PURSUING A CAREER IN THE FIELDS OF STEM

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 prepares students to become highly 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 publication will introduce you to many 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 others can result in more varied 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 all majors offered at Ohio State at [majors.osu.edu](http://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 opportunities in your chosen field and open doors to research or teaching. Keep graduate school in mind when making decisions regarding your major, courses and co-curricular activities.
The College of Arts and Sciences is a dynamic fusion of art and humanities, social and behavioral sciences, and natural and mathematical sciences. The programs offer challenging curriculums, access to world-renowned faculty and personal attention through academic advisors and student organizations. Below are specific majors within the college that can lead to science-related career opportunities. Some of these majors not only prepare students for careers, but are also excellent preparation for graduate study which can lead to teaching and researching at the university level.

<table>
<thead>
<tr>
<th>Majors</th>
<th>Career possibilities</th>
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<tr>
<td><strong>Anthropology and Anthropological Sciences</strong>&lt;br&gt;Both of these majors explore the nature and history of the human condition in all times and places. Students gain hands-on experience through field work and research opportunities.</td>
<td>- Archaeology&lt;br&gt;- Education&lt;br&gt;- Forensic anthropology&lt;br&gt;- Government agencies&lt;br&gt;- Museums</td>
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<td><strong>Astronomy and Astrophysics</strong>&lt;br&gt;The astronomy and astrophysics major focuses on the study of planets, stars, galaxies and the universe as a whole. The major prepares students to conduct, analyze and interpret observations of celestial bodies using the tools of modern theoretical physics.</td>
<td>- Observatories&lt;br&gt;- Planetariums&lt;br&gt;- Science museums</td>
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<td><strong>Atmospheric Sciences</strong>&lt;br&gt;This program examines atmospheric systems on spatial and temporal scales. Students study topics such as weather forecasting, severe weather, micrometeorology, global climate change, climatology, atmospheric dynamics and thermodynamics.</td>
<td>- Air quality analysis&lt;br&gt;- Climatology&lt;br&gt;- Insurance industry&lt;br&gt;- Local, state and national parks&lt;br&gt;- National Weather Service&lt;br&gt;- U.S. Environmental Protection Agency</td>
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<td><strong>Biochemistry</strong>&lt;br&gt;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 innovative applications. The major is especially suitable as preparation for graduate study in biochemistry or health professions.</td>
<td>- Pharmaceutical companies&lt;br&gt;- Private research labs&lt;br&gt;- Research in hospitals and universities&lt;br&gt;- Sales</td>
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<td><strong>Biology</strong>&lt;br&gt;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.</td>
<td>- Health or environmental education&lt;br&gt;- Pharmaceutical companies&lt;br&gt;- Research&lt;br&gt;- Teaching and research at universities (requires graduate school)</td>
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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

Data Analytics  
Specializations: Business Analytics; Computational Analytics; Biomedical Informatics  
The undergraduate major in data analytics introduces students to a diverse and rapidly growing field with data at its core. Students explore the science behind big data and investigate the principles of data representation and management, software design, and statistical modeling and analysis.

- Banking
- Cyber-security
- Government
- Healthcare
- Insurance
- Logistics
- Military and legal systems
- Oil and gas
- Retail
- Scientific discovery

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

Earth Sciences  
The Earth 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

Geographic Information Science and Spatial Analysis  
Students in this program will learn the tools and methods for the management and analysis of geographic information. Students will study computer and web-enabled mapping patterns, issue analysis, exploratory spatial data analysis and spatial statistics, spatial decision support, and spatial database fundamentals.

- Computer systems management
- Data processing
- GIS consulting
- Software development

Geography  
The geography program is ranked as one of the top geography programs in the country. The Bachelor of Arts offers two specializations: environment and society and urban, regional and global studies. The Bachelor of Science offers three specializations: climatic studies, physical geography and spatial analysis.

- Geographic information systems (GIS)
- Meteorology
- Urban planning
### 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 microbiology program explores the essential nature of microorganisms in the survival of all living things. Students engage in research while studying the structure of molecules and the analysis of entire 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

### Neuroscience
**Specializations:** Cellular/Molecular Neuroscience, System/Behavioral Neuroscience, Cognitive/Computational Neuroscience
The neuroscience major combines diverse subjects such as psychology, biology, physics, computer science and more, to offer students a unique academic home to develop their understanding of many disciplines.

- Clinical psychology
- Medicine
- Pharmaceuticals
- Research

### Physics
Physics 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 interested in a related field.

- Design and development firms
- Government agencies

### Zoology
Designed for students with an interest in animals and the natural sciences, this program provides real-world experience through field and laboratory classes as well as hands-on research. Students develop critical-thinking skills and diverse approaches to problem solving.

- Biological research
- Federal wildlife agencies
- Government agencies
Engineering students at Ohio State have access to opportunities and resources that complement their academic experience. New students take a first-semester engineering survey course that introduces them to the major, are 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 robots and energy-efficient cars and homes.

### Majors

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<tr>
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<th>Career possibilities</th>
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<tr>
<td><strong>Aeronautical and Astronautical Engineering</strong></td>
<td>• Aircraft, guided missile and space vehicle industries&lt;br&gt;• Business and engineering firms&lt;br&gt;• Commercial airlines</td>
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<tr>
<td><strong>Specializations:</strong> Structural Design, Navigation and Control, Instrumentation and Communication</td>
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<td>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.</td>
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<tr>
<td><strong>Aviation</strong></td>
<td>• Airport and aviation support systems&lt;br&gt;• Airport planning management&lt;br&gt;• Commercial airlines</td>
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<td><strong>Specializations:</strong> Aviation Management, Professional Pilot</td>
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<td>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.</td>
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<td><strong>Biomedical Engineering</strong></td>
<td>• Hospitals and health care facilities&lt;br&gt;• Medical equipment manufacturers&lt;br&gt;• Research at educational or medical institutions</td>
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<td><strong>Specializations:</strong> Bioimaging, Biomaterials, Biomechanics</td>
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<td>This 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.</td>
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<td><strong>Chemical Engineering</strong></td>
<td>• Consulting organizations&lt;br&gt;• Department of Energy&lt;br&gt;• Petroleum, plastics, food processing, environmental and cosmetic industries&lt;br&gt;• Pharmaceutical research</td>
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<tr>
<td><strong>Civil Engineering</strong></td>
<td>• Construction industry&lt;br&gt;• Oil and fuel refineries&lt;br&gt;• Transportation and infrastructure&lt;br&gt;• Utility companies</td>
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<tr>
<td>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.</td>
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Computer Science and Engineering
Focus Areas: Computer Graphics, Computer Games, Artificial Intelligence, Data Analytics
This 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
Options: Electrical Engineering, 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
- Manufacturing and industrial firms
- Medical instrumentation
- Public utilities

Engineering Physics
This interdisciplinary program combines engineering disciplines with physics and mathematics. Through this program students can develop a strong back-ground 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, Ecological 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
Specializations: Data Analytics and Optimization, Human-Systems Integration and Design, Management Systems and Operations Research, Manufacturing, Supply Chain Management
This program's curriculum 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.

Materials Science and Engineering
Focus areas: Biomaterials, Ceramics, Electronic Materials, Metallurgy, Polymers
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.

Mechanical Engineering
Areas of application: Automotive Systems, Biomechanical Systems, Energy and Environmental Quality, Materials and Manufacturing, Micro and Nanotechnology, Nuclear Science
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.

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

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

Agricultural Systems Management
Students study how to manage agricultural production and processing systems, including field production machinery, irrigation and drainage systems, processing equipment or commodity handling, and storage facilities.

Career possibilities

- Equipment management
- Grain merchandising
Agriscience Education
This major focuses on education training as it relates to bioscience, including 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
Specializations: Animal Biosciences, Animal Industries, Veterinary Technology
This program offers courses in biology, chemistry, physics, economics, and social and environmental sciences as they relate to animals.
- Animal behavior
- Nutrition consulting
- Reproductive physiology

Construction Systems Management
This program educates students in the technical, analytical and business aspects of construction. Students learn how to plan and manage the construction of residential and commercial buildings as well as other infrastructure.
- Commercial construction
- Individual contracting
- Project safety specialist

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; Environmental Molecular Science; Environmental Science Education; Soil Resources and Environmental Sustainability; Water Science
This program focuses on the environment, its components and processes, and ways to manage and restore the ecosystems within it. Students investigate the mechanisms behind climate change and develop approaches to sustainably manage Earth’s resources.
- Soil and water conservation
- Stream and coastal biology

Food Science and Technology
The food science and technology 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
Specializations: Fisheries and Aquatic Sciences, Forest Ecosystem Science and Management, Forestry and Wildlife, Wildlife and Fisheries Sciences, Wildlife and Pre-Veterinary Science, Wildlife Science
This major focuses on sustainable solutions for managing forest lands, freshwater and coastal ecosystems, and fish and wildlife. Students explore human use of habitats, landscape restoration, and habitat and species conservation.
- Fisheries biology
- Urban forestry
- Wildlife biology
- Wildlife refuge management
**Meat Science**
This program focuses on anatomy, muscle biology, meat processing and food safety. Students will learn to process and add value to the meat product they are developing to provide consumers with muscle food products that deliver a wholesome, nutritious and desirable eating experience.
- Management in meat packing plants
- Product development
- USDA meat inspection

**Plant Health Management**
This major focuses on plant diseases and their management. Students learn plant pathology, microbiology, plant biology, molecular genetics, agriculture and environmental science.
- Medicinal chemistry
- Plant breeding and genetics
- Plant pathology research or education
- Plant protection and quarantine

**Plant Pathology**
Students in this major study plant diseases that devastate crops, forests and landscapes in areas ranging from molecular genetics to applied aspects of plant disease management.
- Clinical diagnostics
- Medicinal chemistry
- Plant protection and quarantine

**Sustainable Plant Systems**
Specializations: Agronomy, Horticulture, Landscape Design and Management, and Turfgrass Science
The sustainable plant systems major offers courses in biology, greenhouses and nurseries, weed science, turfgrass, and floriculture. The program prepares students to devise solutions to the changing problems in plant systems.
- Chemical dealer
- Lawncare specialist
- Molecular biology
- Research in breeding and genetics

**Knowlton School**
knowlton.osu.edu
The Knowlton School educates students to shape the world from the design of a singular building to the development of an entire metropolitan region. The school's academic programs fuse science and technology with history and theory through the creative act of design. Students propose new ideas and solutions to specific problems and present those ideas to peers, faculty and public clients. Each of the school's majors offer career opportunities related to science and technology.

**Majors**

**Architecture**
Design studios are the heart of the architecture curriculum. In the studio, students combine ideas about the world with the use of fabrication technology and graphic representation skills. Physical models and computer renderings are used to communicate these ideas.
- Architecture
- Allied fields of engineering, graphic design, landscape architecture and urban design
- Construction and infrastructure
- Digital fabrication

**City and Regional Planning**
This program’s curriculum includes courses on history, transportation, policy and law, international and community development, and economics. Real-world experience occurs in the planning studio where students work directly with clients and professionals to create planning solutions and improve quality of life for a community.
- Allied fields of landscape architecture and urban design
- City and regional planning
- Data analysis and forecasting
- Federal, state and local government
- Geographic Information Systems (GIS)
- Transportation and infrastructure
Undergraduate Minors

A minor is the perfect complement to any major. Ohio State offers over 100 minors all designed to lend additional depth or breadth to your academic interest while strengthening your major and enhancing your marketability. Below is a list of selected minors available to students with an interest in STEM.

Agricultural Systems Management
Agronomy
Air Science
Animal Nutrition
Animal Sciences
Anthropology – 3 tracks (Archaeology, Cultural, Physical)
Architectural Studies
Astronomy and Astrophysics
Aviation
Biochemistry
Biological Bases of Behavior
Biology
Biomedical Engineering
Chemistry
City and Regional Planning
Cognitive Science
Communication Technology
Computational Science
Computer and Information Science
Earth Sciences – 8 Tracks (Earth Sciences, Economic Geology, Environmental Studies, Geoarchaeology, Geochemistry, Geophysics, Mineralogy and Petrology, Paleontology)
Engineering Sciences
Entomology
Environmental Engineering
Environmental Science
Equine Science
Evolution and Ecology
Evolutionary Studies
Food Processing
Food Safety
Forensic Science
Forestry, Fisheries and Wildlife
General Psychology
Geography
Geographic Information Science
Horticulture
Human Development and Family Science
Human Nutrition
Landscape Architecture
Landscape Architectural Studies
Landscape Construction
Landscape Design and Management
Linguistics
Mathematics
Meat Science
Microbiology
Military Sciences
Molecular Genetics
Neuroscience
Nuclear Engineering
Physics
Plant Cellular and Molecular Biology
Plant Pathology
Production Agriculture
Psychology
Psychology Research
Soil Science
Speech and Hearing Science
Statistics
Surveying and Mapping
Sustainable Agriculture
Technology Studies
Zoology

Landscape Architecture
The studio-driven curriculum of the landscape architecture program prepares students to design spaces of beauty, meaning, wellness and diversity; protect valuable resources; and address critical social and ecological challenges. Students use a variety of fabrication technology and representation skills to communicate ideas.
Exploring Sciences and Technology

exploration.osu.edu/prospective-students

For incoming freshmen who are interested in the sciences, technology, environment and mathematics but undecided on a major, University Exploration is a valuable resource. University Exploration offers six specialized areas from which students can investigate majors. Science, Technology and Environment Exploration, one of these areas, allows students to participate in rigorous courses while looking at the differences between theoretical and applied sciences to determine which one best fits their strengths, interests and values.

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 three learning communities that may be of interest to students pursuing the fields of STEM: Engineering House Learning Community; Food, Agricultural and Environmental Sciences Learning Community; and Women in Engineering Learning Community.

For more information: housing.osu.edu/learning-communities

Scholars programs at Ohio State

The Ohio State Scholars Program brings together high ability students interested in joining academically stimulating, close-knit communities. Each program emphasizes its own specific academic area, career or special interest. The following Scholars programs are designed for students interested in the fields of STEM: Architecture, Landscape and City Scholars; Biological Sciences Scholars; Environment and Natural Resources Scholars; Green Engineering Scholars; Humanitarian Engineering Scholars; and STEM Exploration and Engagement Scholars.

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)
- TerrAqua (terraqua.org.ohio-state.edu)