

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**Note:** May be taken 2 times

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**Note:** May be taken 2 times

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**Note:** May be taken 2 times

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**Note:** May be taken 2 times

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**Note:** May be taken 2 times

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**Note:** May be taken 2 times

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**Note:** May be taken 2 times

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**Note:** May be taken 2 times

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**Note:** May be taken 2 times

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**Note:** May be taken 4 times

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 709 | Advanced Motor Controls | 2 |
| AP IW 710 | AutoCAD | 4 |
| AP IW 713 | Electrical Project Supervision | 4 |
| AP IW 714 | Electrical Certification Preparation | 4 |
| AP IW 715 | Low Voltage | 4 |
| AP IW 716 | Photovoltaics | 4 |
| AP IW 717 | Service Equipment | 2 |
| AP IW 718 | Test Equipment | 2 |
| AP IW 719 | Welding | 2 |
| AP IW 720 | Instructional Leadership I | 4 |
| AP IW 721 | Programmable Logic Controllers | 4 |
| AP IW 722 | Fire/Life Safety Systems | 4 |
| AP IW 723 | Instrumentation | 4 |
| AP IW 724 | Instructional Leadership II | 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.

Note: May be taken 2 times

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

Note: May be taken 2 times

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

Note: May be taken 2 times

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

Note: May be taken 2 times

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

Note: May be taken 2 times

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

Note: May be taken 2 times

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 709 Advanced Motor Controls (2)

1 ½ hours lecture - 1 ½ hours laboratory

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

Note: May be taken 2 times

Study of advanced techniques for control system installations of motors and related equipment, utilizing field-proven techniques for installation, start-up, control system documentation, and trouble-shooting. Students will become familiar with industry-standard control configurations that are used in a variety of installation scenarios. Specialized control devices will be examined.

AP IW 710 AutoCAD (4)

3 hours lecture - 3 hours laboratory

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

Note: May be taken 2 times

Application of a step-by-step approach to the commands of AutoCAD LT. Topics include application fundamentals, drawing setup, file operations, commands, object properties, dimensioning, menus, drawing management, and AutoCAD LT applications in the electrical trade.

AP IW 713 Electrical Project Supervision (4)

3 hours lecture - 3 hours laboratory

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

Note: May be taken 2 times

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

Note: May be taken 2 times

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 715 Low Voltage (4)

3 hours lecture - 3 hours laboratory

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

Note: May be taken 2 times

Study of technologies and installation requirements for low voltage systems. Subjects presented in this course are Low Voltage Design and Specification Techniques, Fiber Optics, LAN Cabling Systems, IEEE Grounding Requirements for Electronic Equipment, Power Quality to Support Low Voltage Systems, Telephone Systems, Nurse Call, and CCTV.

AP IW 716 Photovoltaics (4)

3 hours lecture - 3 hours laboratory

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

Note: May be taken 2 times

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 717 Service Equipment (2)

1 ½ hours lecture - 1 ½ hours laboratory

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

Note: May be taken 2 times

Presentation of the technologies and skill sets required for installing and provisioning an electrical service for commercial or industrial facilities. Topics presented in this course include electrical distribution overview, safety, OSHA requirements, shoring, trenching, Sempra Service Guide requirements, rigging, IEEE Standards, and National Electrical requirements (Article 230) for an electrical service.

AP IW 718 Test Equipment (2)

1 ½ hours lecture - 1 ½ hours laboratory

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

Note: May be taken 2 times

The technologies and skill sets required for testing and troubleshooting electrical distribution systems and associated hardware including electric motors and drives. The topics presented in this course include testing procedures, test equipment, testing documentation, lighting and branch circuit analysis and troubleshooting.

AP IW 719 Welding (2)

1½ hours lecture - 1½ hours laboratory

Prerequisite: A minimum grade of 'C' in AP IW 706**Note:** May be taken 2 times

Basic understanding of cutting torch and electrical resistance welding principles and techniques. Covers safe storage, transportation, and use of acetylene, oxygen, and chemelene (MAPP) gases for cutting, as well as "stick" and wire-feed welding safety and technique. Upon completion of the course students will be able to weld in vertical, overhead and horizontal positions.

AP IW 720 Instructional Leadership I (4)

3 hours lecture - 3 hours laboratory

Prerequisite: A minimum grade of 'C' in AP IW 706**Note:** May be taken 2 times

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.

AP IW 721 Programmable Logic Controllers (4)

3 hours lecture - 3 hours laboratory

Prerequisite: A minimum grade of 'C' in AP IW 706 and AP IW 709**Note:** May be taken 2 times

Provides an in-depth study of programmable logic controllers (PLC) while examining standard programming languages and common PLC hardware applications. This course focuses on the underlying principles of PLCs and provides practical information on installing, programming, maintaining, and troubleshooting PLCs.

AP IW 722 Fire/Life Safety Systems (4)

3 hours lecture - 3 hours laboratory

Prerequisite: A minimum grade of 'C' in AP IW 706**Note:** May be taken 2 times

Introduces students to the code requirements, design concepts, and installation techniques required for an efficiently installed and properly working fire alarm system. Includes an overview of NFPA 70 (NEC) – 2002 edition as it applies to Fire Alarm, an introduction to NFPA 72 – 1999 edition National Fire Alarm Code with overview of Chapters I through 9, including Appendix A.

AP IW 723 Instrumentation (4)

3 hours lecture - 3 hours laboratory

Prerequisite: A minimum grade of 'C' in AP IW 706**Note:** May be taken 2 times

Provides students with a more advanced understanding of instrumentation and control, covering temperature, pressure, flow, and level detection (process control) systems; their principles of operation, and strategies for installation, maintenance, and troubleshooting of these systems.

AP IW 724 Instructional Leadership II (4)

3 hours lecture - 3 hours laboratory

Prerequisite: A minimum grade of 'C' in AP IW 706**Note:** May be taken 2 times

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.

AP IW 725 Building Automation Systems (4)

3 hours lecture - 3 hours laboratory

Prerequisite: A minimum grade of 'C' in AP IW 706**Note:** May be taken 2 times

Covers the 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.

AP IW 726 Electrical Construction Practices (4)

3 hours lecture - 3 hours laboratory

Prerequisite: A minimum grade of 'C' in AP IW 706**Note:** May be taken 2 times

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, Sempa 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.

Note: May be taken 4 times

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

Plasterer (AP PL)

A four-year apprenticeship program. Applicants for this program should be directed to the Carpenters Joint Apprenticeship and Training Committee for Southern California, San Diego Carpenters Training Center, 8595 Miralani Drive, San Diego, CA 92126. Telephone (858) 621-2667.

**A.S. DEGREE MAJOR OR
CERTIFICATE OF ACHIEVEMENT**

| Program Requirements | | Units |
|----------------------|---|-------------|
| AP DL/AP PL/ | | |
| AP AC 701 | Orientation | 1.5 |
| AP DL/AP PL/ | | |
| AP AC 702 | Safety and Health Certifications | 1.5 |
| AP DL/AP PL/ | | |
| AP AC 703 | Printreading | 1.5 |
| AP DL/ | | |
| AP PL 705 | Basic Lathing | 1.5 |
| AP PL 706 | Basic Plastering | 1.5 |
| AP PL 707 | Exterior Plastering | 1.5 |
| AP PL 708 | DOT and Screed Techniques | 1.5 |
| AP PL 709 | Interior Plastering | 1.5 |
| AP PL 710 | Finish Applications | 1.5 |
| AP PL 711 | Ornamental Plastering | 1.5 |
| AP PL 713 | Theme Plastering | 1.5 |
| AP DL/ | | |
| AP PL 715 | Exterior Insulation Finish Systems (EIFS) | 1.5 |
| AP DL/ | | |
| AP PL 716 | Firestop/Fireproofing Procedures | 1.5 |
| AP PL 717 | Plastering Equipment Application | 1.5 |
| AP PL 718 | Plastering Equipment | 1.5 |
| AP WE 714 | Plasterer Work Experience | 1.6 |
| TOTAL UNITS | | 38.5 |

COURSE OFFERINGS**AP PL 701 Orientation (1.5)**

1 hour lecture - 1½ hours laboratory

Prerequisite: Indentured apprentice to a designated Joint Apprenticeship and Training Committee**Note:** Cross listed as AP DL 701/AP AC 701; may be taken 2 times

An introduction to the Interior Systems program. Safe and proper use of hand tools, power tools, trade related math, beginning print reading and layout as well as safety certifications. Certifications will include scaffold erector/dismantler (welded frame) and low velocity powder actuated tools.