AC Systems, Level I - 3rd Ed. AC Systems marks the beginning of study in AC Theory. Lessons covered in this course include a review of DC theory, the use of trigonometry and vector math in circuit analysis, comparing direct current to alternating current, circuit calculations for basic systems, AC resistive circuits, and understanding the basic characteristics of AC circuits. This course also offers several lab exercises, each designed to complement the lessons by reinforcement through actual hands-on learning.

AC Theory, Level I - 3rd Ed. This course will introduce the inductor and capacitor, their inductance and capacitance effects in series or parallel, and the reactance they cause in an AC circuit.

AC Theory, Level II - 3rd Ed. This course builds upon the knowledge of reactance learned in AC Theory, Level I by applying a systematic approach to the calculation of AC circuits. The first three lessons cover working with series RL, RC, and RLC circuits before the next three lessons cover the study of parallel RL, RC, and RLC circuits. Next, circuits with no resistance (LC) are studied, followed by a summary lesson on comparing the distinguishing characteristics of series and parallel RLC circuits. The final lesson covers how to analyze and work with combination RLC circuits.

AC Theory, Level II featuring the Electrical Theory Simulator - 2nd Ed. This course is designed to teach the learner the important concepts of power factor and power factor correction. The course also introduces generators, understanding how DC generators work, the design and function of AC generators, and finally introduces the learner to three-phase systems. This course also offers several lab exercises, each designed to complement the lessons by reinforcement through actual hands-on learning.

AC Theory, Level III - 3rd Ed. This course is designed to teach the learner the important concepts of power factor and power factor correction. The course also introduces generators, understanding how DC generators work, the design and function of AC generators, and finally introduces the learner to 3-phase systems. This course also offers several lab exercises, each designed to complement the lessons by reinforcement through actual hands-on learning.

AC Theory, Level III featuring the Electrical Theory Simulator - 2nd Ed. This course is designed to teach the learner the important concepts of series resonance, parallel resonance, series parallel resonant circuit comparisons, filters, and electronic circuit test instrument. This course also offers several lab exercises, each designed to complement the lessons by reinforcement through actual hands-on learning.

AC Theory, Level IV - 3rd Ed. This course is designed to teach the learner the important concepts of series resonance, parallel resonance, series parallel resonant circuit comparisons, filters, and electronic circuit test instrument. This course also offers several lab exercises, each designed to complement the lessons by reinforcement through actual hands-on learning.

Access Control, Level I This course will introduce fundamental concepts for access control systems. Topics presented include cards, codes, and biometrics, door hardware, control panels, access control terminology, and basic design concepts.

Ace That Test The aim of the Ace That Test program is to help you improve your test taking skills. This is accomplished by practicing many types of short tests on how to get the best test score on an exam. We want you to be a successful test taker and ensure that what you really know is reflected in your test score. The Ace That Test program aims to help you do well on important tests and certification exams.

Blueprints, Level I The learner will be introduced to the fundamentals of understanding and drawing blueprints as well as the skills required for reading and analyzing residential blueprints.

Blueprints, Level II The Blueprints Level II course expands on the concepts learned in Level I. The course starts with a review of basic fundamentals of blueprints and how they are drawn, which is immediately followed with analyzing and laying out circuits. The learner is also introduced to job cost and how to perform a takeoff, blueprint specifications, schedules and component location, and blueprint systems integration.

Blueprints, Level III The Blueprints Level III course expands on the concepts learned in Level I and Level II. The course starts with a review and comparison between residential, commercial, and industrial specifications followed by a lesson specific to industrial specifications, and finally three lessons on how to read and interpret industrial blueprints.

Building a Foundation in Mathematics, Level I Many skills are required to successfully complete the electrical apprenticeship program and be able to function as a competent Journeyman. One such skill is the ability to apply standard mathematics in the classroom as well as on the job. The Building a Foundation in Mathematics, Level I course provides a review of necessary mathematical skills which are crucial to anyone working in the electrical trade. Topics include operations with whole numbers, integers, fractions, decimals, ratios, exponents, and units and measurements.

Building a Foundation in Mathematics, Level II w/ SW (w/o IG) The lessons throughout Building a Foundation in Mathematics, Level II will be much more demanding than the previous level and will require extensive use of the basic skills covered in the Level I course. A solid math foundation will create a base on which to build the understanding and knowledge necessary to be a confident Journeyman. This course offers more advanced topics including logarithms, trigonometry, vectors, and the basics of geometry. Final lessons in the course deal with binary, octal, and hexadecimal numbers and their applications, along with an introduction to Boolean algebra.

Building Automation 1: Control Devices and Applications, Level I Building Automation 1: Control Devices and Applications Level I explains how building systems, such as HVAC, lighting, and electrical systems, can communicate information through a network of intelligent control devices. Emphasis is placed on these control devices and how they work together in common automation scenarios. Topics covered include the operation, signal types, and functions of the sensors, actuators, and other control equipment used in automated systems in commercial buildings. The course is organized by building system, and the operation of each system is explained to clarify the function and application of each control device.

Building Automation 1: Control Devices and Applications, Level II Building Automation 1: Control Devices and Applications Level II explains how building systems, such as HVAC, plumbing, fire protection, access control, and security systems, can communicate information through a network of intelligent control devices. Emphasis is placed on these control devices and how they work together in common automation scenarios. Topics covered include the operation, signal types, and functions of the sensors, actuators, and other control equipment used in automated systems in commercial buildings. The course is organized by building system, and the operation of each system is explained to clarify the function and application of each control device.

Building Automation 2: System Integration with Open Protocols, Level I B Building Automation 2: System Integration with Open Protocols, Level IB introduces concepts of automated electronic controls and network communication and then details the BACNet for wired networks. The protocol system is thoroughly described with information about installation, configuration, operation, maintenance, and troubleshooting.

Building Automation 2: System Integration with Open Protocols, Level I L Building Automation 2: System Integration with Open Protocols, Level IL introduces concepts of automated electronic controls and network communication and then details the LonWorks for wired networks. The protocol system is thoroughly described with information about installation, configuration, operation, maintenance, and troubleshooting.

Building Automation 2: System Integration with Open Protocols, Level II The capstone Building Automation course is a series of examples that illustrate the design, installation, and configuration of each protocol in various scenarios. The final chapter discusses the future of building automation, including trends in the industry, networking, protocols, and control strategies.

Code and Practices 2, Level I, Based on the 2017 NEC The learner is introduced to a number of the requirements of the 2017 NEC and is tasked with locating these requirements in the NEC.

Code and Practices 2, Level II, Based on the 2017 NEC The learner is introduced to a number of the 2017 NEC requirements for wiring methods and materials.

Code and Practices 3, Level I, Based on the 2017 NEC The principal purpose of overcurrent protective devices (OCPDs) is to protect circuits and equipment from the effects of harmful overcurrents. This series of lessons will introduce the fundamental concepts of overcurrent protection, the most common types of OCPDs (fuses and circuit breakers) and their characteristics, operation and sizing, conductor tap rules, calculation of fault currents, and ground fault protection of equipment.

Code and Practices 4, Level I, Based on the 2017 NEC The Code and Practices 4, Level I, Based on the 2017 NEC course will explore a unique combination of topics. First, the learner will be introduced to several requirements related to service equipment, swimming pools, fountains, and similar installations. Next, the learner will develop an understanding of emergency and standby system installation requirements, over 1000-volt requirements, and those for remote-control, signaling and power-limited circuits. The final series of lessons examines changes that took place between editions of the NEC.

Code and Practices 5, Level I, Based on the 2017 NEC This series of lessons will explore a unique combination of topics. First, several wiring methods and support for wiring methods will be explored through a look at installation and Code requirements related to wire mesh basket tray, surface nonmetallic raceways, infloor installations, and multioutlet assemblies. This series of lessons will then conclude with a look at NEC requirements for Solar PV systems.

Code and Practices 6, Level I, Based on the 2017 NEC The improper selection and application of overcurrent protection can create electrical problems such as prolonged power outage, fire hazard, shock hazard, arc flash, arc blast, and equipment damage. A properly designed, installed and maintained electrical system provides the benefit to customers and worker safety. Exploration of overcurrent protective devices and their application will continue with a series of lessons covering topics such as motor branch circuit and transformer protection, short-circuit current protection, and selective coordination.

Code Calculations, Complete, Based on the 2017 NEC The Code Calculations, Complete, Based on the 2017 NEC course places all topics covered by the Code Calculations Textbook (S00817) in one place. The course is focused on a complete comprehensive training for solving Code-related mathematical issues.

Code Calculations, Level I, Based on the 2017 NEC The Code Calculations, Level I, Based on the 2017 NEC course focuses on comprehensive training for solving Code-related mathematical issues. This course covers lessons related to special occupancies, electrical equipment, special equipment, introduction to cable tray systems, installing surface metallic raceways, cable tray fills, ampacity of conductors in cable trays, and electric welders.

Code Calculations, Level II, Based on the 2017 NEC The Code Calculations Based on the 2017 NEC, Level II course focuses on comprehensive training for solving Code-related mathematical issues. This course covers lessons related to determining conductor ampacity, finalizing ampacity calculations, performing box size and fill calculations, calculating raceway fill, introduction to electrical load calculations, range and appliance calculations, calculating the parameters of multifamily dwelling loads in accordance with the NEC, and calculating the parameters of commercial loads in accordance with the NEC.

Code Calculations, Level III, Based on the 2017 NEC The Code Calculations Based on the 2017 NEC, Level III course focuses on comprehensive training for solving Code-related mathematical issues. This course covers lessons related to calculating voltage drop in feeders and branch and calculating the parameters of residential loads in accordance with the NEC.

Code, Standards, and Practices 1, Level I, Based on the 2017 NEC The lessons in Code, Standards, and Practices 1, Level I, Based on the 2017 NEC give learners an introduction to the NEC and provide the basics for interpreting the language of the NEC in order to correctly apply its requirements. This course will assist Electrical Workers in becoming more knowledgeable and productive.

Code, Standards, and Practices 2, Level I, Based on the 2017 NEC The learner is introduced to a number of the requirements of the 2017 NEC and is tasked with locating these requirements in the NEC.

Code, Standards, and Practices 2, Level II, Based on the 2017 NEC The learner is introduced to a number of the 2017 NEC requirements for wiring methods and materials.

Code, Standards, and Practices 3, Level I, Based on the 2017 NEC The principal purpose of overcurrent protective devices (OCPDs) is to protect circuits and equipment from the effects of harmful overcurrents. This series of lessons will introduce the fundamental concepts of overcurrent protection, the most common types of OCPDs (fuses and circuit breakers) and their characteristics, operation and sizing, conductor tap rules, calculation of fault currents, and ground fault protection of equipment.

Code, Standards, and Practices 4, Level I, Based on the 2017 NEC This series of lessons covers NEC requirements related to special occupancies, a variety of electrical equipment, special equipment

Code, Standards, and Practices 5, Level I, Based on the 2017 NEC The Code, Standards, and Practices 5, Level I, Based on the 2017 NEC course will explore a unique combination of topics. First, the learner will be introduced to a number of requirements related to service equipment, swimming pools, fountains, and similar installations. Next, the learner will develop an understanding of emergency and standby system installation requirements, over 1000-volt requirements, and those for remote-control, signaling and power-limited circuits. The final series of lessons examines changes that took place between editions of the NEC.

Code, Standards, and Practices 6, Level I, Based on the 2017 NEC The improper selection and application of overcurrent protection can create electrical problems such as prolonged power outage, fire hazard, shock hazard, arc flash, arc blast, and equipment damage. A properly designed, installed and maintained electrical system provides the benefit to customers and worker safety. Exploration of overcurrent protective devices and their application will continue with a series of lessons covering topics such as motor branch circuit and transformer protection, short-circuit current protection, and selective coordination.

Code, Standards, and Practices 7, Level I, Based on the 2017 NEC This series of lessons will explore a unique combination of topics. First, several wiring methods and support for wiring methods will be explored through a look at installation and Code requirements related to wire mesh basket tray, surface nonmetallic raceways, infloor installations, and multioutlet assemblies. This series of lessons will then conclude with a look at NEC requirements for Solar PV systems.

Codeology, Level I, Based on the 2017 NEC The Codeology, Level I, Based on the 2017 NEC course will help the learner to use and apply an efficient method to categorize and locate requirements in the National Electrical Code (NEC). Through repetition and thorough understanding of the "Build" - "Plan" - "Use" concepts, the learner will gain confidence in using the 2017 NEC.

Conduit Fabrication, Level I – 2nd Ed. This course is designed to instruct an Electrical Worker in the basic concepts of conduit bending.

Conduit Fabrication, Level II – 2nd Ed. Level II builds off of the Level I course and covers advanced techniques in conduit bending as well as mechanical and hydraulic benders.

Crossing the Line: Professional Personal Conduct This module combines two very important topics, professional personal behavior and safety in a real-world workplace scenario.

DC Theory, Level I - 2nd Ed. This course is an introduction to the fundamental terminology, formulas, devices, and components for the study of electrical theory.

DC Theory, Level II - 2nd Ed. This course builds upon the concepts learned in DC Theory, Level I by introducing the series circuit and component calculations, fundamental hazards of energized circuits, and basic test instruments.

DC Theory, Level II featuring the ETS and Labs This course will expand on the theories taught through DC Theory Level I. Topics include Kirchhoff’s laws, Thevenin’s and Norton’s theorems, Principles of Magnetism and Electromagnetism, and DC Generators and Motors. The course concludes with a lesson that uses DC Theory to solve real world problems.

DC Theory, Level III - 2nd Ed. This course builds upon the concepts learned in DC Theory, Level I by introducing the parallel circuit and component calculations.

DC Theory, Level IV - 2nd Ed. This course builds upon the concepts learned in DC Theory, Levels II and III, combining lessons learned regarding both series and parallel circuits. The participant will learn to distinguish series and parallel components of combination circuits, calculate component values, and take the next step in electrical theory understanding by studying voltage dividing circuits and the operation of the 3-wire, single-phase system.

DC Theory, Level V - 2nd Ed. This course will expand on the concepts learned in all previous DC Theory levels. Topics include Kirchhoff's Laws, Thevenin's and Norton's Theorems, principles of magnetism and electromagnetism, and DC generators and motors. The course concludes with a lesson that allows the learner to apply DC Theory to solve real world problems.

Digital Electronics, Level I w/ Reference This course will introduce the fundamental concepts of digital electronic theory. The first lesson gives an introduction to digital electronics, directly followed with lessons that introduce AND Logic, OR Logic, Buffers and Inverters, NAND and NOR Logic, XOR and XNOR Logic, and finishing up with Digital Switching Circuits - Debouncing. Many of the lessons contained in this course are reinforced with hands-on lab assignments that complement the lesson material.

Distributed Generation, Level I The Distributed Generation Level I course will introduce and guide the learner through various forms of alternative power sources that may be used for critical loads within a specific environment. The course starts by covering information technology sites and critical loads. After information technology concepts are understood, the learner will be introduced to uninterruptible power supplies, infrastructure components, critical UPS system design considerations, installation, and critical systems service. In addition to UPS systems, the learner will be introduced to fuel cell basics, fuel cell applications, and fuel cell installation.

Electric Motor Drive This course is designed to teach electric motor and electric motor drive operation, installation, and troubleshooting principles. The course begins with an introduction to electric motor drives, motor drive safety, and electric motor power requirements and control methods. After the introductory principles are covered, discussion moves to motor drive components, operation fundamentals, installation procedures, and motor drive programming. The course concludes with an in-depth discussion on motor drive start-up procedures, troubleshooting (including required test tools), motor drive selection, and motor drive retrofit procedures.

Electrical Code Calculations, Level I, Based on the 2017 NEC The Electrical Code Calculations, Level I, Based on the 2017 NEC course focuses on training for solving Code-related calculations. This course covers lessons related to conductor ampacity, identification of boxes and fittings, and box and raceway fill.

Electrical Code Calculations, Level II, Based on the 2017 NEC The Electrical Code Calculations, Level II, Based on the 2017 NEC course focuses on comprehensive training for solving Code-related calculations. This course covers lessons related to determining electrical load calculations, range and appliance calculations, voltage drop calculations, and multifamily dwelling and residential loads calculations in accordance with the NEC.

Electrical Code Calculations, Level III, Based on the 2017 NEC The Electrical Code Calculations, Level III, Based on the 2017 NEC course focuses on comprehensive training for solving Code-related calculations. This course covers lessons related to calculating cable tray fill, the ampacity of conductors in cable trays, and those for electric welders.

Electrical Safety-Related Work Practices, Level I, Based on the 2018 70E Electrical Safety-Related Work Practices, Level I is designed to walk the learner through the basics of Electrical Safety-Related Work Practices. Utilizing a series of questions based on the learning objectives of each lesson, the course is intended to help the learner better understand electrical safety culture, electrical hazards, lockout and tagout, fault current calculation basics, and the definition of an electrically safe work condition.

Electrical Safety-Related Work Practices, Level II, Based on the 2018 70E Electrical Safety-Related Work Practices, Level II is designed to walk the learner through a number of the requirements related to work involving electrical hazards such as when energized work is justified, what is required when justified energized electrical work is permitted, and the requirements for the selection and use of personal and other protective equipment as well as the basics of identifying overcurrent protective devices and application of related requirements and informational notes.

Electrical Theory Simulator (ETS) This electrical circuit simulator allows the student to work free-form to build any circuit he or she can imagine. After the circuit is assembled, the student can energize the circuit and use the included test and measurement equipment to verify the electrical parameters of each of the components in the circuit. In addition, the simulator has a field view mode, which allows the student to gain a better understanding of the correlation between a schematic diagram and physical location of devices. In the mode, the student has the ability to place each component in an enclosure and “install” raceway and conductors between the enclosures. This functionality assists the student’s understanding of how the number and color of conductors which are necessary for the assembled circuit.

Electronic Access Control, Level I This course introduces the fundamentals of access control. The course topics include an overview of access control, security and access concepts, how electronic access control systems work, access control credentials and credential readers, types of access-controlled portals, electrified locks, and magnetic locks.

Every Hour Counts: Productivity Increases Employment This module will address our efforts to restore our customer’s faith in the organized electrical construction industry which is attributed in large part to a personal commitment to make Every Hour Count.

Fiber Optics, Level I The Electrical Training ALLIANCE has partnered with the Fiber Optic Association (FOA) and Corning Optical Communications to bring the latest in fiber optic technology and certification to the organized electrical industry. This partnership and the resulting training materials expand the reach of quality optical fiber training and certification to every JATC and AJATC. This course is to be used in concert with the FOA online resources which will help the student to attain their CFOT® certification.

Based on the FOA Reference Guide to Fiber Optics, the new version of the Reference Guide to Fiber Optics has been enhanced to better reflect the need for fiber optic training required by our JATCs and AJATCs. Completion of the course will give the student a comprehensive knowledge of optical fiber, connecting hardware, testing and fiber optic network design. With added hands-on training, completion of the course can lead to sitting for the Certified Fiber Optic Technician (CFOT) exam - the FOA certification for general fiber optics applications.

Fire Alarm Systems, Level I, Based on the 2017 NEC The Fire Alarm Systems, Level I course begins by introducing the Electrical Worker to basic systems and the codes and standards that are associated with fire alarm systems. The course then explores initiating devices and notification appliances. Once the Electrical Worker has gained an understanding of the basic components of a fire alarm system, he or she is introduced to common installation, startup, and checkout procedures.

Fire Alarm Systems, Level II, Based on the 2017 NEC The Fire Alarm Systems, Level II course goes beyond the fundamental lessons to cover advanced detection issues, residential systems, supervising stations, inspection, testing, and maintenance. The course is rounded out with an assortment of valuable maintenance and troubleshooting information.

Firestopping Applications When fires occur in buildings that are occupied, the occupants are without question in danger of losing their lives. History can certainly demonstrate the dangers that are involved when flames, smoke, and toxic fumes spread throughout the building. Lessons learned from tragic events of the past have improved the chances of survival for occupants of a building when a fire occurs. Easy to recognize are the noticeable fire prevention and notification systems within a building, but there are also systems that aren’t so noticeable, such as firestopping of penetrated walls and floors. Firestopping is intended to stop or limit the spread of flames, smoke, and toxic fumes during a fire, which in turn allows safe evacuation of occupants in the building.

First Impressions: The Power of Personal Appearance This module takes a hard look at personal appearance on the job site.

Fiscally Fit?: The Challenges of the Marketplace This module serves to illustrate the time and effort required to submit a bid in competition with non-union contractors.

Fluke Instrumentation Academy Welcome to the Fluke Instrumentation Academy. The exercises in this Academy will require calibration procedures upon multiple devices. A calibration procedure requires Electrical Workers to be able to perform a detailed, sequence oriented, process to ensure an accurate device. Reference text is provided inside the exercise to indicate the next steps required to complete the exercise but will not provide information that indicates correct actions. Follow the instructions contained in the exercise accurately and be automatically walked through the process of calibration. Recalling previously studied necessary math formulas, definitions, and the calibration procedure is expected to correctly determine the course of action through the exercise. The reference text and student course material contain the necessary information to complete this lab.

Glass Houses: Ethical Behavior This module focuses on “time theft” on the job site. Time theft is a serious abuse of our profession on many levels; it goes against our work ethic, our morals, and the trust our customers and our employers place in us.

Grounding and Bonding, Level I, Based on the 2017 NEC This series of lessons will introduce the student to the fundamental concepts of grounding and bonding. Level I starts with lessons on circuit basics and overcurrent protection, Code arrangement, grounding electrodes, requirements for services and grounded conductors, and grounding electrode conductors. The course concludes with lessons on bonding requirements, equipment grounding conductors, grounding electrical equipment, and isolated grounding circuits and receptacles.

concludes with the study of requirements and concepts related to grounding and bonding for communications systems, GFCI and GFPE, medium- and high-voltage systems, and grounding systems and earth ground test instruments.

Grounding and Bonding, Level II, Based on the 2017 NEC This series of lessons will build upon the fundamental concepts of grounding and bonding studied in Grounding and Bonding, Level I. This expanded look will start by exploring grounding at separate buildings and structures, the grounding of electrical systems, grounding for separately derived systems, and special occupancies and equipment. Level II concludes with the study of requirements and concepts related to grounding and bonding for communications systems, GFCI and GFPE, medium- and high-voltage systems, and grounding systems and earth ground test instruments.

Hazardous Locations, Level I, Based on the 2017 NEC The Hazardous Locations, Level I course uses both the NEC and the Eaton Crouse-Hinds 2017 Code Digest to present each Article and its requirements. The knowledge of the hazards involved, and the requirements that mitigate the hazards, will prepare workers to install safe electrical systems in hazardous (classified) locations.

Health Care Facility Electrical Systems, Level I, Based on the NFPA 99 and 2017 NEC Health care facilities are complex systems designed to keep patients and staff safe during normal and catastrophic conditions. This course of study focuses in depth on the unique electrical systems found in all types of health care facilities. Using a typical one-line diagram as a guide, this course follows the flow of energy from the utility services and back-up generators, through the normal and essential electrical system distribution systems to the patient care spaces where the power is utilized. The requirements of several design and installation codes and standards are thoroughly discussed.

Health Care Facility Electrical Systems, Level II, Based on the NFPA 99 and 2017 NEC This course of study builds on the foundation of the Health Care Facility Electrical Systems Level I course. Maintaining electrical distribution systems and equipment is a critical element in any health care organizations approved maintenance plan. The role of an electrical contractor in these approved maintenance plans is discussed, as well as the checklists and protocols needed to maintain critical essential electrical system equipment successfully. Performing electrical work in existing operating facilities is also covered including understanding and implementing Infection Risk Control Assessment/Mitigation (IRCA/M) plans designed to keep patients safe from infectious agents that may be distributed as part of the construction activities. A look at both the medical and construction technology that is revolutionizing health care construction and electrical systems wraps up this course of study.

Human Performance, Level I This course is an introductory summary to human performance improvement approach as was initially introduced by the Department of Energy (DOE) over the last decade. The course is based on the DOE Standard Human Performance Improvement Handbook, Volume 1: Concepts and Principles. The lessons are based on the approach and practices that have had proven success in the nuclear power and utility construction industries. The course provides instruction on reducing errors and understanding how controls can assist to reduce errors. It also assists students in identifying the anatomy of an event and the theory as to why humans commit errors. It teaches students the effect that the organization has on its employees and their behaviors. The final lesson within the course provides ways to control or mitigate errors while also instructing on the effectiveness and reliability of controls.

Installer/Tech Code - 2, Level I, Based on the 2017 NEC The Installer/Technician Code – 2 course begins by introducing the principles involved in sizing building wire and then goes on to describe conduit and raceway basics. The course then introduces requirements for cable assemblies and general requirements for wiring methods and materials. Finally, the course introduces the requirements for remote control, signaling and power limited circuits, fire alarm systems, optical fiber cables and raceways, and communication circuits.

Installer/Tech Grounding and Bonding, Level I, Based on the 2017 NEC The Installer/Technician Grounding and Bonding course introduces the student to the basic concepts of grounding, circuit basics, and overcurrent protection. The course then goes on to explain grounding electrodes, equipment grounding conductors, and grounding electrical equipment. Finally, the course explains the requirements for grounding at separate buildings or structures and grounding and bonding communications systems and equipment.

Installer/Tech Job Information 1, Level I – 2nd Ed. The Installer/Tech Job Information 1, Level I course begins by identifying basic electrical and telecom tools of the trade, including hand tools and test instruments. The course then introduces the student to the workplace of an Electrical Worker and ladder safety. Finally, this course introduces topics such as alignment and measurement, wire pulling, and electrical shock hazards.

Installer/Tech Job Information 1, Level II – 2nd Ed. The Installer/Tech Job Information 1, Level II course begins by introducing the hazards of overhead work being performed. The course then introduces knot tying, hoisting loads, and performing hand signals. In addition, this course describes wire construction and insulation properties, how wire is sized, electrical materials, working with prefixes, the metric system, and structured cabling symbols.

Installer/Tech Job Information 2, Level I - 2nd Ed. The Installer/Tech Job Information 2, Level I course begins by introducing the theories of magnetism and electromagnetism. The course then familiarizes the student with firestopping and occupancy based on the International Building Code (IBC). Finally, the course introduces structured cabling management including boxes, cabling brackets, and flexible raceways.

Installer/Tech Job Information 2, Level II - 2nd Ed. The Installer/Tech Job Information 2, Level II course focuses on common materials that the Installer/Technician uses on a daily basis. These materials include steel boxes and covers, nonmetallic boxes, floor boxes, commercial fittings, and weatherproof boxes.

Installer/Tech Power Quality, Level I With more and more industries relying on technology for their operations, maintaining sufficient and appropriate power to support these machines and computers is critical. Understanding and being able to troubleshoot power quality issues including harmonics and other power quality issues is an invaluable asset the Electrical Worker must possess.

Instrumentation Introduction - Module 1 This course serves as an introduction to basic instrumentation topics such as math, science, electrical theory, meters and measurements, vocabulary, and process and instrumentation diagram interpretation. The course is designed to be used as self-paced course, independent of formal instruction. Therefore, it utilizes unique locking features which require the subject matter be completed in a specific order. All of the educational material is provided within the course, and does not require the use of a textbook, though referencing the textbook is not prohibited.

Each lesson is broken down into pairs. The odd-numbered lessons serve as pretests for the even-numbered lessons which are the educational lessons. Lessons must be accomplished in numerical order. For example, Lesson 1 and/or 2 must be completed prior to Lesson 3 and/or 4. If mastery is demonstrated in the pretest by achieving a minimum score of 90%, the subsequent lesson grouping (even/odd) is unlocked, as well as the associated even-numbered educational lesson for future reference. If pretest mastery is not achieved, the student must complete the associated even-numbered educational lesson by achieving a minimum score of 80% in order to unlock the subsequent lesson grouping.

This course is intended to present prerequisite information in order to be successful in the full, instructor-led course, consisting of Modules 2 and 3. It is not intended to be used a sole preparation for any type of accreditation exam.

Instrumentation Introduction - Module 2: Basics This Instrumentation Introduction - Module 2: Basics Course is the second step on the journey to become an Instrumentation Technician. This course is focused on the fundamentals of pressure, level, flow, and temperature measurements along with calibrations unique to both conventional and smart instrument transmitters. Rounding out the course is an in-depth discussion on control valves. Successful completion of this course is required in order to move on to Module 3: Advanced, the final instructional course.

Instrumentation Introduction - Module 3: Advanced This Instrumentation Introduction - Module 3: Advanced Course is the third step on the journey to become an Instrumentation Technician. Building upon the knowledge foundation presented in Modules 1 and 2, advanced topics of analytical measurement, process controllers, and control methods are presented. Rounding out the course is a discussion on common installation information. Successful completion of this module in addition to Modules 1 and 2 is required to sit for a theory-based qualification exam.

Intelligent Network Video, Level I The Intelligent Network Video, Level I course will introduce basic video technologies including analog video surveillance, lens characteristics, IP video, video and audio technologies, encoders, and camera types. Though the course primarily focuses on network video, common components of both analog video and IP video are explored in detail.

Intelligent Network Video, Level II Intelligent camera systems in use today are typically installed on either a small network or possibly installed on a large network. Today’s Electrical Worker, therefore, must understand the function of a network and how networks are wired. The Intelligent Network Video, Level II course will introduce wired networks, wireless networks, and various network technologies that are used with video surveillance systems.

Intelligent Network Video, Level III Intelligent network video system installation and network connection are important concepts in surveillance systems. However, there is so much more that goes into a truly intelligent network video system. The Intelligent Network Video, Level III course includes lessons on video management software, storage devices, hosted solutions, intelligent video, intelligent video solutions, and proper methods used to design an intelligent network video system.

Introduction to Network Technologies, Level I This course is designed to give fundamental networking knowledge to the Electrical Worker by presenting topics including network topologies, the OSI model, network protocols, wireless technologies, and basic wiring principles.

Introduction to Network Technologies, Level II The Introduction to Network Technologies, Level II course expands on content introduced in the Level I course. The course first starts by describing how switches are used in networks and then goes on to introduce how routing networks are created. The course then describes how names can be resolved to IP addresses, the importance of network security, how wide area networks are connected, troubleshooting, network fault tolerance, and management and administration of networks.

Intrusion Detection, Level I - 2nd Ed. This course will introduce fundamental concepts for intrusion detection. Topics presented include terminology, magnetic contacts, motion sensors, glass break detectors, codes and standards associated with intrusion detection, and basic design of the system.

Job Information 1, Level I, Based on the 2014 NEC - 4th Ed. In Job Information 1, Level I, Based on the 2014 NEC, students will learn about the proper care and use of basic tools of the trade. They will also learn about the typical workplace of an Electrical Worker. The course covers topics such as ladders, fastening devices, and alignment and measurement. Lessons on electrical safety, ground-fault interrupters, and twist-on wire connectors are also included.

Job Information 1, Level I, Based on the 2017 NEC In Job Information 1, Level I, Based on the 2017 NEC, students will learn about the proper care and use of basic tools of the trade. They will also learn about the typical workplace of an Electrical Worker. The course covers topics such as ladders, fastening devices, and alignment and measurement. Lessons on electrical safety, ground-fault interrupters, and twist-on wire connectors are also included.

Job Information 1, Level II, Based on the 2017 NEC (previously Job Information 2) In the Job Information 1, Level II, Based on the 2017 NEC course, students learn about building wire construction and insulation properties. They are introduced to commonly-used electrical materials, firestopping, and wire-pulling techniques. They also review basic math principles needed on the job.

Lighting Essentials, Level I - 2nd Ed. The Lighting Essentials, Level I - 2nd Ed. course gives a brief overview of the nature and science of light itself. Many electrical contractors "value engineer” a lighting architect's or lighting designer's lighting specifications. So to meet the needs of the owner/customer, the electrical contractors, or their employees, that are making lighting equipment and placement decisions should understand the nature and science of light and luminaries. The lessons also give an overview of lamp types, the quantity and quality of light sources and some basics on lighting control.

Lighting Essentials, Level II - 2nd Ed. As the move continues toward energy conservation, many existing lighting systems (even those installed less than 10 years ago) could be replaced with newer more energy efficient lamps, luminaires and controls. The Lighting Essentials, Level II - 2nd Ed. course describes some basic concepts to be aware of when approaching a lighting retrofit and also provides in-depth coverage of fluorescent lighting, High Intensity Discharge (HID) lighting, and LED lighting systems.

Lighting Essentials, Level III - 2nd Ed. Lighting Essentials, Level III - 2nd Ed. delves deeper into the basic design element for the most common occupancies. This helps the electrical contractor and/or Electrical Worker understand how to fulfill the lighting requirement of the customer in a design/build situation. It also allows the electrical contractor and Electrical Worker to carry on an intelligent conversation with the customers architect or lighting designer. The course also contains lessons on troubleshooting HID ballasts and makes an economic case for the use of LED lighting systems.

Lightning Protection, Level I A lightning protection system is essential in order to provide complete protection for the structure and its contents. This course will provide two integral parts to the understanding of lightning protection systems. Part 1 will describe the basic terminology and components of lightning protection systems. In Part 2, the student will study essential methods for the correct installation of such a system, including design and layout requirements.

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Motor Control, Level I Motor Control, Level I explains manually, mechanically, and automatically operated control devices. Both NEMA and IEC contactors and magnetic motor starters are addressed with emphasis on types, functions, and applications. The course concludes with the development and purpose of schematic, wiring, logic, and ladder diagrams, including details on standard drawing techniques for generating and interpretation of ladder diagrams.

Motor Control, Level II Motor Control, Level II, explains solid state input and output devices. Unique motor control devices, including special purpose motor starters, programmable timers, and function specific control components, are presented. The function and operation of AC and DC motor speed control devices are explained, including troubleshooting techniques and a variety of applications.

Motor Control, Level III Motor Control, Level III covers analog signal types and analog devices used in motor controls. Advanced topics such as variable speed drives, programmable logic controllers, and networks are presented. The course concludes with detailed methods for system-wide troubleshooting of motor control systems using real-world applications.

Motors, Level I - 2nd Ed. The Motors, Level I - 2nd Ed. course introduces the learner to theory concepts such as magnetism and induction. After the theory concepts have been mastered, the student is introduced to motor nameplates, AC alternators, three-phase motors, and squirrel-cage motors.

Motors, Level II The Motors Level II course introduces the learner to topics such as braking, multi-speed motors, adjustable speed drives, bearings, drive systems and clutches, and finally motor alignment. The student will also learn how to troubleshoot motors and decide the appropriate course of action for repair.

Motors, Level II, Based on the 2017 NEC - 2nd Ed. The Motors, Level II, Based on the 2017 NEC - 2nd Ed. course introduces the learner to wound-rotor motors, single-phase motors, motor protection, DC motors and generators, and a wide variety of starting methods. Finally, this course introduces NEC requirements and calculations needed for motor installations.

The Motors, Level III - 2nd Ed. course introduces the learner to complex motors. These motors include synchronous motors, multispeed motors, and special-application motors. Components such as braking, bearings, drive/clutch systems, and adjustable speed drives are also discussed. Finally, the course discusses troubleshooting and maintenance of motors.

NECA Basic Foremanship Entry-level foremen or those who wish to move into a foreman role will greatly benefit from Basic Foremanship. This course covers essential topics for early-career foreman, such as the foreman's role, documentation, mobilizing the job for success, maintaining a safe job and project closeout. Participants must take both this online component and participate in an in-seat discussion group to earn a certificate for this course. Learn more at [www.necanet.org/BasicForemanship](http://www.necanet.org/BasicForemanship). Please contact education@necanet.org to access this course.

Paging Systems, Level I Paging systems, background music, and PA systems are evident almost everywhere. This course is intended to provide a basic understanding of these systems, their fundamental components, and how these systems work, and then it explores some of the specific applications of the systems. It begins with lessons on understanding the components associated with distributed sound systems/ paging systems and their functions. Next, it explains the differences between a constant voltage system and a self-amplified system. Single-zone and multi-zone paging systems will also be examined. One of the prime considerations in any sound system design is an efficient power transfer between the amplifier and the associated speakers. There is a lesson designed to explain the two power transfer methods, their advantages and disadvantages. Other topics discussed in this course are designing and layouts and sound masking systems.

Power Quality, Level I With more and more industries relying on technology for their operations, maintaining sufficient and appropriate power to support these machines and computers is critical. Understanding and being able to troubleshoot power quality issues including harmonics and other power quality issues is an invaluable asset the Electrical Worker must possess. The lessons in this course are designed to instruct the learner on the financial concerns which drive a need for power quality, power distribution systems, and related measurement and monitoring techniques required for an accurate assessment of a facility's power quality needs. Power quality terminology, costs, and concepts and defining the power quality issues that directly affect digital equipment and traditional electrical loads are the objectives outlined within the course material.

Preparing for Leadership: Personal Qualities, Level 1 This is the first in a series of courses which will lay the foundation for you to become a leader in the organized electrical industry. This course, Personal Qualities, explores the traits that each member of a team should possess. These qualities will help to facilitate the harmonious coordination between the team's many parts.

Press One for Service: Meeting the Customer's Needs This module focuses on the importance of delivering excellent customer service in order to gain new customers and retain customer loyalty.

Programmable Logic Controllers, Level ImThe Programmable Logic Controllers Level I course is a beginning level course for the study of programmable controllers and focuses on the Rockwell Automation (Allen-Bradley) PLC Systems. This course begins with basic PLC hardware requirements and the installation of PLC equipment including pilot devices, loads and analog devices typically used with PLC systems. The course then focuses on basic concepts and instruction types used with programmable controllers such as input and output types and internal functions such as timers, counters, and sequencers. This course does not provide any training for the programming of PLC systems.

Programmable Logic Controllers, Level II A The Programmable Logic Controllers Level II A Course introduces programming for address-based programmable logic controller systems. The course is based on Rockwell Automation’s RSLogix 500 Software, which is used to program both the SLC500 and the MicroLogix series of programmable controller systems. The course begins with ladder logic programming for contacts and coils, and then proceeds through timers, counters, and other advanced programming instructions. The course is designed to teach the learner how address-based systems utilize memory and how programming instructions can be used to develop complex programmable controller programs in ladder logic based control systems. The Programmable Logic Controllers Level I Course is a prerequisite for this course.

Programmable Logic Controllers, Level II T The Programmable Logic Controllers Level II T Course introduces programming for tag-based programmable logic controller systems. The course is based on Rockwell Automation’s ControlLogix 5000 Software, which is used to program both ControlLogix and CompactLogix series of programmable controller systems. The course begins with ladder logic programming for contacts and coils, and then proceeds through timers, counters, and other advanced programming instructions. The course is designed to teach the learner how tag-based systems utilize memory, and how programming instructions can be used to develop complex programmable controller programs in ladder logic based control systems. The course also introduces three additional programming languages which can be used with tag-based Allen Bradley systems including Function Block Diagram programming, Structured Text programming, and Sequential Function Block programming. The Programmable Logic Controllers Level I Course is a prerequisite for this course.

Residential Job Information 2, Level I, Based on the 2017 NEC The Residential Wireman must have the ability to communicate effectively and understand the relation between labor and management. These topics are covered in depth. Other topics covered include testing and verifying circuit performance, installing wire and cable in dwelling units, analyzing and laying out residential circuits, and understanding job costs and actual takeoffs for dwelling units.

Rigging, Hoisting, and Signaling, Level I This course is designed to teach the physical principles, safety considerations, and common practices involved in hoisting loads. The course begins with an introduction to hoisting safety, crane types and operation, lift planning, signaling, and load weight and balance calculations. The discussion then moves to fiber ropes and knots, slings and sling hitches, synthetic slings, chains and chain slings, and wire rope and wire rope slings. The course concludes with a discussion on rigging hardware, rigging equipment maintenance, hoists, and block and tackle.

Semiconductors, Level I Semiconductor technology is the backbone in nearly every electronic device used. This course serves as an introduction to the wide world of electronics for the electrical profession. It provides the necessary background required to understand the concepts and theory associated with semiconductors, an essential component in the proper installation and maintenance of electrical systems. It examines the basics of the most commonly used semiconductor devices today, as well as common troubleshooting concepts for working with these systems. Learners are given the essential building blocks that will lead to a complete understanding of all aspects of semiconductor electronics. Many of the lessons contained in this course are reinforced with hands-on lab assignments that complement the lesson material.

Semiconductors, Level II This course expands on the concepts learned in the Level I course. The student will be introduced to JFETs, MOSFETs, and other transistor types, fundamental concepts of amplifiers, differential amplifiers and operational amplifiers, oscillators, electronic control devices and circuits, and finally integrated circuits. Many of the lessons contained in this course are reinforced with hands-on lab assignments that complement the lesson material.

Something's Fishy: Absenteeism This module addresses the topic of absenteeism on the job: how it jeopardizes our relationship with our customers, the on-time completion of the project, and future employment opportunities for all IBEW members.

Structured Cabling, Level I The Structured Cabling course introduces the student to premises cabling, the related safety codes, and the TIA/EIA standards and codes. With these fundamentals in place, the course further explains the need for structured cabling systems through exploring the system overview. It covers unshielded twisted pair cables, connecting hardware, pathways, and spaces. After learning about telecommunications cabling administration and grounding and bonding, the student will begin configuring structured cabling systems and their applications. The remaining lessons delve into the advantages and characteristics of fiber optics, as well as understanding fiber optic connections and installations.

Test Instruments, Level I The course is designed to instruct why special test instruments are needed and how to select, understand, and safely operate them. Knowledge of Voice-Data-Video (VDV), power quality, high voltage and insulation, instrumentation and process control, and special maintenance test instruments prepares the learner to work on all kinds of electrical installations. The course concludes by presenting a systematic approach to troubleshooting necessary for effective test instrument use.

Time is Money: Productivity This module addresses the critical issue of productivity.

Torque, Level I This course introduces why torque is important in the electrical industry by explaining torque theory, specific definitions, torque conversion, friction, phases of fastening, and factors that affect torque. The Electrical Worker will be introduced to the basic principles of fasteners, which include markings, class/ grade, bolt tension and strength, nut strength and compression, the use of washers, and thread identification and pitch. The course will also cover types of torque wrenches and screwdrivers, and the required procedures for torque application to electrical equipment such as breakers, lugs, and receptacles.

Transformer Simulator This simulator is a fully interactive training tool that simulates transformer connections in a lifelike setting which is safe for student and the equipment. The simulator is capable of simulating almost any transformer connection imaginable. The simulator is capable of displaying both schematic and field views for each connection configuration.

The connections are verified through the use of test instruments to check voltages and other circuit parameters. If correct procedures and protocols are not followed, or if the transformer is wired improperly, the system reacts in the same manner as a “real” transformer. This is truly a state-of-the-art training tool that will help to increase the student’s retention of the material learned while remaining in a safe environment.

Transformers, Level I - 2nd Ed. This course is designed to teach the fundamentals of transformers and the different type of transformer connections. The course covers important topics such as the Principles of Magnetism and Electromagnetism and Transformer Operating Principles. After the basics are covered, the students begin the study of Transformer Connections. Once this topic is covered in detail, the students can use the Transformer Simulator to practice making real transformer connections that were covered in the lesson and associated labs. The transformer simulator provides a safe environment for the students to practice making the connections. Applying the knowledge of transformer connections, a lesson on Real World Transformer Connections comes before a study in transformer Harmonics and Power Generation and Distribution.

Transformers, Level II, Based on the 2017 NEC - 2nd Ed. This course is designed to expand on the knowledge gained from the Level I course. A study in Reactors and Isolation Transformers comes before digging into Auto Transformers and Buck-Boost Transformers. The students can then use the Transformer Simulator to practice making real transformer connections that were covered in the lesson and associated labs. The transformer simulator provides a safe environment for the students to practice making the connections. Finally, this course covers Transformer Overcurrent Protection and Transformer Overcurrent Protection with Associated Tap Rules.

Transformers, Level III - 1st Ed. This course is the conclusion of the study of transformers and begins with a brief overview of Electrical Safety. Elaborating on previous knowledge of auto transformers, a study in the use and connection methods of Buck-Boost Transformers is covered next. Lessons on Special Transformers and Special Connections are covered before concluding with a lesson on Selection and Installation and a lesson on Maintenance and Troubleshooting. The students can use the Transformer Simulator to practice making real transformer connections in a safe environment.

Transformers, Level III - 2nd Ed. This course is the conclusion of the study of transformers and begins with a brief overview of Electrical Safety. Elaborating on previous knowledge, a study covering Special Transformers and Special Connections come before concluding with a lesson on Selection and Installation and a lesson on Maintenance and Troubleshooting. The students can use the Transformer Simulator to practice making real transformer connections in a safe environment.

Voice-Data-Video: Applications and Installation, Level I This course offers an in-depth overview of copper and fiber optic cabling used for voice-data-video (VDV) applications in the electrical industry. The course introduces important concepts such as VDV safety as well as an overview of the VDV industry. The course then introduces tools used in the VDV industry, copper and fiber cabling systems, VDV prints, cabling standards and NEC requirements, and copper and fiber optic installation and testing methods.