- JETS – TEAMS and NEDC – www.jets.org – TEAMS challenges groups of high school students to work together and apply key math, science, and physics concepts toward solving real-world engineering scenarios. NEDC is a hands-on competition that allows students to explore, research, design, and build a working prototype to empower individuals with disabilities to succeed in the work force.
- Odyssey of the Mind - www.odysseyofthemind.com – An international educational program that provides creative problem-solving opportunities for students from kindergarten through college.
- Intel International Science and Engineering Fair - www.sciserv.org/isef/ - The world's largest pre-college celebration of science.
- Think Quest Programs - www.thinkquest.org - Students work in teams to create the best educational websites and compete for exciting prizes, including a trip to ThinkQuest Live, an educational extravaganza celebrating their achievements.

Academic Studies

John Harding
Hardware Dev. Engineer
Hewlett Packard Company

"Some non-engineering courses that have proved to be helpful are management, business, and entrepreneurship classes. I also took a psychology class on behavior and personal adjustment which I use almost every day. It teaches you about people and about your behavior with people. These are very important because you're working with a team, and you need to understand how to deal with other people."

Most electrical engineers begin their career by earning a Bachelor of Science (B.Sc.) degree in electrical engineering or a closely-related field (electronics, power, control, telecommunication or computer engineering; or computer science). The B.Sc. degree usually requires 4-5 years in an undergraduate program at an accredited university. A Bachelor of Science degree in electrical engineering or closely-related disciplines expands career options and can open the door to other professions. While many graduates of electrical engineering programs spend their entire career working on technical and engineering projects, others continue their education in other diverse areas such as law (e.g., patent or telecommunications law), medicine (e.g., development of sophisticated sensors for detection of disease), and business (e.g., using computer algorithms to optimize commodity trading). Those who are inclined to achieve deeper understanding of engineering processes, and want to engage in research and development often continue beyond the B.Sc. degree toward a Master of Science (M.Sc.) in Electrical Engineering, and later toward a Doctor of Philosophy (Ph.D.) or Doctor of Science (D.Sc.)

All prospective students of electrical engineering should seek institutions that are recognized for instruction quality and modern facilities. In many countries there are accrediting bodies (such as ABET in the United States, JABEE in Japan, CEAB in Canada, and ABEEK in Korea) that publish lists of programs they have reviewed and approved ("accredited"). In countries where such accrediting bodies do not exist, some schools carry accreditation or accreditation-like certifications from accrediting bodies in other countries. In the absence of local accreditation, students should in general prefer schools that are recognized by state or local government and are accountable to a local department of education.

Career Guidance Materials

TryEngineering.org

www.tryengineering.org

This site combines interactive activities with information on careers in engineering. TryEngineering.org is designed to educate a variety of audiences about the different engineering disciplines and the impact engineers have on society. Developed for teachers, school counselors, parents, and students, TryEngineering.org lets site visitors explore how to prepare for an engineering career, ask designated experts engineer-related questions, and play interactive games.

JETS

www.jets.org

Visit JETS and explore real-world careers in engineering and technology. JETS provides top academic programs, career exploration materials, a dynamic monthly e-newsletter, and online resources for students, parents, and educators. Coming soon: JETS Clubs—a streamlined approach to pre-college engineering education that will establish a nationwide network of teachers and counselors who will be more easily able to "unlock" the mysteries of engineering and technology; the ASSESS—a diagnostic self-assessment tool designed to help high school students identify their strengths and weaknesses in subject areas important for success in college engineering or technology programs.

Sloan Career Cornerstone Center

www.careerconrnerstone.org

The Cornerstone Center is a comprehensive career planning resource center for those considering careers in science, technology, engineering, mathematics, computing, or medicine. The site also offers Podcasts, PDFs and PowerPoint presentations for use by counselors, students, teachers, and parents.

IEEE Pre-university Education Center

www.ieee.org/web/education/preuniversity/home.html

The IEEE and the IEEE Educational Activities Board are committed to providing quality educational resources for educators, parents, students, IEEE volunteers, and the public.

http://www.ieee.org/web/education/preuniversity/netresources/brochures.html

Visit this website to view and download brochures on electrical engineering, teacher in-service programs, and IEEE's virtual museum.

IEEE Student Concourse

www.ieee.org/portal/pages/education/faqs/index.html

Visit this site for those FAQ's about electrical engineering.

About IEEE

IEEE is the world's largest technical professional society. Through its 365,000 members in 150 countries, the society is a leading authority on a wide variety of areas ranging from aerospace systems, computers, and telecommunications to biomedical engineering, electric power, and consumer electronics. Dedicated to the advancement of technology, the IEEE publishes 30 percent of the world's literature in the electrical and electronics engineering and computer science fields, and has developed more than 900 active industry standards. The organization also sponsors or cosponsors more than 300 international technical conferences each year.

For more information contact us at:

Phone: +1.732.562.5496
Email: pre-university@ieee.org
Mail: IEEE
445 Hoes Lane, Piscataway, NJ USA 08854

What is an Electrical Engineer?

IEEE

What is an Electrical Engineer?

Did you know that electrical engineers are involved in creating cell phones, lasers, the Internet, PDAs, hybrid cars, video games, and satellite TV? Technologies developed by electrical engineers have enriched our lives in countless ways and revolutionized our daily environment.

Electrical engineers gave the world modern virtual reality and spanned power distribution networks across vast rural areas in developing countries. Electrical engineers develop new pacemakers for ailing hearts, ultrasonic diagnostic devices for detection of tumors, and NMR machines. They provide secure and reliable communication to expeditions in remote and dangerous locations and to astronauts in space. They are responsible for numerous household and personal items, from your electronic wristwatch to your iPod.

Electrical engineers work in multimedia, telecommunications, electric power, signal processing and control. They work with physicians on new diagnostic devices and with urban planners on new efficient vehicles. Their work makes our lives more interesting, effective and safe, and increases our productivity and standard of living.

Electrical Engineers Work on Aerospace Vehicles, Aeronautics and Avionics

Carolyn Kerr
Electrical Systems Engineer
Boeing Commercial Airplane Group

"I came into a group that did a lot of the fun things that I like to do. I like to work with people; I like to travel a little bit. And so I've lucked out. I am responsible for procuring generators, contractors, and control units, the main sources of electrical power on an airplane."

Many designs of airplanes and aircraft are undergoing dramatic transformation. Subsystems that depended in the past on bulky mechanical and hydraulic devices are replaced by small electronic circuits and high density computer chips. Better and smaller sensors, digital control units and "computers on a chip" make airplanes lighter, more capable and safer. Electrical engineers are at the forefront of this transformation, and new technologies keep making their professional life more exciting. Some of these new technologies include Nanotechnology, Mechatronics, and MEMS (Microelectromechanical Systems).

Electrical Engineers Work with Computers and Software

Wesley Driver
Software Engineer
Harris Corporation

"I'm a software engineer and it's cool. They stick me in a lab or office with tons of toys—computer gadgets. I get to play with them all day. . . and they pay me for it. It's a bit of cloak and dagger atmosphere."

Computers and software are everywhere—in our cars, embedded in bridges and roads, installed in the bodies of patients to regulate biological mechanisms, and integrated into ID cards and passports. Electrical engineers are involved in the design and manufacture of these devices, and often (as computer or software engineers) they take part in creating the scripts that control these devices and determine their capabilities. Many electrical engineers are engaged in writing computer code and testing and debugging it, to ensure that it works according to specifications and that its operation is predictable, error free and safe.

Careers with Options

Electrical engineering—and its closely related fields (electronics engineering, power engineering, telecommunications engineering, computer science, computer engineering, and control engineering)—provide career opportunities in many industries and branches of business. There are electrical engineers in manufacturing plants, control rooms of large petrochemical plants, monitoring rooms of space flights, and hospitals. Here are some of the challenges that electrical engineers of the future are likely to be taking up.

Field	Activity Example
Aerospace and Aeronautics	Develop new sensors, control systems and power supplies for the next generation of space vehicles
Communications	Develop new networks that allow instant unlimited voice and audio communication with anyone, anywhere, anytime
Transportation	Develop remote control cars that can be driven automatically on "smart highways"
Medicine	Develop new sensing and drug delivery techniques that allow diabetics to regulate their blood sugar levels without injections
Homeland Security	Develop imaging techniques that allow error free detection of all explosive devices within 10 kilometers of an airport
Entertainment	Develop new multimedia techniques to enhance visual, smell, and tactile effects in concerts and on the Internet
Power	Develop a new longer-lasting battery that allows a cell phone to operate for a year without recharging
Robotics	Develop smart robots that can detect and locate survivors in earthquakes and accidents
Military Engineering	Develop reliable and secure communication methods for special force units operating underground
Geosciences and Remote Sensing	Develop highly-reliable networks to detect and predict earthquakes and tsunamis

An Early Start

Jeff Cannon, Telecommunications Engineer
ADC Telecommunications

"In high school I got into computers and tried my hand at programming. It's been surprising how applicable a lot of the seemingly abstract math and science concepts taught in high school have been in my engineering career."

Education, interest, training, and experience lead the way to a career in electrical engineering. Throughout high school, students can begin preparing for an engineering career by laying a solid academic foundation. Taking courses in mathematics, science, and communication can be very helpful for future study of engineering at a university and should include:

- Algebra
- Biology
- Business Writing
- Calculus
- Chemistry
- Computer Science
- Electronics
- Geometry
- Physics
- Public Speaking
- Trigonometry

Taking an active role in extra-curricular activities can enhance classroom studies by providing hands-on experience with engineering design and practice. Such activities include: competing in science and technology fairs; robot, rocket, and other design competitions, and active membership in engineering clubs. The following competitions are representative of the many opportunities available to students who wish to explore engineering:

- Botball – www.botball.org - A hands-on learning experience in robotics designed to engage students in learning the practical applications of science, technology, engineering, and math.
- BEST Robotics – www.bestinc.org – A sports-like, science- and engineering-based robotics competition.
- FIRST Robotics – www.usfirst.org - An exciting, multinational competition that teams professionals and young people to solve an engineering design problem in an intense and competitive way.