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A BEGINNER'S GUIDE TO ELECTRICAL ENGINEERING

What is Electrical Engineering?

Electrical engineering is comparatively one of the newer branches of engineering and dates back to the late 19th century. It is that branch of engineering that deals with the technology of electricity, electronic components, and electromagnetism. Electrical engineers work on a wide range of components, devices, and systems, from tiny microchips to huge power station generators.

The interest in this branch usually develops from an interest in dealing with different electric circuits and components. From resistors to transformers, this branch of engineering is the root of most of the electric appliances at home and the many complicated components at an electric power station!

Early experiments with electricity included primitive batteries and static charges. However, the actual design, construction, and manufacturing of useful devices and systems started with the implementation of Michael Faraday's Law of Induction, which essentially states that the voltage in a circuit is proportional to the rate of change in the magnetic field through the circuit.

Some of the most famous personalities in electrical engineering include Thomas Edison known for the invention of the electric light bulb, George Westinghouse known for the invention of alternating current, Nikola Tesla known for the invention of a simple induction motor, Guglielmo Marconi known for the invention of radio and Philo T. Farnsworth known for the invention of television. These devices, which are so common in the daily usage of a human being, were initially developed with one itself.

What does an electrical engineer do?

Electrical engineering advances the fields of electricity and electromagnetism. The fundamentals of electricity are electrical charge and the forces (electromagnetism) it generates. An Electrical Engineer harnesses the power of electrical charge to create a practical and safe energy source. Electricity is an integral component of modern society, used for basic living needs as well as communication, entertainment, and in businesses. Electrical engineering focuses on both small and large-scale electricity requirements. Electrical engineers utilise the principles of electricity (mathematical and physical science) to design power grids, computer circuits, software programs, and power supplies.

A significant area of interest for electrical engineers is electricity generation and distribution. On such immense scales, electricity can be extremely dangerous to work with; therefore, safety is a great area of concern for engineers. Many of the sub-disciplines of Electrical engineering are, however, dedicated to the transmission and processing of information. All Electrical Engineers, upon graduation, are equipped with an advanced level of programming skills and are required to undertake practical, hands-on work when building components such as circuits, motors, or generators.

As a field based on electricity and electromagnetism, electrical engineering is suited to those who have high attention to detail and enjoy electrical circuit design. It is also suited to those who have a knack for computer systems and software programming.

The fundamental ability of an electrical engineer is to understand how circuits and variables affect the flow and force of electricity. However, what must be considered is that while electrical engineers may build circuits and components on occasion, they are mostly undertaking theoretical design and calculations. Electrical technicians are hands-on with a more limited understanding of electrical charge theory.

Career Options

Broadcast Engineer — Broadcast engineers, also known as broadcast engineering technicians, are the individuals responsible for setting up and operating video and audio equipment for television, radio, or internet broadcasts.

Circuit designer — Mainly does the job of working out the physical form that an electronic circuit will take. Gives a levelled view of the electrical design of the construction of the physical circuit.

Communications engineer — A communications engineer is responsible for the research, design, development, and production of communications equipment/systems. Communications engineering encompasses modes of communication such as satellites, radio, internet and broadband technologies, and wireless telephone services.

Consumer Advocate — a person whose job is to protect the rights of customers, for example by giving advice, testing products, or trying to improve laws relating to the sale of goods

Design Engineer — A design engineer is a general term that covers multiple engineering disciplines including electrical, mechanical, etc. It implies the work on the designing end in any given discipline from the overview layout to the complete product.

Distribution Planning engineer — The job here mainly is about the electrical planning and layout of the distribution of power to any given centre or commanding location.

Drafting technician — Although it is known to be a field in civil engineering, electrical engineers are also into this while drafting the electrical side of anything, Yes, any appliance.

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Hardware Engineer — Hardware engineers research, design, develop, and test electrical systems and components such as processors, circuit boards, memory devices, networks, and routers.

Helicopter Pilot — The name says it all. Electrical Engineers can become helicopter pilots!

Military engineer — The job description here involves the electrical communication part of the military services.

Network Engineer — A network engineer, also known as a network architect, designs and implements electrical networks. Unlike network administrators, the network engineer focuses on high-level design and planning.

Nuclear Engineer — Nuclear engineers design the equipment and create the operating procedures used in nuclear power plants. Many also operate the machinery that monitors nuclear power and find methods to safely handle and dispose of nuclear waste.

Patent Agent — A person who is qualified to prosecute patents (i.e. drafting and filing a patent application) is known as a patent agent. Given the fact the drafting a patent requires specific technical as well as legal knowledge, only a person qualified in both domains will be able to fulfil the obligations of patent prosecution.

Product Development Engineer — The primary responsibility of development engineers is to create a product design that fulfils a company's or client's strategic goals while integrating the needs of marketing, sales, and manufacturing departments. They oversee research and design teams, lead testing procedures, and draft specifications for manufacturing.

Product Manager — The product manager is often considered the CEO of the product and is responsible for the strategy, roadmap, and feature definition for that product or product line. The position may also include marketing, forecasting, and profit and loss (P&L) responsibilities.

Project Engineer — The project engineer is also often the primary technical point of contact for the consumer. A project engineer's responsibilities include schedule preparation, pre-planning, and resource forecasting for engineering and other technical activities relating to the project.

Public Utility consultant — As the name suggests, this career option is all about giving consultancy to either firms or some entity, regarding the required info required.

Research Engineer — Research Engineers apply their expertise and knowledge to technical projects, finding innovative, cost-effective means to improve research, techniques, procedures, and/or products and technologies.

Robotics Technologist — Robotic technologists use their knowledge of electrical, electronic, and mechanical systems to assist engineers in the development and production of automated equipment.

Sales Representative — Sales representatives sell retail products, goods, and services to customers. They work with customers to find what they want, create solutions and ensure a smooth sales process. Sales representatives will work to find new sales leads, through business directories, client referrals, etc.

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System Support Analyst — A system support analyst is an electrical specialist who analyses and optimizes these processes for their company. These analysts may work with many forms of technology, from inventory systems and cost and variance vectors to more concrete electrical concerns such as communication, power-saving, and payroll.

Technical Sales Engineer — Also sometimes called ‘systems engineers,’ ‘pre-sales support,’ or ‘field consultants,’ SEs act as the sales team’s technical encyclopaedia during the sale, representing the technical aspects of how the product solves specific customer problems. They perform technical presentations for the product.

Technical Writer — Like a Content writer or a developer, a technical writer focuses on generating and writing content with its primary focus on the technical aspects.

Telecommunications technician — A telecommunications technician has to maintain and repair networks by testing circuits, isolating malfunctions, and repairing equipment. Demonstrate proper equipment usage to customers. Establish and remove the wiring, hardware, and equipment used in communication systems and networks.

Test Technician – The primary duty is to ensure that products satisfactorily perform their proposed functions. For complex products, such as automobiles or computers, test technicians may specialize in monitoring a specific part or set of components.

Toy Designer — Designing electrical toys like a car or a robot or even a gun comes in the primary duties of this career option.

University Professor — No description required.

Aeronautical Engineer — Aeronautical engineers work to make sure propulsion systems operate efficiently and that an aircraft’s aerodynamic performance is sufficient.

Aerospace Engineer — Aerospace engineers design primarily aircraft, spacecraft, satellites, and missiles. Also, they test prototypes to make sure that they function according to design.

Aircraft Performance Engineer — As an aircraft performance engineer, you would be responsible for applying advanced engineering principles to the design and development of aircraft, to ensure that they operate at optimal levels, as safely and efficiently as possible.

Astronautical Engineer — This comes under the Aerospace engineering category and is a subcategory.

Avionics Engineer — Avionics engineering is a subfield of Aeronautical engineering and deals with electronic systems that are used on aircraft, artificial satellites, and spacecraft. It deals with the systems that are required for the plane to work seamlessly.

Electrical Engineer — The main job duties are: evaluates electrical systems, products, components, and applications by designing and conducting research programs; applying knowledge of electricity and materials. Confirms system’s and components’ capabilities by designing testing methods; testing of properties.

Electrical Systems Engineer — Research, design, develop, test, or supervise the manufacturing and installation of electrical equipment, components, or systems for commercial, industrial, military, or scientific use.