

ELECTRICITY 1

DEVICES, CIRCUITS, AND MATERIALS

NINTH EDITION



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DELMAR
CENGAGE Learning

**Electricity 1, Devices, Circuits, and
Materials, Ninth Edition**
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INTRODUCTION

OBJECTIVES

After studying this unit, the student should be able to

- list the areas of work in which the student electrician becomes involved.
- discuss the ethics of and necessary qualifications for the electrical trade.
- describe the educational program, and discuss its values.

When beginning a new program of study, an individual should be thoroughly familiar with the nature of the program and its values and requirements. This is especially important when the program involves training for a lifelong occupation.

DESCRIPTION OF THE TRADE

The electrical trade is one of the basic trades in the construction industry. It is a trade in which individual ability and skill are recognized and rewarded. The trade involves the following areas: electrical installation in new buildings, rewiring old buildings, electrical maintenance and repair, and troubleshooting electrical equipment and installations. Many of these areas are also basic to the power and electronics fields.

The work involved in all fields often is so closely related to the technical and theoretical concepts of electricity that only a trained person can do the job. This is especially true in the field of electronics. Because more and more electronic equipment is being used, the electrician is expected to be able to install and maintain this equipment. Therefore, the electrical apprentice needs to acquire the related technical information.

WORKING CONDITIONS IN THE TRADE

The surroundings and working conditions of the electrical trade are favorable to the worker. The trade offers opportunities for indoor and outdoor work. Working hours and conditions of the trade permit the electrical worker to find pleasure in doing a first-class job. Journeymen on many jobs have the opportunity to deal with customers; therefore, personal conduct of the experienced worker affects future advancement of the trade and industry. The electrical trade requires a high degree of responsibility on the part of the trained technician because this person is responsible for interconnecting and constructing complex electrical systems. These systems are controlled by state and local building codes and the *National Electrical Code*[®]. As a result, the work requires skilled technicians.

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OPPORTUNITIES IN THE TRADE

The general public's interest in building construction at the present time demands a greater number of highly trained electricians. The modern home, office, and factory require a higher degree of proficiency in electrical work. The constant increase in new types of construction, new electrical equipment, and new uses for electrical equipment offers increasing employment opportunities for qualified electricians. The ever-increasing use of electronic equipment in the power field has shown the need for advanced training of electricians.

Technological advances have created new improvements, ideas, and processes. The apprentice must be familiar with these developments to advance in the electrical profession. The increased use of this information by the electrician makes the electrical trade more interesting and desirable. The apprentice can become a first-class journeyman by understanding new phases of the electrical field. A first-class journeyman can advance to the position of foreman or contractor. The electrical trade needs individuals with a complete knowledge of the practical and technical phases of the trade, including those who can supervise workers on the job.

Some of the fields that offer opportunities are electrical construction, line construction, cable installation, signaling systems, light and power systems, electrical motor maintenance and repair, equipment and appliance servicing, and industrial electronics. Due to the increased needs of our society, new opportunities are developing rapidly.

ETHICS OF THE TRADE

Electricians are judged by the quality of their work and by their attitude toward fellow workers, employers, and the public. A good electrician takes pride in doing high-quality work and gives an honest day's work for an honest day's pay. An accurate and complete job is expected in every activity, including the safe handling of materials (Figure 1-1). Much work is done alone and unsupervised.

QUALIFICATIONS FOR EMPLOYMENT

Educational

The student should be a high school graduate or equivalent, and should be eager to learn the skills and technical information necessary for success in the electrical trade. The student is expected to have a working knowledge of mathematics as this aids in the understanding of important and necessary electrical formulas.

Physical

A person must be strong enough to perform certain duties because the trade requires a considerable amount of moving around, climbing, and working under conditions that require muscular action. The student's general health should be good.

Figure 1-1 Safe handling.



General

The student must like to work with electrical equipment and should be interested in the general theory of electricity. The student must like to work with others in a cooperative manner. Electricians often work in pairs and also with individuals in other trades. The trade requires a liking for indoor as well as outdoor work, and a willingness to do a fair share of manual labor.

VALUE OF APPRENTICESHIP PROGRAMS

- An apprenticeship is an educational experience.
- An apprentice program provides organized training.
- A controlled apprenticeship brings together the fundamental factors that are necessary to produce a skilled technician.
- An apprenticeship is a practical and efficient means of training a skilled technician.
- An apprenticeship program is beneficial for the trainee, employer, union, and society because all gain from better workmanship.
- Successful electricians profit according to their knowledge and skill. Having the highest qualifications possible is an advantage.

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Figure 1-2 Hard hat with safety goggles.



RESPONSIBILITIES

Educational programs coupled with work experiences provide the student with the opportunity to acquire the knowledge and skill necessary to become a skilled technician. It is the trainee's responsibility to make the most of these opportunities.

Students are expected to take an interest in their work, to have a desire to learn, to fit into the employer's organization, to plan and organize their work efficiently, to be resourceful, and to know how to conserve materials.

The student is further expected to be punctual, to maintain good health, to develop initiative and leadership, to cooperate in every way, to be neat in personal appearance, and to practice safe working procedures at all times with appropriate equipment (Figure 1-2).

The student is expected to keep informed regarding new facts, ideas, and procedures of the trade. Because the student is also expected to continue learning while earning, the trainee must be prepared to attend school to obtain the necessary technical and related instruction.

THE PROGRAM OF RELATED INSTRUCTION

Generally, an apprenticeship program requires the student to attend classes in related subjects for a minimum number of hours. The length of the apprenticeship period in the electrical trade is normally five years. In certain localities, time spent in related instruction is not classified as work time and is not paid for, whereas in other localities, school attendance is considered work time so that the student receives pay at the prevailing wage rate.

The program of instruction consists of courses based on divisions of work within the trade, such as residential wiring, commercial wiring, industrial plant wiring, maintenance, and repair. Each course includes information, such as trade science, trade mathematics, and trade theory and practice.

If students enter a related instruction program at the time the course is being taught, they will obtain instruction in the normal manner by attending classes. If the related instruction course is not being given at the time students enter the program, this information must be acquired through self-study, under the supervision of and with the assistance of the instructor. Students are expected to provide their own materials, such as textbooks, notebooks, and workbooks, as advised by the instructor.

SUMMARY

Electricians and electrical workers of all types are in great demand today. The pay is directly related to the knowledge and skill of the workers, and their ability to keep up with the changes in the industry. A solid understanding of electrical concepts is essential. Apprenticeship programs are found in most communities across the country, along with opportunities for related instruction at local schools and community technical colleges.

ACHIEVEMENT REVIEW

1. Name three fields that offer opportunities in the trade.

2. Briefly state the educational and physical qualifications for employment.

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3. Electricians are judged by the _____ of their work, and by their _____ toward fellow workers, employers, and the public.
4. Select the best answer. An apprenticeship is a/an _____ experience.
- | | |
|-----------------|-----------------|
| a. disorganized | c. uncontrolled |
| b. educational | d. coded |