Aerospace Engineers

SOC Code 17-2011 • Projected Growth (2020)

Description

What Aerospace Engineers Do

Aerospace engineers design aircrafts, spacecrafts, satellites, and missiles. In addition, they test prototypes to make sure that they function according to design.

Duties

- Direct and coordinate the design, manufacture, and testing of aircraft and aerospace products
- Assess proposals for projects to determine if they are technically and financially feasible
- Determine if proposed projects will result in safe aircraft and parts
- Evaluate designs to see that products meet engineering principles, customer requirements, and environmental challenges
- Develop acceptance criteria for design methods, quality standards, sustainment after delivery and completion dates
- Ensure that projects meet quality standards
- Inspect malfunctioning or damaged products to identify sources of problems and possible solutions

Training Opportunities Linked to Those Jobs

(Degree Types and Colleges/Universities**)**

How to Become an Aerospace Engineer

Aerospace engineers must have a bachelor's degree in aerospace engineering or some other field of engineering or science related to aerospace systems. Some aerospace engineers work on projects that are related to national defense and thus require security clearances. U.S. citizenship may be required for certain types and levels of clearances.

Education and Training

Entry-level aerospace engineers usually need a bachelor's degree. High school students interested in studying aerospace engineering should take courses in chemistry, physics, and mathematics, including algebra, trigonometry, and calculus.

Bachelor's degree programs are designed to take 4 years and include classroom, laboratory, and field studies in subjects such as general engineering principles, propulsion, stability and control, structures, mechanics, and aerodynamics, which is the study of how air interacts with moving objects.

Some colleges and universities offer cooperative programs, in partnership with industry, that give students practical experience while they complete their education. Cooperative programs and internships allow students to get valuable experience and to finance part of their education.

At some universities, a student can enroll in a 5-year program that leads to both a bachelor's degree and master's degree upon completion. A graduate degree will allow an engineer to work as an instructor at a university or to do research and development. Programs in aerospace engineering are accredited by ABET (formerly the Accreditation Board for Engineering and Technology).

Licenses

Aerospace engineers are not required to be licensed at the entry level. More experienced aerospace engineers, who have more responsibility, must be licensed as professional engineers (PE). Licensure generally requires the following:

- A degree from an engineering program accredited by ABET
- A passing score on the Fundamentals of Engineering (FE) exam
- Relevant work experience
- A passing score on the Professional Engineering (PE) exam

The initial Fundamentals of Engineering (FE) exam can be taken right after graduating with a bachelor's degree. Engineers who pass
this exam commonly are called engineers in training (EITs) or engineer interns (EIs). After acquiring suitable work experience, EITs can take the second exam, called the Principles and Practice of Engineering exam.

Several states require engineers to take continuing education courses to keep their licenses. Most states recognize licenses from other states, as long as the other states' licensing requirements meet or exceed their own licensing requirements.

Advancement

Eventually, aerospace engineers may advance to become technical specialists or to supervise a team of engineers and technicians. Some may even become engineering managers or move into executive positions, such as program managers. However, preparation for assuming a managerial position usually requires serving an apprenticeship under a more experienced aerospace engineer. For more information, see the profile on architectural and engineering managers.

Important Qualities

Analytical skills. Aerospace engineers must be able to identify design elements that may not be meeting requirements in particular operating environments and then formulate alternatives to improve their performance.

Business skills. Much of the work done by aerospace engineers involves meeting federal government standards. Meeting these standards often requires knowledge of standard business practices, as well as knowledge of commercial law.

Critical-thinking skills. Aerospace engineers must be able to translate a set of issues into requirements and to figure out why a particular design does not work. They must be able to ask the right question and then to find an acceptable answer.

Math skills. Aerospace engineers use the principals of calculus, trigonometry, and other advanced topics in mathematics for analysis, design, and troubleshooting in their work.

Teamwork. Aerospace engineers must work with other professionals involved in designing and building aircraft, spacecraft, and their components. They must be able to communicate well, divide work into manageable tasks, and work with others toward a common goal.

Writing skills. Aerospace engineers work with many other professionals, often other kinds of engineers. They must be able to write papers that explain their designs clearly to these professionals. They must also create documentation for future reference.

Postsecondary Education

Texas Southmost College	South Texas College	Texas State Technical College	The University of Texas at Brownsville	The University of Texas - Pan American
	Associated of Science in Engineering		Bachelors of Science in Engineering Physics	Bachelors of Science in Civil Engineering

Local Employers

Ambiotec Group	Brownsville		Rike-Ogden-Figueroa Architects	Harlingen
Chemical Response & Rmdtn	Harlingen		Rios Surveying CO	San Benito
Control Engineering Assoc	Harlingen		Taylor Craft Aviation	Brownsville
Homeland Surveying CO	Brownsville		Trinity Testing Laboratories	La Feria
NRS Consulting Engineers	Harlingen		University of Texas	Brownsville

Career Options

(Specific Job Types)

- Aerospace Engineer
- Flight Test Engineer
- Design Engineer
- Systems Engineer
- Structures Engineer
- Test Engineer
- Aeronautical Engineer
- Aerospace Stress Engineer
- Avionics Engineer
- Flight System Test Engineer

Salary Ranges

Wages for **Aerospace Engineers**

Location	Pay Period	2012				
		10%	25%	Median	75%	90%
United States	Hourly	$31.47	$39.37	$49.87	$61.33	$71.69
	Yearly	$65,500	$81,900	$103,700	$127,600	$149,100
Texas	Hourly	$29.56	$38.55	$51.20	$62.90	$72.25
	Yearly	$61,500	$80,200	$106,500	$130,800	$150,300

Professional Associations linked to the Careers

For information about general engineering education and career resources, visit
American Society for Engineering Education
Technology Student Association

For more information about licensure as an aerospace engineer, visit
National Council of Examiners for Engineering and Surveying
National Society of Professional Engineers

For information about accredited engineering programs, visit
ABET

For information about licensure and current developments in the aeronautics, visit
American Institute of Aeronautics and Astronautics

Sources

The information provided in this document was collected from the following sources:

- Occupational Outlook Handbook (http://www.bls.gov/ooh/)
- O*NET OnLine (http://www.onetonline.org/)
- Texas CARES (http://www.texascaresonline.com/)
- CareerOneStop (http://www.careeronestop.org/)

Aerospace Engineers

Cluster Overview: Planning, managing, and providing scientific research and professional and technical services including laboratory and testing services, and research and

Career Goal (O*NET Code): (17-2011) - Aerospace engineers design aircraft, spacecraft, satellites, and missiles. In addition, they test prototypes to make sure that they function according to design.

Student Name: _____

School: _____

SUGGESTED COURSEWORK

Middle School	8th	***HS Courses:***	(Local districts may list high school credit courses here)
High School	9th	***Core Courses:***	English I Algebra I nguages other than English I Biology World Geography La
		Career-Related Electives:	Introduction to Engineering Design
	10th	***Core Courses:***	English II Geometry World History La
		Career-Related Electives:	Principles of Engineering
	11th	***Core Courses:***	English III Algebra II Communications United States History Professional
		Career-Related Electives:	Digital Electronics
	12th	***Core Courses:***	English IV Precalculus/Engineering Mathematics Engineering Design & Problem Solving Government/Economics Fine Arts recommended
		Career-Related Electives:	Engineering Design and Development, Civil Engineering Design and Architecture, Computer

EXTENDED LEARNING

Curricular Experiences:

Camp SOAR-Aerospace Engineering-Texas A&M University
Aerospace Academy-San Jacinto College
Project Lead
the Way
Skills USA
Technology Student Association
The Infinity Project

Career Learning Experiences:

Career
Preparatio
n Job
Shadowing
Internship

Extracurricular Experiences:

Destination ImagiNation
High School Students
United with NASA
International Bridge
Building Contest
Marine Advanced Technology Education Center
National Engineering Design Competition
UIL Academic Competitions
Aerospace Summer Camps

Service Learning Experiences:

Campus Service
Organizations

COLLEGE CREDIT OPPORTUNITIES -- High School

Students should take Advanced Placement (AP), International Baccalaureate (IB), dual credit, Advanced Technical Credit (ATC), or locally articulated credit courses, if possible. List those courses that count for college credit on your campus.

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Postsecondary

Texas Southmost College South Texas College Texas State Technical College	
University of Texas at Brownsville University of Texas - Pan American	
BS in Engineering Physics - Computer Engineering	BS in Computer Engineering
BS in Engineering Physics - Electrical Engineering	BS in Electrical Engineering
BS in Engineering Physics - Mechanical Engineering	BS in Manufacturing Engineering
	BS in Mechanical Engineering

Career Options:

Aerospace Engineer	Test Engineer
Flight Test Engineer	Aeronautical Engineer
Design Engineer	Avionics Engineer
Systems Engineer	Flight Systems Test Engineer
Structures Engineer	Aerospace Stress Engineer

Professional Associations:

American Chemical Society
American Institute of Aeronautics and Astronautics
American Institute of Chemical Engineering
American Society of Agricultural & Biological Engineers
American Society of Civil Engineers
American Society for Engineering Education
American Society of Mechanical Engineers
Electronics Technicians Association International
Institute of Electrical and Electronic Engineers
International Technology Education Association
Mathematical Association of America
National Academy of Engineering
National Coalition for Electronics

Students may select other elective courses for personal enrichment purposes.

This plan of study serves as a guide, along with other career planning materials, for pursuing a career path and is based on the most recent information as of 2012. All plans