

Electrician (AP E)

A five-year apprenticeship program. Applications for Riverside/San Bernardino/Mono/Inyo counties should apply to the Riverside and San Bernardino Joint Electrical Apprenticeship Training. Committees, 1855 Business Center Drive, San Bernardino, CA 92408. Telephone: (909) 890-1703.

A.S. DEGREE MAJOR OR CERTIFICATE OF ACHIEVEMENT

Program Requirements	Units
AP E 701 Electrical Trade/Industry/DC/Conduit	4
AP E 702 Electrical Theory/Practice/Blueprint Reading	4
AP E 703 Inductance/Capacitance Theory	4
AP E 704 Transformers/Code Calculations/Conduit	4
AP E 705 Electronic/Industrial Blueprints	4
AP E 706 Grounding/Electrical Services/Connection	4
AP E 707 Motor Control/Pilot Devices/Starters	4
AP E 708 Digital Electronics	4
AP E 709 Mgmt/Alarms/Testing/Wiring	4
AP E 710 Programmable Logic Controllers	4
AP WE 713 Electrician Work Experience	16
TOTAL UNITS	56

COURSE OFFERINGS

AP E 701 Introduction to the Electrical Trade and Industry, DC Theory and Conduit Bending (4)

3 hours lecture - 3 hours laboratory

Prerequisite: Completion of the following: (1) One semester of Algebra I with a grade of 'C' or better; (2) Designated tests with a passing grade determined by the appropriate committee; (3) Indentured apprentice to the San Diego Electrical Joint Apprenticeship and Training Committee or the Riverside and San Bernardino Joint Electrical Apprenticeship Training Committee.

Orientation to the electrical industry; introduction to the electrical code fundamentals of wiring methods, fastening devices, electrical conductors, circuits, and voltage.

AP E 702 Electrical Theory, Practice and Blueprint Reading (4)

3 hours lecture - 3 hours laboratory

Prerequisite: A minimum grade of 'C' in AP E 701

Study of floor and plot plan; basic blueprint reading and circuit drawing; theory of magnetism; DC and AC generators; motors and transformers; on-the-job safety and first aid, and the electrical code.

AP E 703 Inductance and Capacitance Theory and Codeology (4)

3 hours lecture - 3 hours laboratory

Prerequisite: A minimum grade of 'C' in AP E 702

Review of the International Brotherhood of Electrical Workers constitution and local union by-laws. Study of the effects of inductance and capacitance on current and voltage. Application of phase angle calculation and the National Electric Code. Overview of workplace problems due to drug abuse.

AP E 704 Transformers and Code Calculations, Conduit Bending and Blueprints (4)

3 hours lecture - 3 hours laboratory

Prerequisite: A minimum grade of 'C' in AP E 703

Study of transformers theory, installation, connection and distribution systems. Performing short circuit calculations, selecting of building wire for specific applications, calculating loads for residential and multifamily loads and service feeders. Applying conduit bending principles using mechanical benders to fabricate segmented concentric bends.

AP E 705 Introduction to Electronics and Industrial Blueprints (4)

3 hours lecture - 3 hours laboratory

Prerequisite: A minimum grade of 'C' in AP E 704

Introduction to basic electronics including examination of semiconductor devices, current and voltage manipulation, applications, and blueprint reading.

AP E 706 Grounding, Electrical Services, and Transform Three-Phase Connections (4)

3 hours lecture - 3 hours laboratory

Prerequisite: A minimum grade of 'C' in AP E 705

Study of requirements for electrical services installation. Study of electrical grounding including merits, impact on safety, ground fault protection, and identification of grounding system elements and functions.

AP E 707 Electrical Motor Control, Pilot Devices, Starters and Relays (4)

3 hours lecture - 3 hours laboratory

Prerequisite: A minimum grade of 'C' in AP E 706

Study of controls and circuits, pilot devices, starters, and relays. Includes the analysis and development of circuits, the installation and service of electrical equipment, and the electrical code.

AP E 708 Digital Electronics (4)

3 hours lecture - 3 hours laboratory

Prerequisite: A minimum grade of 'C' in AP E 707

Introduction to digital electronic technology and electronic equipment. Instruction includes basic digital systems, binary and decimal numbering systems, decision-making logic circuits, Boolean Algebra, flip-flops, counters, shift registers, encoders, decoders, ROMs, DC to AC converters and organization of these component blocks to accomplish manipulation of data.

AP E 709 Management, Fire Alarms, High Voltage Testing, and Telephone and Security Wiring (4)

3 hours lecture - 3 hours laboratory

Prerequisite: A minimum grade of 'C' in AP E 708

Introduction to management and marketing practices, installation of fire alarm systems and the National Electric Code as it relates to alarm installation and high voltage of telephone wiring and security systems.

AP E 710 Programmable Logic Controllers (4)

3 hours lecture - 3 hours laboratory

Prerequisite: A minimum grade of 'C' in AP E 709

Introduction to basic input/output hardware, processors and memory numbering systems associated with programmable controllers. Instruction includes use of personal computer to create and modify ladder diagrams and relay instructions, using solid state logic elements, counters, and shift registers. Principles of process control are explained and principle components are identified.

AP E 797 Electrical Topics (.5 - 4)

Units awarded in topics courses are dependent upon the number of hours required of the student. Any combination of lecture and/or laboratory may be scheduled by the department. Refer to Class Schedule.

Prerequisite: Indentured apprentice to the San Diego Electrical Joint Apprenticeship and Training Committee or the Riverside and San Bernardino Joint Electrical Apprenticeship Training Committee

Concentrated courses on electricity. Course title will designate subject covered.

Inside Wireman (AP IW)

A five-year apprenticeship program. Study of technical course development and delivery techniques for the electrical trade, utilizing classroom-proven techniques. The student will familiarize him/herself with classroom management, testing and assessment techniques, curriculum development and material presentation based on industry-standard and college level instructional methodologies. Applications for this program should be directed to the San Diego Electrical Training Trust, 4675 Viewridge Avenue, San Diego, CA 92123. Telephone (858) 569-6633, ext. 111.

A.S. DEGREE MAJOR OR CERTIFICATE OF ACHIEVEMENT

Program Requirements		Units
AP IW 701	Introduction to the Electrical Trade	4
AP IW 702	Electrical Theory, Practice and Blueprint Reading	4
AP IW 703	Inductance and Capacitance Theory	4
AP IW 704	Transformer, Motors, and Motor Controls	4
AP IW 705	Special Electrical Systems	4
AP IW 706	Specialized Electrical Applications	4
AP WE 713	Electrician Work Experience	16
Electives (Select 16 units)		
AP IW 713	Electrical Project Supervision	4
AP IW 714	Electrical Certification Preparation	4
AP IW 716	Photovoltaics	4
AP IW 725	Building Automation Systems	4
AP IW 726	Electrical Construction Practices	4
AP IW 797	Inside Wireman Topics	2 - 4
TOTAL UNITS		56

COURSE OFFERINGS

AP IW 701 Introduction to the Electrical Trade (4)

3 hours lecture - 3 hours laboratory

Prerequisite: One semester of Algebra I with a grade of 'C' or better, designated tests with a passing grade determined by the appropriate committee, and indentured apprentice to the San Diego Electrical Joint Apprenticeship and Training Committee or the Riverside and San Bernardino Joint Electrical Apprenticeship Training Committee. Introduction to the electrical industry, with emphasis on jobsite safety, basic conduit bending, National Electric Code (NEC), sexual harassment, introduction to blueprints, tools and their use. Particular attention will be given to fastening devices, basic mathematics, resistance, voltage, power in DC series, parallel, and combination circuits.

AP IW 702 Electrical Theory, Practice and Blueprint Reading (4)

3 hours lecture - 3 hours laboratory

Prerequisite: A minimum grade of 'C' in AP IW 701

Survey of drug awareness, Union Constitution and Bylaws, parliamentary procedure, test instruments, 3Ø electrical systems, DC and AC power generation, specialized conduit bending techniques, National Electric Code (NEC), solid state devices, blueprint analysis, AC theory, transformers, vector analysis, impedance, voltage, power in AC series, parallel, and combination circuits.

AP IW 703 Inductance and Capacitance Theory (4)

3 hours lecture - 3 hours laboratory

Prerequisite: A minimum grade of 'C' in AP IW 702

Study of circuit analysis techniques, power factor, semiconductors, AC system grounding and bonding, ground fault protection systems, overcurrent protective devices (fuse and circuit breakers), test instruments, National Electric Code (NEC), and industrial blueprint analysis.

AP IW 704 Transformer, Motors, and Motor Controls (4)

3 hours lecture - 3 hours laboratory

Prerequisite: A minimum grade of 'C' in AP IW 703

Study of real-world application of transformer, motor and motor control concepts utilizing extensive hands-on labs and demonstrations. Students work in foreman-led teams to design, build, and test motor control circuits. Students will gain familiarity with a wide array of test instruments including DMMs, voltage testers, megohmmeters, clamp-on ammeters, capacitance testers and other equipment.

AP IW 705 Special Electrical Systems (4)

3 hours lecture - 3 hours laboratory

Prerequisite: A minimum grade of 'C' in AP IW 704

Introduction to telephony and data networks, fire alarm systems, nurse call systems, Programmable Logic Controllers (PLCs), arc-flash protection, and instrumentation concepts, National Electric Code (NEC), and OSHA rules and regulations.

AP IW 706 Specialized Electrical Applications (4)

3 hours lecture - 3 hours laboratory

Prerequisite: A minimum grade of 'C' in AP IW 705

Introduction to electrical power quality, CATV and CCTV Systems, security systems, fiber optics, hazardous locations, lighting protection, advanced conduit bending, HVAC principles and controls, blueprints, and leadership skills.

AP IW 713 Electrical Project Supervision (4)

3 hours lecture - 3 hours laboratory

Prerequisite: A minimum grade of 'C' in AP IW 706

An overview of all processes required to run a successful job. The class utilizes field trips and speakers to give the student a 360° view of the workplace. Each speaker will bring expertise from the field into the classroom where students will learn the right and the wrong way to organize and run a jobsite.

AP IW 714 Electrical Certification Preparation (4)

3 hours lecture - 3 hours laboratory

Prerequisite: A minimum grade of 'C' in AP IW 706

Designed to prepare the student to take the California Electrician Certification Examination (CECE). Provides a review of concepts and principles, but focuses primarily on understanding and applying the national Electric Code (NEC), the set of standards upon which the CECE is based.

AP IW 716 Photovoltaics (4)

3 hours lecture - 3 hours laboratory

Prerequisite: A minimum grade of 'C' in AP IW 706

Technologies and installation requirements for photovoltaic systems. Subjects presented in this course are renewable energy construction, renewable energy resources, renewable energy efficiency, and energy savings devices used in construction.

AP IW 725 Building Automation Systems (4)

3 hours lecture - 3 hours laboratory

Prerequisite: A minimum grade of 'C' in AP IW 706

Technologies and installation requirements for Building Automation Systems (BAS.) The subjects presented in this course are Building Automation applications and requirements used in the construction of commercial and industrial buildings. This course allows students to practice the technical skills required to successfully install, commission, and verify operation of a wide variety of advanced components, such as photosensors, occupancy sensors, digital dimming networked and wireless control systems, programmable time clocks, and emergency lighting controls. In addition, it comprehensively addresses the requirements, regulations, products and strategies which will enable electricians to master successful, expert, and professional customer relations, installation, and maintenance of Electric Vehicle (EV) and Plug-in Hybrid Electric Vehicle (PHEV) infrastructure.

AP IW 726 Electrical Construction Practices (4)

3 hours lecture - 3 hours laboratory

Prerequisite: A minimum grade of 'C' in AP IW 706

The technologies and skill sets required for installing and provisioning the electrical requirements for commercial or industrial facilities. The topics presented in this course include electrical distribution overview, safety, OSHA requirements, shoring, trenching, Semptra Service Guide requirements, rigging, IEEE Standards, Blueprints, CSI Master Format construction specifications and National Electrical requirements for electrical services and distribution systems.

AP IW 797 Inside Wireman Topics (2 - 4)

Units awarded in topics courses are dependent upon the number of hours required of the student. Any combination of lecture and/or laboratory may be scheduled by the department. Refer to Class Schedule.

Topics in Inside Wireman. See Class Schedule for the specific topic offered. Course title will designate subject covered.