



Aerospace Engineering

The sky's the limit! For those who enjoy putting things in motion, aerospace engineering strikes a chord. Be it a satellite observing the Martian atmosphere, a turbine engine from a commercial airliner, a fixture for testing performance of a defensive missile, or an active ballast for reducing sway in an ocean liner, aerospace engineers are on the job.

Where do Aerospace Engineers Work?

Aerospace engineers work in a variety of organizations, including:

- NASA Flight and Research Centers
- Robotics Companies
- Automotive Facilities
- Department of Defense
- Private/Commercial Space Firms

Explore Our Aerospace Curriculum

Grades 3-5:

Rocket Power
Pop Rockets
Strawkets and Weight

Grades 6-8:

Action-Reaction! Rocket
Solar Sails: The Future of Space Travel
Building-Testing-Improving Paper Airplanes...

Grades 9-12:

Rocket Launch Time: Flying with Style
Linear Equations Game
Rocketry Calculations: Houston, We Have a Problem!

Aerospace engineering spans many disciplines, but is generally broken into a few subfields:

astrodynamics, flight structures and materials, propulsion and fluid dynamics, instrumentation, control systems, and navigation.

What do Aerospace Engineers Study?

Aerospace engineers study parts of other engineering disciplines in order to create larger systems. Combining aspects of mechanical, electrical, software, and chemical engineering with math and physics, aerospace engineers design ways of fitting multiple parts of a project together. They focus on things like optimizing performance, and characterizing new technologies. Aerospace engineers are exposed to lots of useful tools, like mechanical CAD (*for designing structures*), circuit analysis software (*for creating electrical systems*), computation programs (*for handling complex calculations like interplanetary trajectory planning*), and data acquisition tools (*for testing and analyzing design performance*).



Agricultural Engineering

Making farms more efficient! By integrating technological principles into food growing and processing, agricultural engineers help farmers produce larger crop yields while improving sustainability. Agricultural engineering is involved with the food production chain, from developing seeds to designing and testing farm equipment. They also optimize transportation and storage.

Where do Agricultural Engineers Work?

Agricultural engineers work in a variety of organizations, including:

- United States Department of Agriculture
- State agriculture extension programs
- Foreign Agricultural Service (USDA)
- Farm equipment manufacturers
- Engineering consulting firms

Explore Our Agricultural Curriculum

Grades 3-5:

Cutting Through Soil
Lab Experiments in Rebuilding Soil with Biochar
Plant Cycles: Photosynthesis & Transpiration

Grades 6-8:

Rooftop Gardens
Soil Biosolarization: Using Waste & Sunshine to...
Sun Keeps the Pests Away: How Soil Solarization...

Agricultural engineering spans many disciplines, but is generally broken into a few subfields:

soil science, plant biology, organic chemistry, climatology and atmospheric science, along with engineering practices around equipment design, molecular optimization, and waste management.

What do Agricultural Engineers Study?

A combination of many engineering disciplines, including environmental, civil, and chemical, agricultural engineering requires an understanding of a wide array of key principles. Agricultural engineers may study farming sciences such as soil science, plant biology, organic chemistry, climatology and atmospheric science, along with engineering practices around equipment design, molecular optimization, and waste management. Agricultural engineers also work on specialized projects that help grow their knowledge of the manufacturing involved in raising crops and animals for food and other consumer products.



Biomedical Engineering

Globally, biomedical engineers contribute to improving access to effective, safe, quality and affordable medicines, medical technologies and devices through the development of new innovative solutions. Biomedical engineers apply their knowledge of analytical and design principles to the development, testing and analysis of novel and improved medical treatments and devices.

Where do Biomedical Engineers Work?

Biomedical engineers work in a variety of organizations, including:

- Medical research facilities
- Medical device and instrument companies
- Pharmaceutical companies
- Biotechnology firms

Explore Our Biomedical Curriculum

Grades 3-5:

Kidney Filtering
The Artificial Bicep
Biohazard Protection Design Project: Suit Up!

Grades 6-8:

Saving a Life: Heart Valve Replacement
Prosthetic Party: Build and Test Replacement Legs
Designing Medical Devices to Extract Foreign...

Grades 9-12:

Artificial Heart Design Challenge
Help Bill! Bioprinting Skin, Muscle and Bone
Designing a Robotic Surgical Device

Biomedical engineering spans many disciplines, but is generally broken into a few subfields:

math, physics, chemistry, design, human biology, anatomy, physiology, biomechanics, neuroscience and bioethics

What do Biomedical Engineers Study?

Biomedical engineers work to design, build and test medical equipment. They meet with physicians, patients, or other clinical partners to take measurements, collect data and learn about a user's needs. They will research different materials to use in new equipment and manufacturing techniques to make equipment light and efficient. A biomedical engineer may use computer programs to model how new equipment works, analyze results, and draft reports and presentations to share key findings. Biomedical engineers learn to design diagnostic tools, medical devices, artificial organs and prosthetics.



Chem & Bio Engineering

Chemical and biological engineers harness organic and inorganic forms of matter to improve the world. Whether it's optimizing the composition of a substance or developing new products that are stronger and more reliable, chemical and biological engineers develop exciting new technologies for a variety of industries, including energy, agriculture, and environmental science.

Where do Chemical & Biological Engineers Work?

Chemical and biological engineers work in a variety of organizations, including:

- National research labs
- Pharmaceutical companies
- Industrial manufacturing
- Food engineering research

Explore Our Chemical & Biological Curriculum

Grades 3-5:

Acid Attack
Stretching to Compare Properties: The Plastic Test
Acid Rain Effects

Grades 6-8:

Red Cabbage Chemistry
Chromatography Lab
Edible Algae Models

Grades 9-12:

Bio-Engineering: Making and Testing Model Proteins
Bridging to Polymers: Thermoset Lab
Creepy Silly Putty

Chemical & biological engineering spans many disciplines, but is generally broken into a few subfields:

chemistry, chemical processes, petrochemical engineering, nanotechnology, plastics, materials engineering biology, biochemical engineering, environmental health engineering, bioinformatics

What do Chemical & Biological Engineers Study?

Chemical and biological engineers work to solve challenges involving chemical, biological, and physical phenomena. Areas of academic study include a range of natural sciences and systems, such as human physiology, plant biology, environmental science, organic and physical chemistry, depending on the topic of focus, and a focus on key engineering concepts such as mass balances, properties of materials, computer modeling and product design.



Civil Engineering

If you can dream it, civil engineers can build it! Almost every piece of infrastructure you see (and lots you don't) were designed by civil engineers: buildings, bridges, tunnels, dams, highways, airports, water and sewer systems. Civil engineers meet the needs of the future by balancing human demands with the requirements for healthy, natural environments.

Where do Civil Engineers Work?

Civil engineers work in a variety of organizations, including:

- Structural Design Firms
- Geotechnical Consulting Firms
- Commercial Construction Firms
- Residential Development Firms
- Departments of Transportation

Explore Our Civil Curriculum

Grades 3-5:

Dam Forces
Test & Improve: Making Tall & Strong Recycled...
Building Our Bridge to Fun!

Grades 6-8:

Protecting Our City with Levees
Breaking Beams
Construction Technologies: Create the Strongest...

Grades 9-12:

Preventing Potholes
Pump It! Design-Build-Test Helpful Village Water...
Boom Construction

Civil engineering spans many disciplines, but is generally broken into a few subfields:

built environments, architectural, construction, geotechnical and earthquakes, transportation and water resources.

What do Civil Engineers Study?

To address the complex problems we face with designing and implementing infrastructure to serve a growing population, civil engineers need to understand a wide array of systems and how they interact. Designing energy and resource efficient structures, roads, bridges and treatment systems requires engineers to have an understanding of properties of materials, computer-aided design, environmental factors, statics and dynamics. Civil engineers collaborate with other engineers on heating and cooling systems, electrical systems and finding ways to minimize environmental impact of new construction.



Environmental Engineering

Environmental engineers find solutions to the world's largest problems. With rapid population growth, urbanization, and climate change, our world is facing challenges to ensure environmental and human systems thrive. They work to provide clean drinking water, sanitation, improve air quality, and remediate polluted sites.

Where do Environmental Engineers Work?

Environmental engineers work in a variety of organizations, including:

- public utilities
- oil and gas production firms
- construction companies
- consulting firms
- local, federal or international governing bodies
- environmental non-profit organizations

Explore Our Environmental Curriculum

Grades 3-5:

Modeling Oil on the Ocean:...
Biodomes Engineering Design Project: Lessons 2-6
Clean Enough to Drink:...

Grades 6-8:

Small-Scale Modeling of Oil Spill Cleanup Methods
Microbes Know How to Work!
Just Breathe Green: Measuring Transpiration Rates

Grades 9-12:

Creating Mini Wastewater Treatment Plants
Zero-Energy Housing
Save a Life, Clean Some Water!

Environmental engineering spans many disciplines, but is generally broken into a few subfields:

math, physics, chemistry, along with understanding of environmental sciences such as biology, water chemistry, hydrology and atmospheric science.

What do Environmental Engineers Study?

Environmental engineers learn about how contaminants move through different ecosystems, how to design for sustainability, and the importance of life cycle assessment. Environmental engineers gain expertise in how to design water and wastewater treatment systems, how to reduce air pollution and how to remediate sites impacted by hazardous materials.



Electrical Engineering

Harnessing the power of electricity! Electrical engineers contribute to a wide variety of projects. With an understanding of electricity, electronics and electromagnetism, they design systems which process information and transmit energy. Electrical engineers also work with engineers from other disciplines to design, build and test products for virtually every industry.

Where do Electrical Engineers Work?

Electrical engineers work in a variety of organizations, including:

- Renewable Energy Firms
- Power Generation and Distribution
- Electronics Manufacturers
- Construction Building Systems Companies
- Automotive and Aerospace Industries

Explore Our Electrical Curriculum

Grades 3-5:

Potato Power
Light Your Way: Design-Build a Series Circuit Flashlight
Build a Toy Workshop

Grades 6-8:

Yogurt Cup Speakers
Saltwater Circuit
LilyTiny Plush Monsters Are Alive!

Grades 9-12:

Designing a Thermostat
SIK Keyboard Instrument
Building a Piezoelectric Generator

Electrical engineering spans many disciplines, but is generally broken into a few subfields:

energy systems, power engineering, microelectronics, systems and control, telecommunications and signal processing, digital and analog electronics.

What do Electrical Engineers Study?

Electrical engineers focus on coursework that allow them to understand the systems that power our society. In addition to mastering a background in mathematics and physics, electrical engineers specialize in a range of disciplines such as communications, circuits, electromagnetics, digital and analog electronics, telecommunication, digital signal processing, and controls. Electrical engineers may also participate in elective courses that broaden their training through hands-on projects using electrical devices and machines.