I Want to Be an Engineer!

software
nuclear
systems
aerospace
electrical
mechanical
Welcome!

Are you good at math and science? Are you creative? Do you like solving puzzles? Are you curious about how things work? Do you want to make a difference in the world? If so, have you considered a career in engineering?

Engineering offers the opportunity to do an amazing array of challenging things, earn a very good salary, work in different parts of the world, and even go out of this world—some engineers also become astronauts!

Engineers have had something to do with pretty much everything around you—from the building where you go to school; to the house where you live, to the clothes you wear, and the food you eat; to the things you do for fun. Some engineers even work on projects that help people stay safe or recover from illness.

While earnings for engineers vary by discipline, as a group engineers earn some of the highest average starting salaries among college graduates. According to the U.S. Department of Labor, career opportunities in engineering are only expected to increase for the future engineers sitting in classrooms today. In the coming years, many of these job openings will arise from the need to replace engineers who retire or who move into management, sales or other professional opportunities.

In this brochure, you can find out more about engineering, what to do now to prepare for a career in engineering—or at least to have the option to consider it later—and learn about some of the engineering disciplines at Lockheed Martin. Headquartered in Bethesda, Maryland, Lockheed Martin employs about 140,000 people worldwide and is one of the leading systems and technology companies in the world. Lockheed Martin engineers work on exciting technical challenges for projects of global significance. Throughout this brochure, you’ll get a chance to meet some of those engineers up close and personal.

“All disciplines of engineering offer great career opportunities simply because there are so many to choose from. Everything you use on a day-to-day basis was somehow engineered before you bought it and brought it home. An engineering degree is very versatile and allows you to look for jobs in almost any area of interest.”

—Kimberly Quinlan works for Lockheed Martin in Gaithersburg, Maryland, as a senior project engineer. She has a bachelor’s degree in electrical engineering from Purdue University and a master’s degree in electrical engineering from the Florida Institute of Technology.

It’s a Fact!

Engineers don’t just work on serious things like skyscrapers and space shuttles. They work on fun stuff, too. An engineer designed the snowboard—and the rides at Disney World. And an engineer with degrees in both mechanical and nuclear engineering “accidentally” invented the Super Soaker® squirt gun!
About Engineering

Engineering is the largest of all the scientific and technical professions. In fact, among all professions, only elementary and secondary teaching employs more people. Engineering is also a very diverse profession. For example, at Lockheed Martin engineers work in a variety of different disciplines—aerospace, electrical, mechanical, nuclear, software, and systems engineering.

Because engineers work with leading-edge technology, their jobs are always changing in this exciting profession. The work they do is important and touches every aspect of our daily lives—from designing bridges and buildings; to making sure our water is clean; to ensuring we have power for heating and lighting; to space exploration and health care and global security; to equipping us with computers, iPods, cell phones, and video games.

One of the most important things you can do now to keep your career options open is to take the right courses in school—including algebra, geometry, biology, chemistry, and physics. Every profession looks for well-rounded people, and engineering is no exception!

“A great thing about an engineering degree is the opportunity to do other things in the company. Someone with an engineering background can move into sales, marketing, finance, etc., within a technical company. Engineers can branch out in lots of different directions.”

— Neil Jones works for Lockheed Martin in Dallas, Texas, as a manufacturing engineer. He has a bachelor’s degree in electronics engineering from the University of North Texas and master’s degrees in systems engineering and management from Southern Methodist University.

It’s a Fact!

While earning his bachelor’s degree in engineering at the University of Michigan, Larry Page built an inkjet printer out of Lego™ bricks. Enrolling later at Stanford University in the Ph.D. program in computer science, he met Sergey Brin, who had a bachelor’s degree in mathematics and computer science from the University of Maryland at College Park. Together, Page and Brin co-founded Google™ in 1998.

Students who complete these courses:

- Algebra I .................................................. 8%
- Geometry .................................................. 23%
- Algebra II .................................................. 40%
- Trigonometry ............................................. 62%
- Pre-Calculus ............................................. 62%
- Calculus .................................................... 74%

Have this chance of earning a college degree:

- Algebra I .................................................. 8%
- Geometry .................................................. 23%
- Algebra II .................................................. 40%
- Trigonometry ............................................. 62%
- Pre-Calculus ............................................. 74%
- Calculus .................................................... 80%

*From www.learndoearn.org
The field of engineering is full of amazing accomplishments and interesting people. How much do you know about them? Take this quiz and check your Knowledge Quotient (KQ)!

**True or False?**

1. The Chesapeake Bay Bridge-Tunnel, which connects Virginia Beach, Virginia, with the Eastern Shore of Virginia, is one of the seven engineering wonders of the modern world.

2. Biomedical engineers work in research labs.

3. Civil engineers work in the judicial system.

4. Henry Robert, author of *Robert’s Rules of Order*, was also an engineer.

5. No engineer has ever been president or CEO of a company.

6. Although engineering is not a new profession, college engineering programs have only existed for about the last 100 years.

7. Some engineers work in the clothing and textile industries.

8. Engineering is all about math and science, so those are the subjects that really count.

9. There are only about a dozen good engineering schools worldwide today.

10. It’s very important to know what specialty you want to pursue before you enter a college engineering program.

"My dad always told me to go to college and to be successful doing what I enjoy. I became interested in engineering in college while learning statics (the branch of physics concerned with the analysis of loads on physical systems) and computer-aided drafting."

—Jorge Arturo Gudino works for Lockheed Martin in Palmdale, California, as a senior research engineer. He has an associate degree in science engineering from Los Angeles Mission College, and a bachelor’s degree in manufacturing systems engineering and a master’s degree in automation engineering from California State University-Northridge.

**Engineering KQ Answers**

1. True

2. False

3. False

4. True

5. False

6. True

7. True

8. False

9. True

10. False
There are lots of things you can do now—in addition to doing your best in school—to keep your career options open. Get involved in extracurricular activities and read and learn all you can about engineering as a career.

**Activities and Competitions**
Here are a few engineering-oriented activities that you might want to check out. Ask your teacher or guidance counselor about them.

- **FIRST Robotics Competition** ([www.usfirst.org](http://www.usfirst.org))—teams of high school students build robots using a standard “kit of parts” and a common set of rules and enter them in competitions.
- **National Engineers Week** ([www.eweek.org](http://www.eweek.org))—a week-long celebration plus competitions and activities for students at all grade levels.
- **National Science Bowl** ([www.scied.science.doe.gov/nsb](http://www.scied.science.doe.gov/nsb))—teams of high school students compete to solve technical problems and answer questions in all branches of science and math.
- **Science Olympiad** ([www.soinc.org](http://www.soinc.org))—a series of team-oriented science and technology competitions at the local, state and national levels.
- **Team America Rocketry Challenge** ([www.rocketcontest.org](http://www.rocketcontest.org))—teams of students build and fly model rockets; top scoring teams are invited to attend a national competition.
- **TEAMS** ([www.jets.org/teams/index.cfm](http://www.jets.org/teams/index.cfm))—an annual national competition for high school students with an interest in math, science and engineering applications.

**Scouting**
Both the Boy Scouts and the Girl Scouts have engineering-oriented programs and activities. The Boy Scouts offer an engineering Merit Badge. The Girl Scouts, in conjunction with the American Society of Mechanical Engineers (ASME), offer activities associated with technology-related career paths. Talk with your troop leader to find out more.

**Books to Read**
Here are a few books that will give you more information about engineering and careers in the field. Ask your librarian for more suggestions.

- **Changing Our World: True Stories of Women Engineers**, by Sybil E. Hatch with a forward by Dr. Mae C. Jemison (American Society of Civil Engineers, 2006).
- **Opportunities in Engineering Careers**, by Nicholas Basta (VGM Career Books, 2002).

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**Cool suits, which kept Apollo astronauts comfortable during moon walks, are today worn by race car drivers, nuclear reactor technicians, shipyard workers, people with multiple sclerosis, and kids with genetic disorders.**
Lockheed Martin employs engineers in a number of exciting and varied disciplines.

**Aerospace Engineering**

Aerospace engineers are the intellectual descendents of the Wright Brothers, who made aviation history in 1903 with the first powered airplane flight. Today, aerospace engineers design and develop some of the most exciting machines imaginable.

- **Education:** Bachelor’s degree in aerospace engineering or a related field
- **Salary range:** $56,000-$115,000*
- **Products created by aerospace engineers include:** aircraft, spacecraft, rockets
- **Websites to visit:** Aerospace Industries Association (www.aia-aerospace.org); American Institute of Aeronautics and Astronautics (www.aiaa.org)

**Electrical Engineering**

There is very little that touches us in our daily lives that an electrical engineer did not have something to do with—from the generation, transmission and distribution of electrical power, to computer hardware and consumer electronics.

- **Education:** Bachelor’s degree in electrical engineering or a related field
- **Salary range:** $47,000-$110,000*
- **Products created by electrical engineers include:** communications satellites, speakers, TVs, microwaves
- **Website to visit:** Institute of Electrical and Electronics Engineers (www.ieee.org)

**Mechanical Engineering**

If it’s a machine—anything from the engine in a supersonic jet fighter to the toaster in your kitchen—a mechanical engineer was involved. In addition, almost anything that is mass-produced—from your pencil to your favorite candy bar—is made by machines that were designed by mechanical engineers.

- **Education:** Bachelor’s degree in mechanical engineering or a related field
- **Salary range:** $44,000-$100,000*
- **Products created by mechanical engineers include:** machines, engines, cars, snowmobiles
- **Websites to visit:** American Society of Mechanical Engineers (www.asme.org); MechEngineer.com (www.mechengineer.com)

“If I hadn’t been an engineer, I would have been a wheelchair designer. Since I am a wheelchair rider, I have encountered many barriers in my life. I do not give up. I just move forward.”

—Omar Talavera (shown here working in the centrifuge facility) is a design engineer with Lockheed Martin in Moffett Field, California. He has a bachelor’s degree in mechanical engineering from the University of California at Berkeley.

Photo courtesy of NASA Ames
Nuclear Engineering

Nuclear engineers work on practical applications that harness the power of nuclear energy and radiation. They work in nuclear power plants; they develop the fuels and components that power aircraft carriers and submarines, and they work with X-ray machines and other imaging equipment in medical centers.

- **Education:** Bachelor's degree in nuclear engineering or a related field
- **Salary range:** $63,000-$119,000*
- **Products created by nuclear engineers include:** power plants, reactors, MRI machines, X-ray machines
- **Website to visit:** American Nuclear Society (www.ans.org)

Software Engineering

Software engineers deal with all aspects of computer systems. They design them, build them and operate them. They also develop the software systems that operate computers.

- **Education:** Bachelor's degree in software or electrical engineering or a related field
- **Salary range:** $51,000-$126,000*
- **Products created by software engineers include:** computer programs that control automated robotic systems, aircraft and spacecraft guidance systems, video games, iPod®s
- **Websites to visit:** Institute of Electrical and Electronics Engineers (www.ieee.org); Software Engineering Institute (www.sei.cmu.edu)

Systems Engineering

Systems engineers look at the big picture. They’re the people who have to think about how all the components of a project will work together as a system. They work in teams with engineers from all the different disciplines involved in a project and deal with cost, scheduling, design, function, and even a project's social impact.

- **Education:** Bachelor's degree in systems engineering or a related field
- **Salary range:** $44,000-$113,000*
- **Products created by systems engineers include:** water treatment systems, telecommunications systems, weather/environment systems
- **Website to visit:** International Council on Systems Engineering (www.incose.org)

*From Career Opportunities in Engineering, by Susan Echaore-McDavid and Richard A. McDavid (Checkmark Books, 2006)
If you know that engineering is the career for you—or if you think you might be interested in engineering—it’s important to do your research and find out about all the different types of schools to consider. There are several options—about 500 schools or branch campuses across the United States, as well as numerous schools worldwide, offer engineering programs.

Among the things you will want to think about are location and cost. You’ll also need to decide which type of engineering school you would like to attend. There are four main categories: research universities, engineering schools, state universities, and private colleges.

- **Research universities** have comprehensive science and engineering departments. Some of the top researchers in the country teach at these schools, although generally only at the graduate level.

- The primary focus of **engineering schools** is the engineering program and the majority of the students are studying engineering.

- Many **state universities** offer high-quality engineering programs; they also are the most affordable option for an engineering degree. Most engineers working today graduated from a state university.

- **Private colleges** offer the widest range of options but also can be the most expensive.

Regardless of the type of school you select, it’s important to make sure that the program is accredited by the Accreditation Board of Engineering and Technology (ABET). Other things to consider are the quality and number of labs, computers and other facilities available; the status and reputation of the school, and who teaches the undergraduate courses. For example: How many classes are taught by full professors rather than teaching assistants? Again, the “big name” professors and researchers usually teach only at the graduate level.

Another important consideration is the placement office. Is there an office where recruiters can visit and interview students? How many recruiters visit, and what companies do they represent? How many graduates find jobs in their field and how many go on to postgraduate programs?

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**“By starting out as a software engineer, I’ve been able to earn a good living right out of college. I have been able to go back for my MBA while working full time, with Lockheed Martin paying my tuition.”**

—Jessica Miller works for Lockheed Martin in Palmdale, California, as a senior software engineer. She has a bachelor’s degree in computer science from the University of Southern California and a master’s degree in business administration from Cal Poly Pomona.

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**“All of the engineering disciplines offer great career opportunities because you get to work on things that will benefit people and society while at the same time getting a good salary. Without engineers, we would not have any of the conveniences of modern society…no cell phones, no iPod®s, no computers, no cars, not even any electricity. Fifty years ago, computers, microwaves, GPS, and MRI did not exist. Today these are common devices that nearly everyone has heard of or used. As an engineer, you get to be part of things like this in the next 50 years.”**

—Kerry Timmons works for Lockheed Martin in Littleton, Colorado, as a systems engineer. She has a bachelor’s degree in mechanical engineering from the University of Colorado and is working on a master’s degree in systems engineering.

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**It’s a Fact!**

Engineers have been responsible for everything from the Internet to different colors of Heinz® ketchup.
It can’t be said too many times: The most important thing you can do as a high school student who is interested in a career in engineering is to take as many science and math courses as you can.

It is also important to be active. Extracurricular activities show that you are a well-rounded person and help to distinguish you from other college applicants with good grades. For example, you could get involved with an engineering organization such as the Junior Engineering Technical Society (JETS), a design competition such as the Team America Rocketry Challenge, or a social club such as the Boy Scouts or Girl Scouts. All of these activities are a great way to prepare for college and help you gain important experience and career information while learning more about the world of engineering. You should also keep your eyes open for internship opportunities. Internships give you valuable experience and help you discover areas of engineering that are most appealing to you.

Top Tips for Getting into a Good Engineering School

1. Take lots of science and math. Most engineering schools require at least four years of math and three years of science, including physics and chemistry.
2. Build a solid academic record. SAT and ACT test scores are important, but a strong academic record matters more.
3. Get involved in extracurricular activities. Join science and engineering clubs and participate in competitions. (See the suggestions on page 5.)
4. Do your homework when looking at schools. Visit school websites; talk with your guidance counselor; ask any engineers you know or meet where they went to school.
5. Visit the schools on your short list. If possible, set up interviews with an admissions officer and someone from the engineering school.

“I had a lot of great teachers in middle and high school who encouraged me to take on challenges and ignore limits. They showed me that science careers are a lot of fun, and not just for boys.”

—Cheryl Kotan works for Lockheed Martin in Eagan, Minnesota, as a senior systems engineer. She has a bachelor’s degree in psychology and a master’s degree in industrial engineering, both from the University of Nebraska-Lincoln.

“It was really, really tough deciding on a major. I liked so many things, so I decided to focus on subjects that are useful in almost every field—math, computer science and communications (public speaking, writing, technical writing).”

—Duncan Atchison (shown here testing a special monitor used by astronauts) is a project engineer with Lockheed Martin in Moffett Field, California. He has a bachelor’s degree in mathematics from the College of William and Mary and a master’s degree in human resource development from Marymount University.

“Engineering provides one with skills, not only for the job, but skills to be used daily as part of your normal life.”

—Kevin Chin works for Lockheed Martin in Vienna, Virginia, as a senior software engineer. He holds a bachelor’s degree in electrical engineering from Worcester Polytechnic Institute and a master’s degree in systems engineering from Virginia Tech.
There are several ways to pay for a college education—government grants, low-interest loans, work-study programs, ROTC, and scholarships—to name a few.

Here are just a few organizations that provide engineering scholarships. Talk with your school counselor to learn about other opportunities for financial assistance.

- Advancing Hispanic Excellence in Technology, Engineering, Math and Science (www.ahetems.org)*
- American Indian Science and Engineering Society (www.aises.org)
- American Institute of Aeronautics and Astronautics (www.aiaa.org)
- American Society of Mechanical Engineers (www.asme.org)
- Hispanic College Fund (www.hispanicfund.org/scholarships.php)
- Institute of Electrical and Electronics Engineers (www.ieee.org)
- Institute of Industrial Engineers (www.iienet2.org)
- National Action Council for Minorities in Engineering (www.nacme.org)
- National Society of Professional Engineers (www.nspe.org)
- Society of Manufacturing Engineers (www.sme.org)
- Society of Women Engineers (www.swe.org)
- United Negro College Fund (www.uncf.org)

* A link from the Society of Hispanic Professional Engineers (SHPE)

"What other job allows you to work with advanced technology on the forefront of fighter aircraft? An aerospace degree allows you to work on anything from small planes, to jumbo jets, to spacecraft."

—Jerome Socha works for Lockheed Martin in Fort Worth, Texas, as a systems engineer. He has a bachelor’s degree in aerospace engineering and mechanics and a master’s degree in mechanical engineering, both from the University of Minnesota.

The Ferris wheel is considered one of the greatest engineering wonders in the world. It was named for Pittsburgh, Pennsylvania, engineer George W.G. Ferris who, in 1893, constructed a wheel supported by two 140-foot steel towers that were connected by a 45-foot axle. At that time, the wheel was the largest single piece of forged steel ever made.
American Society for Engineering Education K-12 Center (www.engineeringk12.org/students)
Explore the different engineering fields, find out how to get and pay for an engineering education, and more.

A Sightseer’s Guide to Engineering (www.engineeringsights.org)
An interactive map helps tell the story of engineering.

Be What I Want to Be (www.bewhatiwanttobe.com)
Sponsored by the Maryland Business Roundtable for Education and focusing on students in Maryland, this site also includes general information about deciding on a career.

Boy Scouts (www.boyscouttrail.com/boy-scouts/meritbadges/engineering.asp)
Requirements for the engineering Merit Badge.

Discover Engineering.Org (www.discoverengineering.org)
Information, ideas and activities relating to the field of engineering.

Engineer Girl! (www.engineergirl.org)
A site designed to encourage girls to pursue careers in engineering.

Girl Scouts (www.girlscouts.org/program/program_opportunities/science)
Activities focused on science, technology, engineering, and math (STEM).

Junior Engineering Technical Society (www.jets.org)
Student competitions, assessment tools, career guidance resources, an e-newsletter, and more.

Lockheed Martin Engineers in the Classroom (www.engineersintheclassroom.com)
Offers educational resources, materials and engineer profiles.

National Society of Black Engineers Pre-College Initiative (www.nsbe.org/precollege)
Promotes college, academics, technology, and leadership to pre-college students.

National Society of Professional Engineers Student Page (www.nspe.org/students)
A resource for students seeking information about engineering and the role engineers play in our society.

Society of Hispanic Professional Engineers (www.shpe.org)
Supports leadership development, career counseling and networking opportunities.

TryEngineering.org (www.tryengineering.org)
A portal about engineering and engineering careers.

Other Sites of Interest

How Stuff Works (www.howstuffworks.com)
Information about a wide range of topics, products and interests.

Human Factors and Ergonomics Society (www.hfes.org)
Promotes consideration of compatibility of people, machines and environments in the design of interactive systems.

Toastmasters International (www.toastmasters.org)
Helps students and adults hone their communication and presentation skills.

“After you gain some experience, your opportunities broaden, and you can continue to do engineering, or you can go into management, research and development, quality assurance, or any of the areas you may have been exposed to in your career. If interested and motivated, you could go into teaching or you could become a consultant in your area of expertise. There are many possibilities because you learn a lot along the way.”

—James Evans works for Lockheed Martin in Manassas, Virginia, as a senior systems engineer. He holds a bachelor’s degree in electrical engineering from Virginia Tech.
In Their Own Words... Lockheed Martin engineers talk about some cool parts of their jobs:

“I was aboard the USS San Juan, a nuclear submarine, on its commissioning voyage to San Juan, Puerto Rico.”
—James Evans, systems engineer

“I helped figure out how to levitate moon dust.”
—Arwen Davé, mechanical engineer

“I run programs on two of the world’s three fastest computers.”
—Thomas Laub, nuclear engineer

“My job is interesting and exciting. I have worked on missiles that fly far out into space and robots designed to help our soldiers. The MULE™ (Multifunction Utility/Logistics and Equipment Vehicle) is a robot being designed to help soldiers carry equipment and move faster. The MULE™ can go anywhere a soldier can go by climbing over rocks and debris and crossing gaps. Robotic technology, like the MULE™, is transforming the job of our soldiers to help keep them safe and allowing them to be successful.”
—Shelia Salinas, software engineer

“I flew with the U.S. Coast Guard on law enforcement missions off the Florida coast.”
—Cheryl Kotan, systems engineer

“I’ve simulated a torpedo hit and seen the first flights of an entirely new aircraft.”
—Jerome Socha, aerospace engineer

“All of the Tom Clancy books have proved to be very useful, especially The Hunt for Red October. When I was just starting out, I had a lot of questions about some of the systems and how they worked. One of the more experienced engineers told me that he couldn’t tell me because the information was classified, but if I read The Hunt for Red October, I should be able to figure it out.”
—Amanda Malm, systems engineer

Education pays off. Consider this:

- The estimated lifetime earnings of someone with a high school diploma—$1.2 million
- The estimated lifetime earnings of someone with an associate degree—$1.6 million
- The estimated lifetime earnings of someone with a bachelor’s degree—$2.1 million
- The estimated lifetime earnings of someone with a master’s degree—$2.5 million

*From www.learndoearn.org