

CONSTRUCTION TRADES

The Construction Trades Program is designed to provide students with the knowledge and the skills for initial apprenticeship employment and be able to pursue a long and rewarding career in the electrical trades and/or plumbing trades occupations.

****Awaiting DoE approval for financial aid awards.**

Programs

- Construction Trades - Electrician Certificate (<https://coursecatalog.tvcc.edu/pathways/service-production-industry/construction-technology/construction-technology-electrical-certificate/>)
- Construction Trades - Plumbing Certificate (<https://coursecatalog.tvcc.edu/pathways/service-production-industry/construction-technology/construction-technology-plumbing-certificate/>)

OSHT-1305. OSHA Regulations- Construction Industry. (3 Credits)

A study of Occupational Safety and Health Administration (OSHA) regulations pertinent to the construction industry.

ELPT-1311. Basic Electrical Theory. (3 Credits)

This course is taken for academic credit. Students will earn an A, B, C, D, F, or W. Basic theory and practice of electrical circuits. Includes calculations as applied to alternating and direct current. Lab fee.

ELPT-1321. Intro to Electrical Safety and Tools. (3 Credits)

Safety rules and regulations. Includes the selection, inspection, use, and maintenance of common tools for electricians.

ELPT-1325. National Electrical Code I. (3 Credits)

An introductory study of the National Electric Code (NEC) for those employed in fields requiring knowledge of the Code. Emphasis on wiring design, protection, methods, and materials; equipment for general use; and basic calculations.

ELPT-1329. Residential Wiring. (3 Credits)

Wiring methods for single family and multi-family dwellings. Includes load calculations, service entrance sizing, proper grounding techniques, and associated safety procedures.

ELPT-1345. Commercial Wiring. (3 Credits)

Commercial wiring methods. Includes overcurrent protection, raceway panel board installation, proper grounding techniques, and associated safety procedures.

ELPT-1357. Industrial Wiring. (3 Credits)

Wiring methods used for industrial installations. Includes motor circuits, raceway and bus way installations, proper grounding techniques, and associated safety procedures.

ELPT-1341. Motor Control. (3 Credits)

This course is taken for academic credit. Students will earn an A, B, C, D, F, or W. Operating principles of solid-state and conventional controls along with their practical applications. Includes braking, jogging, plugging, safety interlocks, wiring, and schematic diagram interpretations. Lab fee.

ELPT-2305. Motors and Transformers. (3 Credits)

Operation of single- and three-phase motors and transformers. Includes transformer banking, power factor correction, and protective devices.

ELPT-1381. Coop: Electrical & Power Trans Installat. (3 Credits)

(3-1-20) Career-related activities encountered in the student's area of specialization offered through an individualized agreement among the college, employer, and student. Under the supervision of the college and the employer, the student combines classroom learning with work experience. Includes a lecture component.

WHAT construction trades occupations DO (<https://www.bls.gov/ooh/production/welders-cutters-solderers-and-brazers.htm#tab-2>)

Workers in construction trades occupations use a variety of resources to build and repair roads, homes, and other structures.

Electricians install, maintain, and repair electrical power, communications, lighting, and control systems.

Plumbers, pipefitters, and steamfitters install and repair piping fixtures and systems.

DUTIES

Electricians typically do the following:

- Read blueprints or technical diagrams
- Install and maintain wiring, control, and lighting systems
- Inspect electrical components, such as transformers and circuit breakers
- Identify electrical problems using a variety of testing devices
- Repair or replace wiring, equipment, or fixtures using hand tools and power tools
- Follow state and local building regulations based on the National Electrical Code
- Direct and train workers to install, maintain, or repair electrical wiring or equipment

Almost every building has an electrical power, communications, lighting, and control system that is installed during construction and maintained after that. These systems power the lights, appliances, and equipment that make people's lives and jobs easier and more comfortable.

Installing electrical systems in newly constructed buildings is often less complicated than maintaining equipment in existing buildings because electrical wiring is more easily accessible during construction. Maintaining equipment and systems involves identifying problems and repairing broken equipment that is sometimes difficult to reach.

Maintenance work may include fixing or replacing parts, light fixtures, control systems, motors, and other types of electrical equipment.

Electricians read blueprints, which include technical diagrams of electrical systems that show the location of circuits, outlets, and other equipment. They use different types of hand tools and power tools, such as conduit benders, to run and protect wiring. Other commonly used tools include screwdrivers, wire strippers, drills, and saws. While troubleshooting, electricians also may use ammeters, voltmeters, thermal scanners, and cable testers to find problems and ensure that components are working properly.

Many electricians work alone, but sometimes they collaborate with others. For example, experienced electricians may work with building engineers (<https://www.bls.gov/ooh/architecture-and-engineering/civil-engineers.htm#tab-1>) and architects (<https://www.bls.gov/ooh/architecture-and-engineering/architects.htm>) to help design electrical systems for new construction. Some electricians may also consult with other construction specialists, such as elevator installers (<https://www.bls.gov/ooh/construction-and-extraction/elevator-installers-and-repairers.htm>) and heating and air conditioning (<https://www.bls.gov/ooh/installation-maintenance-and-repair/heating-air-conditioning-and-refrigeration-mechanics-and-installers.htm>) workers, to help install or maintain electrical or power systems. Electricians employed by large companies are likely to work as part of a crew; they may direct helpers (<https://www.bls.gov/ooh/construction-and-extraction/construction-laborers-and-helpers.htm>) and apprentices to complete jobs.

Plumbers, pipefitters, and steamfitters typically do the following:

- Prepare cost estimates for clients
- Read blueprints and follow state and local building codes
- Determine the materials and equipment needed for a job
- Install pipes and fixtures
- Inspect and test installed pipe systems and pipelines
- Troubleshoot malfunctioning systems
- Maintain and repair plumbing systems

Although plumbers, pipefitters, and steamfitters have distinct responsibilities, they often have similar duties. For example, they all install pipes and fittings that carry water, gas, and other fluids and substances. They determine the necessary materials for a job, connect pipes, and test pressure to ensure that a pipe system is airtight and watertight. Their tools include drills, saws, welding torches, press fitting tools, and drain cleaning tools.

Plumbers, pipefitters, and steamfitters may use different materials and construction techniques, depending on the project. For example, residential water systems use copper, steel, and plastic pipe that one or two plumbers install. Industrial plant water systems, in contrast, are made of large steel pipes that usually take a crew of pipefitters to install.

Journey- and master-level plumbers, pipefitters, and steamfitters frequently direct apprentices and helpers.

Master plumbers on construction jobs may help develop blueprints that show the placement of pipes and fixtures. Their input ensures that a structure's plumbing meets building codes, stays within budget, and works well with the location of other features, such as electric wires. Many diagrams are created digitally with Building Information Modeling (BIM), which allows workers in several occupations to collaborate in planning a building's physical systems.

Some of the specific tasks performed by these workers are as follows:

Plumbers install and repair water, gas, and other piping systems in homes, businesses, and factories. They install plumbing fixtures, such as bathtubs and toilets, and appliances, such as dishwashers and water heaters. They clean drains, remove obstructions, and repair or replace broken pipes and fixtures. Plumbers also help maintain septic systems—large, underground holding tanks that collect waste from houses that are not connected to a sewer system.

Pipefitters and steamfitters, sometimes simply called *fitters*, install and maintain pipes that may carry chemicals, acids, and gases. These pipes are mostly in manufacturing, commercial, and industrial settings. Fitters install and repair pipe systems in power plants, as well as heating and cooling systems in large office buildings. *Steamfitters* specialize in systems that are designed for the flow of liquids or gases at high pressure. Other fitters may specialize as gasfitters or sprinkler fitters.

SUMMARY (<https://www.bls.gov/ooh/production/welders-cutters-solderers-and-brazers.htm>)

- **Electricians**

- 2021 Median Pay: \$60,040 per year, \$28.87 per hour
- Typical Entry-Level Education: High school diploma or equivalent
- Work Experience in a Related Occupation: None
- On-the-job Training: Apprenticeship
- Number of Jobs, 2021: 711,200
- Job Outlook, 2021-31: 7% (As fast as average)
- Employment Change, 2021-31: 50,200

- **Plumbers**

- 2021 Median Pay: \$59,880 per year, \$28.79 per hour
- Typical Entry-Level Education: High school diploma or equivalent
- Work Experience in a Related Occupation: None
- On-the-job Training: Apprenticeship
- Number of Jobs, 2021: 469,000

- Job Outlook, 2021-31: 2% (Slower than average)
- Employment Change, 2021-31: 9,100

WORK ENVIRONMENT

Electricians: Almost all electricians work full-time. Work schedules may include evenings and weekends. Overtime is common.

Plumbers: Plumbers, pipefitters, and steamfitters work in factories, homes, businesses, and other places where there are pipes and related systems. Plumbers are often on call for emergencies, so evening and weekend work is common.

HOW TO BECOME A WELDER, CUTTER, SOLDERER, OR BRAZER

Electricians: Most electricians learn through an apprenticeship, but some start out by attending a technical school. Most states require electricians to be licensed.

Plumbers: Most plumbers, pipefitters, and steamfitters learn on the job through an apprenticeship. Some attend a vocational-technical school before receiving on-the-job training. Most states require plumbers to be licensed.

PAY

Electricians: The median annual wage for electricians was \$60,040 in May 2021.

Plumbers: The median annual wage for plumbers, pipefitters, and steamfitters was \$59,880 in May 2021.

JOB OUTLOOK

Electricians: Employment of electricians is projected to grow 7 percent from 2021 to 2031, about as fast as the average for all occupations. About 79,900 openings for electricians are projected each year, on average, over the decade. Many of those openings are expected to result from the need to replace workers who transfer to different occupations or exit the labor force, such as retiring.

Plumbers: Employment of plumbers, pipefitters, and steamfitters is projected to grow 2 percent from 2021 to 2031, slower than the average for all occupations. Despite limited employment growth, about 48,600 openings for plumbers, pipefitters, and steamfitters are projected each year, on average, over the decade. Most of those openings are expected to result from the need to replace workers who transfer to different occupations or exit the labor force, such as to retire.

STATE & AREA DATA

Explore resources for employment and wages by state and area for electricians and plumbers.

SIMILAR OCCUPATIONS

Compare the job duties, education, job growth, and pay of electricians and plumbers with similar occupations.

MORE INFORMATION, INCLUDING LINKS TO O*NET

Learn more about electricians and plumbers by visiting additional resources, including O*NET, a source on key characteristics of workers and occupations.

SUGGESTED CITATION:

Bureau of Labor Statistics, U.S. Department of Labor, Occupational Outlook Handbook, Electricians, at <https://www.bls.gov/ooh/construction-and-extraction/electricians.htm> (visited May 29, 2023).

Bureau of Labor Statistics, U.S. Department of Labor, Occupational Outlook Handbook, Plumbers, Pipefitters, and Steamfitters, at <https://www.bls.gov/ooh/construction-and-extraction/plumbers-pipefitters-and-steamfitters.htm> (visited May 29, 2023).

TVCC has partnered with **Career Coach** (<https://tvcc.emsicc.com/?radius=®ion=10%20Mile%20Radius%20from%20Athens%2C%20TX>) for students to discover majors and in-demand careers and education based on your interests!

- Career Assessment Profiler
- Interactive Career Catalog
- Browse TVCC's Pathways

Some careers in this field will require a bachelor's degree.

- TVCC's AA degrees are fully transferable to public universities in Texas. See an academic advisor or TVCC's university transfer webpage (<https://www.tvcc.edu/Advisement/Category.aspx?z=72>) for more information on this transfer opportunity.
- Many of TVCC's AAS degrees lead to an online Bachelor of Applied Arts and Sciences (BAAS) degree with participating universities. See an academic advisor or the BAAS transfer website (<https://www.ntxccc.org/pathways/>) for more information on this transfer opportunity.