NCCER
ELECTRONIC SYSTEMS TECHNICIAN CURRICULUM

The following is a brief description of subjects contained in all four levels of the electronic systems technician program as well as the core curricula that all level one students are expected to pass.

CORE CURRICULUM

The core curricula provides a basic introduction to construction work for all crafts. The core curriculum consists of 9 modules taught through in-person instruction and supplemented by online programming.

Basic Safety
Presents basic jobsite safety information to prepare workers for the construction environment. Describes the common causes of workplace incidents and accidents and how to avoid them. Introduces common personal protective equipment (PPE), including equipment required for work at height, and its proper use. Information related to safety in several specific environments, including welding areas and confined spaces, is also provided.

Introduction to Construction Math
Reviews basic math skills related to the construction trades and demonstrates how they apply to the trades. Covers multiple systems of measurement, decimals, fractions, and basic geometry.

Introduction to Hand Tools
Introduces common hand tools used in a variety of construction crafts. Identifies tools and how to safely use them. Proper hand tool maintenance is also presented.

Introduction to Power Tools
Identifies and describes the operation of many power tools common in the construction environment. Provides instruction on proper use, as well as on safe-handling guidelines and basic maintenance.

Introduction to Construction Drawings
Introduces the basic elements of construction drawings. The common components of drawings are presented, as well as the most common drawing types. The use of drawing scales and how to measure drawings is also covered.

Basic Rigging
Provides basic information related to rigging and rigging hardware, such as slings, rigging hitches, and hoists. Emphasizes safe working habits in the vicinity of rigging operations.

Basic Communication Skills
Provides good techniques for effective communication on the job. Includes examples that emphasize the importance of both written and verbal communication skills. Describes the importance of reading skills in the construction industry and covers proper techniques to use in a variety of different written communication formats.

Basic Employability Skills
Describes the opportunities offered by the construction trades. Discusses critical thinking and essential problem-solving skills for the construction industry. Also identifies and discusses positive social skills and their value in the workplace.

Introduction to Material Handling
Describes the hazards associated with handling materials and provides techniques to avoid both injury and property damage. Common material-handling equipment is also introduced.

ELECTRONIC SYSTEMS TECHNICIAN – LEVEL ONE

Introduction to the Trade
Provides an overview of the alarm, telecommunications, and entertainment electronics industries from a technician's perspective. Also introduces the elements of professional conduct and trainees' responsibilities to themselves and their employers, customers, and fellow workers.

Wood and Masonry Construction Methods
Gives the trainees an overview of the materials and techniques used in constructing and finishing residential and commercial buildings, including wood frame, brick and block, and post and beam. Covers common drills, bits, and techniques used to drill through wood and masonry. Also reviews the various types of fasteners used with these materials.

Concrete and Steel Construction Methods
Gives the trainees an overview of the materials and techniques used in constructing and finishing residential and commercial buildings, including poured and prefabricated concrete and structural steel. Covers common drills, bits, and techniques used to drill through concrete and steel. Also reviews the various types of fasteners used with these materials.

Pathways and Spaces
Introduces the many types of conduits and wireways used in low-voltage applications, along with their supporting hardware and fittings. Provides an overview of telecommunications cable pathways from the source to the destination, including maintenance holes, ducts, equipment rooms, and telecommunications closets.

Craft-Related Mathematics
Expands on the knowledge gained in the Core Curriculum module Introduction to Construction Math. Emphasizes the metric system, including how to convert between corresponding English and metric system units. Also covers the use of scientific notation, powers and roots, and the basic concepts of algebra, geometry, and right-angle trigonometry.

Hand Bending of Conduit
Provides an introduction to conduit bending and installation. Covers the techniques for using hand-operated conduit benders, as well as cutting, reaming, and threading conduit.

Introduction to the National Electrical Code®
Provides a navigational road map for using the NEC®. Introduces the layout of the NEC® and the types of information found within the code book. Allows trainees to practice finding information using an easy-to-follow procedure.

Low-Voltage Cabling
Covers the makeup, identification, and applications of various types of conductors and cables used in telecommunications and security systems. Describes the tools, materials, and procedures for pulling cables through conduit and raceways.

ELECTRONIC SYSTEMS TECHNICIAN – LEVEL TWO

DC Circuits
Offers a general introduction to the electrical concepts used in Ohm's law as applied to DC series circuits. Includes atomic theory, electromotive force, resistance, and electrical power equations. Introduces series, parallel, and series-parallel DC circuits. Covers Kirchhoff's voltage and current laws and circuit analysis.

AC Circuits
Provides an introduction to AC theory, circuits, and components, including inductors, capacitors, and transformers. Covers the calculation of reactance and impedance in RL, RC, LC, and RLC circuits using math and vector analysis.

Switching Devices and Timers
Presents the principles of operation and describes the different types and configurations of switches, relays, timers, and photoelectric devices. Covers guidelines for the selection of appropriate devices using specification sheets.

Semiconductors and Integrated Circuits
Provides an introduction to the principles of electronics and semiconductor theory, components, and applications.

Test Equipment
Covers the selection, inspection, use, and maintenance of basic test equipment used in low-voltage work. Also covers specialized test equipment such as signal generators, wattmeters, cable testers, and RF analyzers.

Introduction to Electrical Drawings
Introduces electrical prints, drawings, and symbols. Teaches the types of information that can be found on schematics, one-line drawings, and wiring diagrams.

Introduction to Codes and Standards
Describes the scope and content of the major codes and standards that apply to telecommunications, life safety, security, and other low-voltage systems. Emphasis on familiarization with and use of the NEC®.

Cable Selection
Provides an overview of the types of cable used for various low-voltage installations. Also covers the methods used to select the proper size and type of cable for a typical installation.

Wire and Cable Terminations
Provides information and detailed instructions for selecting, installing, and testing connectors and other terminating devices on the various cables used in low-voltage work, including telecommunications, video, and audio, and fiber optics.

Power Quality and Grounding
Covers grounding and bonding of electrical systems. Discusses NEC® regulations pertaining to grounding and bonding. Covers equipment and devices used for grounding and bonding, including their methods of installation. Explains power quality, along with the causes and effects of poor power quality.

ELECTRONIC SYSTEMS TECHNICIAN – LEVEL THREE

Buses and Networks
Provides information on connecting computers and components, including various methods for connecting computers in a network, information on connecting controls and equipment in a control system, and information on how data is transferred between the nodes in a network.

Fiber Optics
Introduces the types of equipment and methods used in fiberoptic cable installation.

Wireless Communication
Introduces the operating principles and equipment used in common types of radio frequency (RF) and infrared (IR) wireless communication systems. Covers RF communication systems, IR-controlled systems, power line carrier (PLC) systems, RF and IR wireless computer networks, and satellite communication systems. Discusses the equipment used for testing and troubleshooting wireless communication systems.

Site Survey, Project Planning, and Documentation
Covers the tasks involved in planning a job from start to finish, including how to perform site surveys for new and retrofit construction projects. Covers the different kinds of drawings, specifications, and other documents commonly used.

Fundamentals of Crew Leadership
Covers basic leadership skills and explains different leadership styles, communication, delegating, and problem-solving. Job-site safety and the crew leader's role in safety are also discussed. Describes project planning, scheduling, and estimating.

Rack Assembly
Describes rack systems and best practices for assembling electronic system enclosures, including power sequencing, grounding, weight distribution, and heat dissipation. Explains electrical power distribution and load calculations for equipment housed within racks.

System Commissioning and User Training
Covers the basics of final testing and closeout procedures and how to build these activities into your projects. Describes customer satisfaction levels and expectations and how to meet them during the cut-over phase of any project. Focuses on industry best practices and user-required training.

Maintenance and Repair
Introduces the background information and the tasks involved in the maintenance and repair of low-voltage systems and equipment. Covers a systematic approach to system and component-level troubleshooting and the methods of identifying common types of repairs.

ELECTRONIC SYSTEMS TECHNICIAN – LEVEL FOUR

Audio Systems
Introduces and explains audio system components, including input sources, amplifiers, signal processing equipment, and output equipment. Describes power requirements, cabling options, system configuration, and basic design considerations. Review common test equipment used for installation and troubleshooting.

Video Systems
Describes the types of equipment used in various video systems and equipment, including both analog and digital video, video signaling, display devices, HDTV, 3-D video, and video processing and distribution.

Broadband Systems
Describes the major elements of head-end design for specialized television systems, including CATV, SMATV, and MATV systems. Explains receivers, modulators, amplification, and distribution devices. Explains proper signal levels, cable attenuation, insertion loss, and acceptable carrier-to-noise levels. Covers common test equipment and troubleshooting procedures.

Media Management Systems
Explains the basic principles behind shared media resources and their access via a computer network or hardwired application. Describes media types for both analog and digital platforms. Explores cabling options, including fiber-optic interfaces.

Telecommunications Systems
Describes the history and current use of basic subscriber systems. Also covers PBX systems used in business applications and central office services used to interface to the public switched telephone network (PSTN).

Residential and Commercial Building Networks
Describes how home and business systems such as fire alarms, security, energy, and entertainment can be integrated using specialized smart home and building management software and controllers. Describes best practices for system interoperability and performance. Discusses various interconnection options and integration protocols.

Intrusion Detection Systems
Describes devices such as sensors, notifications, control panels, and programming used in intrusion detection security systems. Covers system design and installation guidelines, wiring, testing, and troubleshooting. Emphasizes codes and standards.

Fire Alarm Systems
Covers the basics of fire alarm systems, including devices, circuits, system design, and installation guidelines, power requirements, control panel programming, testing, and troubleshooting. Explores the integration of fire alarms with other systems. Examines both residential and commercial fire alarm applications, emphasizing NEC® requirements.

Overview of Nurse Call and Signaling Systems
Presents an overview of nurse call and signaling systems as found in hospitals and other health-care facilities. Covers basic emergency call and duress system requirements based on facility type. Identifies installation requirements based on UL and other building code specifications.

CCTV Systems
Describes the installation and configuration of closed-circuit TV systems for small, medium, and large facilities. Explains various equipment, including cameras, lenses, remote positioning, video recording, and transmission. Covers the roles of the internet and digital technologies. Introduces test and troubleshooting equipment.

Access Control Systems
Introduces access control systems, including applications, door locking systems, readers, biometrics, and controllers. Emphasizes installation practices as well as building and electrical codes.

THE NCCER PROGRAM

NCCER (National Center for Construction Education & Research) maintains a portable and widely recognized credentialing and certification system through its Registry. This Registry assures portability of skills by providing transcripts, certificates, and wallet cards to students who successfully complete the NCCER Curriculum through an accredited sponsor. These valuable industry credentials benefit students as they seek employment and build their careers. To be entered in NCCER's Automated National Registry, you must complete and sign a Registration and Release form. This form will be completed on the first night of class in each semester and requires your Social Security Number and your signature.

NCCER has developed a consistent program of accreditation, instructor certification, standardized curriculum, registry, assessment, and certification, which is a key element in developing a skilled workforce of craft professionals.

NCCER is the accrediting body for the industry and establishes the benchmark for quality training and assessments. By partnering with industry and academia, NCCER has developed a system for program accreditation that is similar to those found in institutions of higher learning. This process ensures that students receive quality training based on uniform standards and criteria.

The NCCER Curriculum, in cooperation with publishing partner Pearson, has developed and publishes a world-class curriculum created by "Subject Matter Experts" representing contractors and schools from around the country. "Subject Matter Experts" ensure exceptional training programs that meet or exceed national industry standards. The NCCER Curriculum, which includes more than 60 craft areas, is taught worldwide by contractors, associations, construction users, and secondary and post-secondary schools. In addition, multiple State Departments of Education recognize the curriculum along with the U.S. Department of Labor - Office of Apprenticeship.