursue research opportunities at Ohio State by connecting undergraduate researchers with faculty mentors and by providing information about finding, funding, and presenting research experiences.

Ohio State's annual spring Denman Undergraduate Research Forum—a combined effort of the Honors & Scholars Center, the Undergraduate Research Office, and the Office of Research—showcases outstanding student research.

For more information: undergraduateresearch.osu.edu, denman.osu.edu

Learning communities at Ohio State

Learning communities are residential experiences in which students of the same academic program or interest reside in the same residence hall. These communities feature faculty interaction, special programming, and community service. Ohio State offers four learning communities that may be of interest to students pursuing the fields of STEM: Engineering Focus Community; Engineering House Learning Community; Food, Agricultural, and Environmental Sciences Learning Community; and Women in Engineering Learning Community.

For more information: housing.osu.edu/lc.asp

Scholars programs at Ohio State

The Ohio State Scholars Program brings together high ability students interested in joining academically stimulating, close-knit communities. Each of the 14 programs emphasizes its own specific academic program, career, or special interest. There are two Scholars programs designed for students interested in the fields of STEM: Biological Sciences Scholars Program and Engineering Scholars Program.

For more information: honors-scholars.osu.edu

Student organizations at Ohio State

With over 1,000 student clubs and organizations on the Ohio State campus, opportunities to get involved are everywhere. Some clubs and organizations, listed below, are even designed for students pursuing a degree in math, engineering, and/or science.

- Institute of Industrial Engineers (www.ohiostateiie.org)
- National Society of Black Engineers (nsbe.org.ohio-state.edu)
- Women in Engineering (wie.osu.edu)
- Women in Math and Science (wims.osu.edu)

For more information: ohiounion.osu.edu/studentorgs



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