



PLTW Engineering

10-12/Career Exploration – Electrical Engineer

May 1, 2020



10-12/DE

Lesson: 5/1/2020

Objective/Learning Target: Students will be able to explain the career path of an electrical engineer



What do electrical engineers do?

Electrical engineers design, develop, test, and supervise the manufacture of electrical equipment, such as electric motors, radar and navigation systems, communications systems, or power generation equipment.

Electrical engineers also design the electrical systems of automobiles and aircraft.

Electronics engineers design and develop electronic equipment, including broadcast and communications systems, such as portable music players and Global Positioning System (GPS) devices.



Typical duties for an electrical engineer

- Design new ways to use electrical power to develop or improve products
- Perform detailed calculations to develop manufacturing, construction, and installation standards and specifications
- Direct the manufacture, installation, and testing of electrical equipment to ensure that products meet specifications and codes
- Investigate complaints from customers or the public, evaluate problems, and recommend solutions
- Work with project managers on production efforts to ensure that projects are completed satisfactorily, on time, and within budget



Typical duties for an electronics engineer

- Design electronic components, software, products, or systems for commercial, industrial, medical, military, or scientific applications
- Analyze customer needs and determine the requirements, capacity, and cost for developing an electrical system plan
- Develop maintenance and testing procedures for electronic components and equipment
- Evaluate systems and recommend design modifications or equipment repair
- Inspect electronic equipment, instruments, and systems to make sure they meet safety standards and applicable regulations
- Plan and develop applications and modifications for electronic properties used in parts and systems in order to improve technical performance



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Work environment

Electrical and electronics engineers generally work indoors in offices. However, they may visit sites to observe a problem or a piece of complex equipment.

Most electrical and electronics engineers work full time, 40 hours per week or more.



Education requirements for electrical engineers

Electrical and electronics engineers must have a bachelor's degree.

Employers also value practical experience, such as internships or participation in cooperative engineering programs, in which students earn academic credit for structured work experience.



Education requirements for electrical engineers

High school students interested in studying electrical or electronics engineering benefit from taking courses in physics and math, including algebra, trigonometry, and calculus.

Courses in drafting are also helpful, because electrical and electronics engineers often are required to prepare technical drawings.



Education requirements for electrical engineers

In order to enter the occupation, prospective electrical and electronics engineers need a bachelor's degree in electrical engineering, electronics engineering, electrical engineering technology, or a related engineering field.

Programs include classroom, laboratory, and field studies. Courses include digital systems design, differential equations, and electrical circuit theory. Programs in electrical engineering, electronics engineering, or electrical engineering technology should be accredited by ABET.



Education requirements for electrical engineers

Some colleges and universities offer cooperative programs in which students gain practical experience while completing their education. Cooperative programs combine classroom study with practical work. Internships provide similar experience and are growing in number.

At some universities, students can enroll in a 5-year program that leads to both a bachelor's degree and a master's degree. A graduate degree allows an engineer to work as an instructor at some universities, or in research and development.



Important qualities for electrical engineers

Concentration Electrical and electronics engineers design and develop complex electrical systems and electronic components and products. They must keep track of multiple design elements and technical characteristics when performing these tasks.

Initiative Electrical and electronics engineers must apply their knowledge to new tasks in every project they undertake. In addition, they must engage in continuing education to keep up with changes in technology.

Interpersonal skills Electrical and electronics engineers must work with others during the manufacturing process to ensure that their plans are implemented correctly. This collaboration includes monitoring technicians and devising remedies to problems as they arise.

Math skills Electrical and electronics engineers must use the principles of calculus and other advanced math in order to analyze, design, and troubleshoot equipment.

Speaking skills Electrical and electronics engineers work closely with other engineers and technicians. They must be able to explain their designs and reasoning clearly and to relay instructions during product development and production. They also may need to explain complex issues to customers who have little or no technical expertise.

Writing skills Electrical and electronics engineers develop technical publications related to equipment they develop, including maintenance manuals, operation manuals, parts lists, product proposals, and design methods documents.



Licenses and certifications for electrical engineers

Licensure is not required for entry-level positions as electrical and electronics engineers.

A Professional Engineering (PE) license, which allows for higher levels of leadership and independence, can be acquired later in one's career.

Licensed engineers are called professional engineers (PEs). A PE can oversee the work of other engineers, sign off on projects, and provide services directly to the public.



Licenses and certifications for electrical engineers

The initial FE exam can be taken after earning a bachelor's degree. Engineers who pass this exam commonly are called engineers in training (EITs) or engineer interns (EIs).

After meeting work experience requirements, EITs and EIs can take the second exam, called the Principles and Practice of Engineering (PE).

Each state issues its own licenses. Most states recognize licensure from other states, as long as the licensing state's requirements meet or exceed their own licensure requirements. Several states require continuing education for engineers to keep their licenses.



How much do electrical engineers get paid?

The median annual wage for electrical engineers was \$96,640 in May 2018. The median wage is the wage at which half the workers in an occupation earned more than that amount and half earned less. The lowest 10 percent earned less than \$61,190, and the highest 10 percent earned more than \$153,240.



How much do electronics engineers get paid?

The median annual wage for electronics engineers, except computer was \$102,700 in May 2018. The lowest 10 percent earned less than \$64,840, and the highest 10 percent earned more than \$162,200.



Quiz yourself

1. List 2 differences between what electrical engineers and electronics engineers do.
2. What are the education requirements for an electrical or electronics engineer?
3. List 3 qualities needed for people seeking to enter fields in electrical or electronics engineering.
4. What is the minimum education required to become an electrical engineer?
5. What accreditation should a good electrical engineering program have?



Helpful links

[Electrical Engineering Career Profile](#)

[Youtube video - What do electrical engineers do?](#)