



ELECTRICAL, ELECTRONIC AND COMMUNICATIONS ENGINEERING TECHNOLOGY/TECHNICIAN

[CIP Code 15.0303](#)

This document is a Program of Study for Electrical, Electronic and Communications Engineering Technology/Technician programs at the secondary level. This program of study is considered a framework, not a curriculum. From this framework educators may use this as a tool to provide structure for developing learning modules, unit plans, or daily lesson plans that meet the tasks or standards within the program of study. This program of study is based on research, experience, and many resources. The goal is to train a workforce that is skilled, knowledgeable, and able to meet the needs of the industry today and well into the future.

Engineering technicians use the principles and theories of science, engineering, and mathematics to solve technical problems in research and development, manufacturing, sales, construction, inspection, and maintenance. Their work is more narrowly focused and application-oriented than that of scientists and engineers. Many engineering technicians assist engineers and scientists, especially in research and development. Others work in quality control, inspecting products and processes, conducting tests, or collecting data. In manufacturing, they may assist in product design, development, or production.

Engineering technicians who work in research and development build or set up equipment; prepare and conduct experiments; collect data; calculate or record results; and help engineers or scientists in other ways, such as making prototype versions of newly designed equipment. They also assist in design work, often using computer-aided design and drafting (CADD) equipment. Most engineering technicians specialize, learning skills and working in the same disciplines as engineers.

Electromechanical engineering technicians combine knowledge of mechanical engineering technology with knowledge of electrical and electronic circuits to design, develop, test, and manufacture electronic and computer-controlled mechanical systems. Their work often overlaps that of both electrical and electronics engineering technicians and mechanical engineering technicians.

Most engineering technicians enter the occupation with an associate degree in engineering technology. Training is available at technical institutes, community colleges, extension divisions of colleges and universities, public and private vocational-technical schools, and in the Armed Forces. Because the type and quality of training programs vary considerably, prospective students should carefully investigate training programs before enrolling.

Although it may be possible to qualify for certain engineering technician jobs without formal training, most employers prefer to hire someone with at least a 2-year associate degree in engineering technology. People with college courses in science, engineering, and mathematics may qualify for some positions but may need additional specialized training and experience. Prospective engineering technicians should take as many high school science and math courses as possible to prepare for programs in engineering technology after high school.

The type of technical courses required depends on the specialty. For example, prospective mechanical engineering technicians may take courses in fluid mechanics, thermodynamics, and mechanical design; electrical engineering technicians may need classes in electrical circuits,

microprocessors, and digital electronics; and those preparing to work in environmental engineering technology need courses in environmental regulations and safe handling of hazardous materials.

Community colleges offer curriculums that are similar to those in technical institutes but include more theory and liberal arts. There may be little or no difference between programs at technical institutes and community colleges, as both offer associate degrees. After completing the 2-year program, some graduates get jobs as engineering technicians, whereas others continue their education at 4-year colleges. However, an associate degree in pre-engineering is different from one in engineering technology. Students who enroll in a 2-year pre-engineering program may find it very difficult to find work as an engineering technician if they decide not to enter a 4-year engineering program because pre-engineering programs usually focus less on hands-on applications and more on academic preparatory work. Conversely, graduates of 2-year engineering technology programs may not receive credit for some of the courses they have taken if they choose to transfer to a 4-year engineering program. Colleges having 4-year programs usually do not offer engineering technician training, but college courses in science, engineering, and mathematics are useful for obtaining a job as an engineering technician. Many 4-year colleges offer bachelor's degrees in engineering technology, but graduates of these programs often are hired to work as technologists or applied engineers, not technicians.

Career and technical education schools, another source of technical training, include postsecondary public institutions that serve local students and emphasize training needed by local employers. Most require a high school diploma or its equivalent for admission.

Other training in technical areas may be obtained in the Armed Forces. Many military technical training programs are highly regarded by employers. However, skills acquired in military programs are often narrowly focused and may be of limited applicability in civilian industry, which often requires broader training. Therefore, some additional training may be needed, depending on the acquired skills and the kind of job.

Because many engineering technicians assist in design work, creativity is desirable. Good communication skills and the ability to work well with others also are important as engineering technicians are typically part of a team of engineers and other technicians.

Assumptions of This Program of Study

High-quality programs should meet the following standards:

- Promote **positive working relationships**
- Implement a **curriculum** that fosters all areas of skill development – cognitive, emotional, language, physical, and social
- Use developmentally, culturally, and linguistically appropriate and **effective teaching approaches**
- Provide **ongoing assessments** of student progress
- Employ and support qualified **teaching staff**
- Establish and maintain collaborative relationships **with families**
- Establish and maintain relationships and use resources of the **community**
- Provide a safe and healthy learning **environment**

- Implement strong program organization and supervision policies that result in **high-quality teaching and learning**
- Integrate academic skills and aptitudes necessary for gainful employment and promoting a foundation of **lifelong learning**

Academic Rigor

Research shows that career success requires the same level of college-prep courses as postsecondary success requires. The Department of Education's focus is to ensure that every student graduates prepared for college and a career. In order to be successful in this program of study, students should follow the academic sequence as determined by Pennsylvania's high school reform efforts.

Resources Used for This Program of Study

- MAVCC (Multistate Academic Vocational Curriculum Consortium)
<http://www.mavcc.org/>
- NOCTI (National Occupational Competency Testing Institute <http://www.nocti.org/>)
- O*NET <http://online.onetcenter.org/>
- Pennsylvania Approved Certifications for Industry-Recognized Certifications for Career and Technical Education Programs
http://www.portal.state.pa.us/portal/server.pt/community/instructional_resources/7392/industry-recognized_certifications_for_career_and_technical_education_programs/507887
- Pennsylvania Department of Labor & Industry High Priority Occupations
http://www.portal.state.pa.us/portal/server.pt/community/high_priority_occupations/12910
- VTECS (A Consortium of Innovative Career and Workforce Development Resources)
<http://www.vtecs.org/>

CIP Code

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Pennsylvania CIP

An instructional program that prepares individuals to apply basic electronic principles and technical skills to the production, calibration, estimation, testing, assembling, installation and maintenance of electronic equipment. Emphasis is on passive components and solid-state devices; digital circuits; optoelectronic devices; operational amplifiers; audio and RF amplifiers; oscillators; power supplies; and AM, FM and PCM modulators. Knowledge is acquired through theoretical instruction, experimentation and hands-on activities. Instruction will develop basic levels of knowledge, understanding and associated skills essential for entry-level employment in communications, industrial electronics, digital processing, robotics, avionics, biomedical technology and other electronics occupations.

Integrate Academic Career Education and Work Standards for Student Success

As students participate in career exploration activities and rigorous studies from elementary grades through graduation, they learn to appreciate the relationship between their classroom learning and the skills needed within the workplace. The academic and workplace skills within the Academic Standards for Career Education and Work are expected to be addressed within classrooms and achieved by all students throughout Pennsylvania. No student should leave secondary education without a solid foundation in these Standards.

http://www.portal.state.pa.us/portal/server.pt/community/state_board_of_education/8830/state_academic_standards/529102

CEW Standards Tool Kit for teachers to implement CEW Standards

www.pacareerstandards.com

Pennsylvania Approved Certifications

http://www.portal.state.pa.us/portal/server.pt/community/instructional_resources/7392/industry-recognized_certifications_for_career_and_technical_education_programs/507887

The Programs of Study Documents

- Electrical, Electronic and Communications Engineering Technology/Technician Crosswalk Template for Task Alignment (excel) – Instructions: Indicate the number code(s) of your school’s program competency or competencies aligned to each program of study competency.
- Electrical, Electronic and Communications Engineering Technology/Technician Crosswalk Template for Task Alignment (pdf) – Instructions: Indicate the number code(s) of your school’s program competency or competencies aligned to each program of study competency.
- Scope and Sequence Template (word) – Enter secondary technical Program of Study courses. Postsecondary courses will be determined when the Statewide Articulation Agreement for this Program of Study is complete.
- Scope and Sequence Template (pdf) – Enter secondary technical Program of Study courses. Postsecondary courses will be determined when the Statewide Articulation Agreement for this Program of Study is complete.
- PA Academic Standards/Eligible Content Alignment to Electrical, Electronic and Communications Engineering Technology/Technician Task List (excel) – Crosswalk of PA Academic Standards/Eligible Content for Reading, Writing, Speaking and Listening (RWSL), Math, and Science aligned to Program of Study Secondary Competency List.
- PA Academic Standards/Eligible Content Alignment to Electrical, Electronic and Communications Engineering Technology/Technician Task List (pdf) – Crosswalk of PA Academic Standards/Eligible Content for Reading, Writing, Speaking and Listening (RWSL), Math, and Science aligned to Program of Study Secondary Competency List.

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