

Work-Ready Electronics

Synchronizing Curriculum to the Rapidly Changing Workplace

Module: Careers and Education in the Electronics Industry



Careers in Electronics

Occupations in electronics can be divided into two main categories: engineering and technology.

Technicians install, service, maintain, repair, operate electronic equipment and systems.

Engineers primarily design and analyze circuits, equipment, or systems.

The educational path differs depending on which type of career you want.

This module covers the type of education you need to acquire the different jobs, how much they pay, and where the different types of jobs are geographically located.

What Technicians Need to Know

Types of technical jobs available in industry

Educational programs and degrees needed

Difference between engineering and technology education

Differences between engineers, technologists, and technicians as a function of job skills and required education and training

Technical Occupations in Electronics

Technical occupations in electronics include three categories: Scientists, Engineers, and Engineering Technologists.

Scientists – Physicists, chemists, and others perform research and development on materials and components.

Engineers – Design products, equipment, and systems. Perform performance analysis using math and computer simulation.

Technical Occupations in Electronics

Engineering Technologists – Directly assist engineers. They apply scientific and engineering knowledge and methods combined with technical skills to support engineering activities. Electronic technologists differ from technicians because their increased knowledge and methods combined with technical skills support engineering activities. Activities typically include development of various design components of systems that have been designed and developed by engineers.

Most positions in industry are labeled as either technician or engineer. Those whose knowledge and skill qualify them for a technologist position typically hold the title “engineer” (applied engineer, manufacturing engineer, project engineer, field service engineer, etc.)

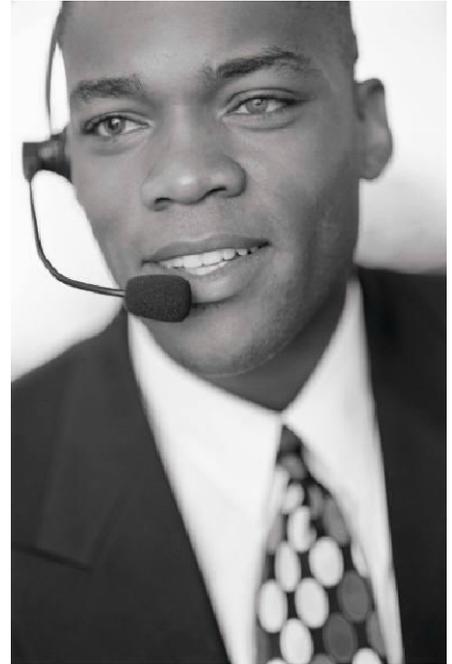
Technical Occupations in Electronics



Technicians – Install, service, maintain, repair, operate electronic equipment and systems.

Support personnel

- Sales and marketing
- Technical writing and editing
- Training and education
- Customer help



Primary Pathway to Jobs: Engineering

Engineering jobs require a bachelor of science in electrical engineering (BSEE) degree or higher. The work is primarily design and analysis of circuits, equipment, or systems. This work is more theoretical, science and math-based, and makes extensive use of computers for analysis and simulation.

Primary Pathways to Jobs: Technology

Jobs in electronics technology do not involve design or analysis and are less theoretical. They are more applied in nature than engineering jobs. Those with technology degrees do more “hands-on” work with equipment and systems. Technology degrees are the associate in applied sciences (AAS) and lead to technician jobs and the bachelor of science in engineering technology (BSET) graduates are referred to as technologists. Technologists deal more with practical engineering and applications in manufacturing, service, sales, and support.

Educational Path: Engineering vs. Technology

The two paths, engineering and technology, are not academically compatible or interchangeable. A person getting an AAS technology degree for example cannot transfer directly to a BSEE program and get credit for prior work.

If an AAS graduate wants an engineering degree, he or she must transfer to a BSEE program and start over. Credits for math, science, humanities and similar generic courses will usually transfer.

The best academic path for an AAS graduate is to transfer to a university with a BSET degree. The first two years represented by the AAS degree work are usually accepted, so that similar courses do not have to be re-taken when working toward a BSET. Furthermore, the BSET degree should eventually lead to a higher level job.

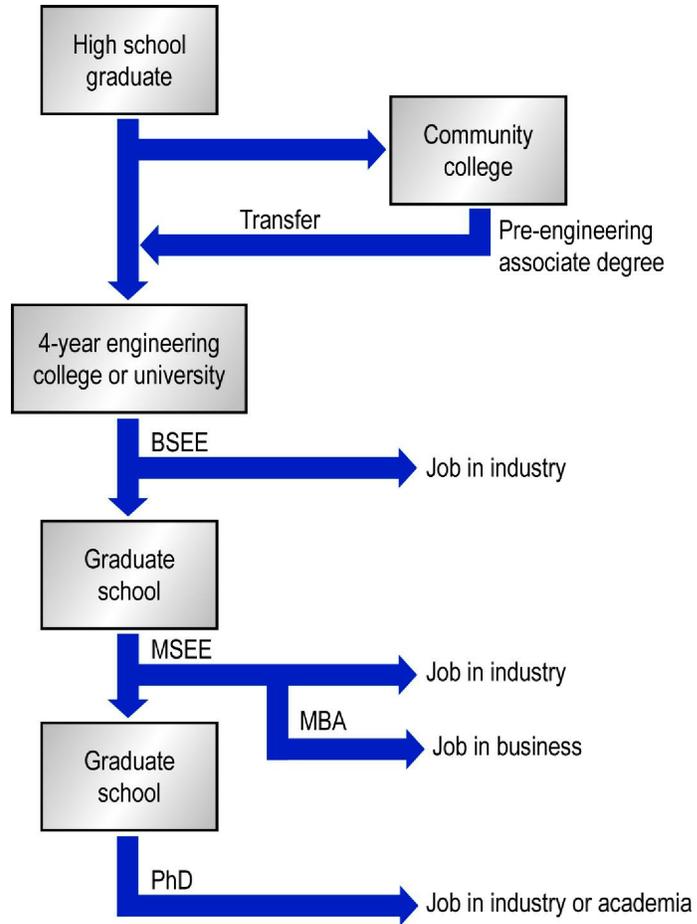
Electronics Engineers

- Hold a BSEE degree, a 4-year program based on math and science
- Perform analysis of circuits, equipment and systems
- Design circuits, equipment and systems
- Use computers in design, simulation and analysis
- Use math and science principles
- Perform work related to development and research

Electronics Engineers: Advanced Degrees

- Master and doctorate degrees available
 - Master of Science in Electrical Engineering (MSEE) – Greater technical depth and breadth of knowledge
 - Master of Business Administration (MBA) – Specialization in business principles, fundamentals with emphasis on management, marketing and finance
 - Doctor of Philosophy (PhD) – Higher level technical knowledge with primary emphasis on research

Pathway to Engineering



Pathway to Engineering

High school graduates may go directly to college or university with BSEE program. Alternately, the high school graduate may also go to a community college for the first two years of engineering then transfer to a university. Graduates with BSEE go to work in industry. Most entry level jobs require this degree.

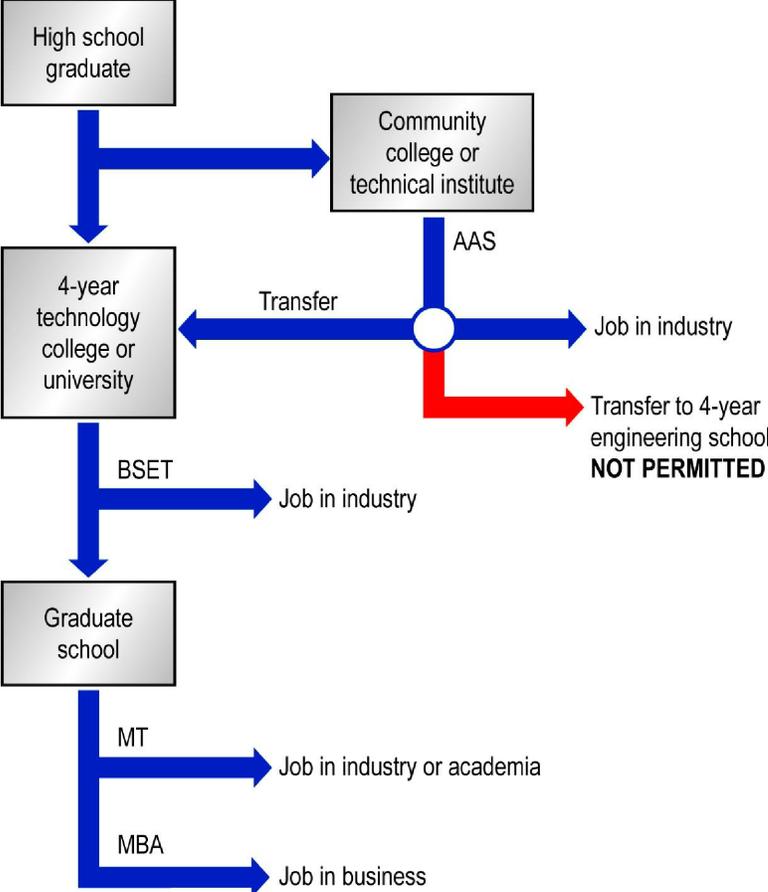
BSEE graduates may then go on for a masters degree directly. The MSEE is for those interested more in the higher level technical jobs while the MBA is for those interested in management or marketing. The PhD or doctorate is primarily for those interested in teaching or doing advanced research.

Electronics Technicians

Electronics technicians usually hold an AAS degree or equivalent. Some technician schools award a diploma. A high percentage of technicians received their training in military service schools.

The primary jobs performed by technicians are maintenance, repair, installation, service, manufacturing, and test. They typically use math up to algebra and trigonometry. Some AAS schools include calculus but technicians rarely if ever need it on the job because they generally do not perform mathematical analysis or design.

Educational Pathway to Technician Jobs



Educational Pathway to Technician Jobs

High school students may go directly to a community college to earn a degree in technology. They can go directly from there to a technician job. This is the usual educational requirement.

Military trained persons or graduates of other technical schools may also go directly to technician jobs.

Technician: Advanced Degrees

High school graduates may also go to a university offering a bachelor of science in engineering technology (BSET) degree. This is different from a BSEE degree although most BSET graduates go to jobs as engineers. AAS degree graduates may also transfer to the university to get the last two years of the BSET degree.

BSET graduates may then go on for a Masters in Technology (MT) degree which is primarily for those interested in teaching or for an MBA if their interest is management, marketing or finance.

Types of Technician Jobs

- Engineering technician – Builds prototypes, makes tests and measurements, and may do simple design jobs
- Maintenance technician – Performs service and repair on a wide range of equipment in industry
- Manufacturing technician – Assembles products in a factory
- Test technician – Performs tests and measurements to ensure compliance with specifications and standards
- Wiring technician – Installs and repairs wiring in computer networks, industrial plants, security systems, telecommunications
- Repair technician – Repairs equipment
- Field service representative – Installs, services, calibrates, maintains, repairs equipment

Specific Technician Jobs: Biomedical Technician



Installs, maintains and repairs medical electronic equipment such as X-ray machines, MRI and CT machines, lab blood analyzers, patient monitoring equipment.

Specific Technician Jobs: Cell Phone Base Station Technician



Services and maintains the transceivers, antennas, and related equipment in a cell phone base station.

Specific Technician Jobs: Wireless LAN Technician



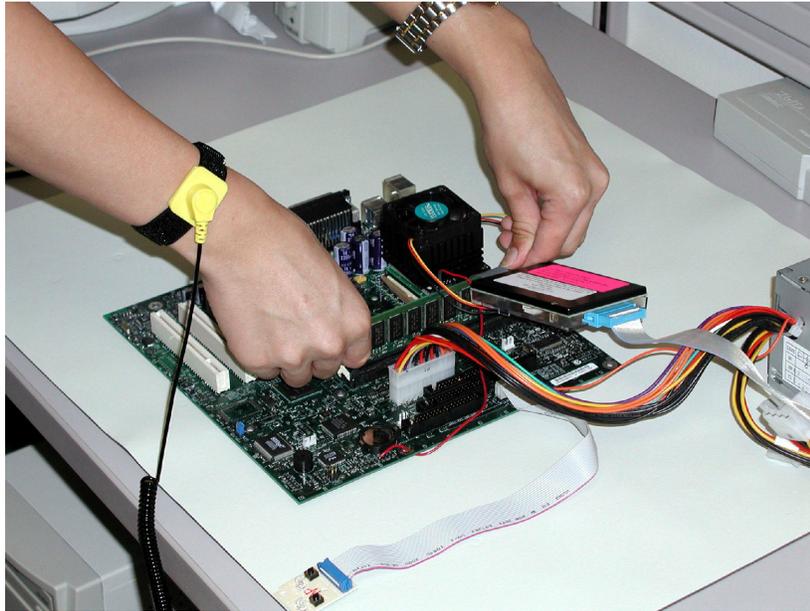
Installs and services wireless LAN nodes which include the transceivers, antennas, interface connections, and power sources.

Specific Technician Jobs: Semiconductor Manufacturing Technician



Operates and/or maintains the equipment in a cleanroom or fab where integrated circuits are made.

Specific Technician Jobs: Process Control Technician



Installs, services and troubleshoots the sensors, analog/digital controllers and communications equipment in oil refineries, chemical plants, or food processing plants.

Other Technician Level Jobs: Sales/Marketing



Sells complex equipment or systems directly to customers, writes proposals and quotations, responds to requests for proposals, makes sales calls and presentations, attends conferences.

Product managers conceive new products, monitor sales and marketing efforts, competition and the technology advancements.

Other Technician Level Jobs: Technical Writer/Editor



Writes user manuals, service manuals, product documentation, articles, books, sales brochures, product literature; maintains websites.

Other Technician Level Jobs: Technical Trainer



Trains employees or customers on equipment. Develops educational materials, conducts classes, creates websites.

Other Technician Level Jobs: Customer Support



Visits customer sites to provide problem solving or service, telephone help desk and support.

ADDITIONAL RESOURCES

Please see the Practice and Resources section of this module for Web References and a video clip on careers in the electronics industry.

Test your knowledge

Careers and Education in the Electronics Industry

Knowledge Probe

Click on [Course Materials](#) at the top of the page.
Then choose **Knowledge Probe**.