

APPRENTICESHIP (APR)

APR 101 Elec/Mfg Plant 1 - Basic Electric Theory (4 Credits)

Students will be introduced to content in trade math, fundamental concepts of electricity, resistance, Ohm's law, series circuits, parallel circuits, grounding, grounding electrode systems, and the National Electrical Code. This course will be taught in a lecture/lab format with hands-on use of meters, power supplies, relays and switches.

APR 102 Elec/Mfg Plant 2 - Basic Wiring (4 Credits)

This course includes principles of inductance, capacitance, transformer fundamentals, generator fundamentals, electric motors, enclosure grounding, and the National Electrical Code as it applies to these topics. This course will be taught in a lecture/lab format, with labs demonstrating the electrical functions of the various elements.

APR 103 Elec/Mfg Plant 3 - Industrial Wiring (4 Credits)

Students will be introduced to commercial building plans and specs, reading drawings, branch and feeder circuits, appliance circuits, lighting circuits, panel boards, protection circuits, cooling systems, and the National Electrical Code as it applies to these topics. This course will be taught in a lecture/lab format, with a field trip to either a hospital, a newspaper publishing facility or a mill.

APR 104 Elec/Mfg Plant 4 - Commercial Wiring (4 Credits)

Course content includes industrial plans and site work, substations, panel boards and feeders, wire tables, determining conductor size, motors, controllers, ventilating, system protection, site lighting hazards, programmable logic controllers, and the National Electric Code as it applies to these topics. This course will be taught in a lecture/lab format, with labs to include hands-on PLC programming and ladder logic development.

APR 111M Metering Basics (4 Credits)

This course is an introduction to electrical trade theory for Meterman Apprentices and will review math concepts including percentages, scientific notation, metric prefixes, ratios, proportions, and equations. Apprentices will also be introduced to electrical topics such as current, voltage, resistance, Ohm's Law, power, DC series, and parallel circuits. Lastly students will learn about single phase metering, Blondel's Theorem, metering vocabulary, single phase transformers, and working safely within the electric field.

APR 115 Carpenter and Exterior/Interior Specialist I (3 Credits)

Covers Occupational Safety and Health Act (OSHA) safety standards, industry responsibilities, and professional opportunities. Examines and demonstrates the use of construction trade materials and the use and care of basic hand and power tools. Introduces construction equipment, including forklift safe operation and maintenance.

APR 116C Carpenter II (3 Credits)

Prerequisites: APR 115.

Covers techniques for reading and interpreting construction drawings and written specifications. Includes the application of information from construction drawings to create quantity takeoffs. Describes procedures for laying out and constructing commonly used floor systems.

APR 116E Exterior/Interior Specialist II (3 Credits)

Prerequisites: APR 115.

Provides overview of the materials and techniques used in building residential and commercial buildings, wood and steel-framed structures, masonry construction, and concrete-formed structures. Covers planning processes preceding start of work on a construction site including environmental considerations, personnel issues, access roads, traffic control, permits, site safety, utilities, and crane-related concerns.

APR 118C Carpenter III (3 Credits)

Prerequisites: APR 116C.

Explains the identification of components of wall systems, procedures for laying out wood-frame walls, and how to estimate material needs for framing techniques in different wall systems. Recognizes and identifies components of joist and roof framing and sheathing.

APR 118E Exterior/Interior Specialist III (3 Credits)

Prerequisites: APR 116E.

Describes various types of gypsum drywall, their uses, fastening devices and methods used for installation. Covers fire- and sound-rated walls. Covers the materials, tools and methods used to finish and patch gypsum drywall.

APR 118M Transformer Connections (4 Credits)

This course is designed to instruct Meterperson Apprentices on the fundamentals of transformer bank connections: delta-delta, wye-wye, wye-delta, and single-phase regulators. Apprentices will also learn about conditions that can cause back feed, while continuing to learn about single phase metering.

APR 120C Carpenter IV (3 Credits)

Prerequisites: APR 118C.

Covers types of stairways, components associated with stairs, terms used in stair framing, and common building code requirements related to stairs. Describes how to determine the specifications of a stairway and the process to lay out and cut stair components. Explains the concepts of a building envelope, components, and installation techniques.

APR 120E Exterior/Interior Specialist IV (3 Credits)

Prerequisites: APR 118E.

Covers intermediate techniques for reading and using architectural and structural blueprints and specifications. Covers materials, layout, and installation procedures for many types of suspended ceilings used in commercial construction as well as ceiling tiles, drywall suspension systems, and pan-type ceilings.

APR 121 Boiler Operator 1 - Stationary Engine Principles (4 Credits)

The course will cover stationary engineering principles, boiler types and accessories, and trade math.

APR 121C Carpenter V (3 Credits)

Prerequisites: APR 120C.

Covers working with insulation, drywall components, assembly and insulation. Recognize installation techniques for doors and hardware and safety hazards in door and window installation. Covers layout and install procedures for base, wall and other cabinets.

APR 121E Exterior/Interior Specialist V (3 Credits)

Prerequisites: APR 120E.

Describes types and grades of steel framing and provides instructions for selecting and installing steel framing for interior walls, exterior non-bearing walls, and partitions. Covers engineered framing systems.

APR 121M Metering Fundamentals I (4 Credits)

This course is designed to instruct second year Meterperson Apprentices on the fundamentals of AC theory. This includes: DC review, trigonometry review, RC, RL, TLC circuits, series and parallel resonance. Apprentices also learn about self-contained three phase metering and refining what they have already learned about single phase metering.

APR 122 Boiler Operator 2 - Boiler Accessories (4 Credits)

The course content will cover boiler accessories, fuel burning equipment, combustion and draft controls.

APR 122C Carpenter VI (3 Credits)**Prerequisites:** APR 121C.

Encompasses components and installation of exterior finishing materials. Covers accurate estimation of material needs. Includes how to identify and mitigate safety hazards. Examines cold-form framing, its tools, installation method, applications, and safety procedures.

APR 122E Exterior/Interior Specialist VI (3 Credits)**Prerequisites:** APR 121E.

Covers composition and use of various specialty interior finishing products. Covers various specialized exterior finish products. Describes the materials, tools, and application methods used for specialized finishes.

APR 122M Metering Fundamentals II (4 Credits)

This course is designed to instruct second year Meterperson Apprentices on the graphic representation of system parameters (i.e. currents & voltages) and various transformer line-ups that create those parameters. Apprentices learn how to apply mathematical and vectoral approaches for deriving the values of Real, Apparent and Reactive Power in a electrical service. Additionally they learn about instrument rated three phase metering and refining what they have already learned about self-contained three phase metering.

APR 141 Sheet Metal Core Curriculum (4 Credits)

This course is an introduction to construction and maintenance skills used in various crafts. Basic concepts in safety, math, tools, blueprints and rigging are examined this first term. In addition, employment opportunities will be explored through various apprenticeship trades.

APR 142 Sheet Metal I (4 Credits)

This course presents related training material consistent with the minimum skill requirements of the sheet metal trade. The content includes elements of trade specific tools and fundamentals of duct layout and safety as it relates to the sheet metal trade.

APR 143 Basic Layout (4 Credits)

Introduction to trade, terminology, trade math, tools, shop safety, shop equipment, basic layout of duct work and fittings.

APR 144 Sheet Metal Math (4 Credits)

Covers fractions and decimals, geometric shapes, equation solutions, ratios and proportions, perimeters, areas, and volumes of geometric shapes; powers and use of the scientific calculator. Emphasis is on applications to applied sheet metal fabricators. There will be lab time in the class to work on assignments.

APR 145 Blueprint Reading (4 Credits)

Introduction to blueprint reading, drafting blueprints, scaling existing buildings and drafting mechanical systems.

APR 146 Architectural Sheet Metal (4 Credits)

The study of architectural sheet metal in the context of today's industry. The course of study includes the following: discovery of various types of materials; study profiles of roofing panels, water conductors, various types of roof flashings; related trades that are integral with this trade; the philosophy of layout in the field; and the application of actual installations, safety equipment and practices applicable to the trade.

APR 199 Selected Topics: Apprenticeship (1-4 Credits)

Provides a learning experience in apprenticeship not currently available; this course is in development to be proposed as a permanent course.

APR 201 Elec/Mfg Plant 5 - Motor Controls (4 Credits)

Course of study includes reversing circuits applied to motors, power distribution systems, transformers, electronic control devices, relays, photoelectric and proximity controls, programmable controllers, starters, preventive maintenance, and the National Electric Code as it applies to these topics. This course is taught in a lecture/lab format, with labs covering wiring and operation of listed equipment to control a small motor.

APR 202 Elec/Mfg Plant 6 - Motor Controls/Circuits (4 Credits)

Course of study includes reversing circuits applied to motors, power distribution systems, transformers, electronic control devices, relays, photoelectric and proximity controls, programmable controllers, starters, preventive maintenance, and the National Electric Code as it applies to these topics. This course will be taught in a lecture/lab format, with the lab portion including the demonstration of and hands on programming of variable speed drives.

APR 203 Elec/Mfg Plant 7 - Motor Applications (4 Credits)

Topics include safety, commercial and residential calculations; wiring methods; related theory and the National Electric Code as it applies to these topics. This course will be taught in a lecture/lab format. Lab will include field trip to a commercial building with walk-through of service equipment and heating/cooling equipment.

APR 204 Elec/Mfg Plant 8 - NEC Code (4 Credits)

Topics include theory and application of motor controls, solid state fundamentals, special termination, layout, hazardous locations and transformer locations, operation and maintenance of high voltage switchgear and starters, and a thorough review of the National Electric Code. This course will be taught in a lecture/lab format, with students having the opportunity to take practice quizzes and practice code exams.

APR 215C Carpenter VII (3 Credits)**Prerequisites:** APR 122C.

Differentiates types of concrete forms, their applications, and proper assembly for horizontal, vertical, slip, and climbing forms. Covers tilt-up wall-forming process and procedure for erecting and bracing tilt-up wall panels.

APR 215E Exterior/Interior Specialist VII (3 Credits)**Prerequisites:** APR 122E.

Covers various types of exterior finish materials and their installation procedures. Describes the installation of metal doors and related hardware. Includes installation of wood doors, folding doors and pocket doors.

APR 216C Carpenter VIII (3 Credits)**Prerequisites:** APR 215C.

Describes the properties, characteristics, and uses of cement, aggregates, and concrete for vertical foundations and slabs-on-grades. Covers job-site layout to establish formwork locations, elevations, and curbs. Distinguishes best practices and covers safety precautions for concrete moving, handling, finishing, and curing into forms.

APR 216E Exterior/Interior Specialist VIII (3 Credits)**Prerequisites:** APR 215E.

Describes proper methods for selecting, cutting, and fastening trim for professional finished appearance. Covers installation of a variety of finishing materials, including concrete masonry units and brick. Includes installation of curtain walls and fire-rated commercial construction.

APR 217C Carpenter IX (3 Credits)**Prerequisites:** APR 216C.

Covers installation of trim used in finish work and estimating material needs. Covers trenching and excavating including identification of soil types, bearing capacities, and classifications of soil. Examines tools for and selection, applications, and methods of placing, bending, and cutting reinforcing steel.

APR 217E Exterior/Interior Specialist IX (3 Credits)**Prerequisites:** APR 216E.

Covers estimating, layout, and fabrication of interior and exterior soffits. Includes tools and installation methods, and safely working overhead. Covers the requirements, health considerations, and construction of a clean room.

APR 218C Carpenter X (3 Credits)**Prerequisites:** APR 217C.

Covers the principles, equipment, and methods used to perform site layout using differential leveling and site layout requiring angular and distance measurements. Reviews trades mathematics to perform calculations related to angular measurements. Covers leveling and measurement tool use and application.

APR 218E Exterior/Interior Specialist X (3 Credits)**Prerequisites:** APR 217E.

Provides extensive coverage of the materials and techniques used in finishing wood staircases. Covers all phases of interior renovation – planning, estimating, layout, and scheduling.

APR 219C Carpenter XI (3 Credits)**Prerequisites:** APR 218C.

Covers characteristics, types, and installation method for advanced roof structures. Covers installation of advanced wall systems and various finishing materials. Includes assessment of environmental concerns, site utilization plans, and safety measures when preparing a site.

APR 219E Exterior/Interior Specialist XI (3 Credits)**Prerequisites:** APR 218E.

Covers specifications for steel framing material for exterior structural metal framing. Covers the construction, application, and installation of prefabricated panels. Identifies types of mobile scaffolds.

APR 220C Carpenter XII (3 Credits)**Prerequisites:** APR 219C.

Covers advanced wooden and commercial stair systems. Introduces construction equipment. Covers fundamental crew leadership skills. Introduces oxyfuel cutting and arc welding with practice labs.

APR 220E Exterior/Interior Specialist XII (3 Credits)**Prerequisites:** APR 219E.

Describes procedures for erecting supported scaffolds. Covers fundamental crew leadership skills including leadership styles, communication, delegating, and problem solving.

APR 221 Boiler Operator 3 - Boiler Operation (4 Credits)

The course content will include boiler operation, maintenance, water treatment, and boiler room safety.

APR 222 Boiler Operator 4 - Steam Usage (4 Credits)

The course content includes steam usage and management, basic electricity principles and basic knowledge of steam turbines.

APR 223 Turbine Operator 1 - Applied Mechanics (4 Credits)

The course content will include mathematics, mensuration, applied mechanics, thermodynamics, steam and internal combustion engines, steam and gas turbines, refrigeration, air compression, and lubrication.

APR 224 Turbine Operator 2 - Instrumentation (4 Credits)

The course content will include basic electricity, electronics and control instrumentation, fluid mechanics, pumps, power plant piping systems, air compressors, and different types of power plants.

APR 225 Turbine Operator 3 - Thermodynamics (4 Credits)

The course content will include internal combustion engines, lubrication, thermodynamics, heat engines, steam engines, and steam and gas turbines.

APR 226 Turbine Operator 4 - Electrical Theory (4 Credits)

The course content will include electrical theory, AC and DC electrical machines, transformers and rectifiers, steam turbine theory, construction of steam turbines, and steam turbine and condenser operation and maintenance.

APR 231M Metering Advanced I (4 Credits)

This course is designed to instruct third-year apprentices on the subject of advanced metering, including the following: history of metering (past, present and future), review of meter vectoring, polyphase vectoring, self-contained meters, instrument rated meters, instrument transformers (Current and Voltage) and their application. While learning about Primary metering and refining what they have already learned about instrument rated three phase metering.

APR 232M Metering Advanced II (4 Credits)

This course is designed to instruct third-year Meterperson Apprentices on the subject of advance fundamentals of metering including: billing rates, demand metering, Kilovolt-Ampere-Reactance (KVAR) and Kilovolt Ampere (KVA) metering, special metering, net metering, and pulse metering (pulse weights, pulse initiation, and totalization). Additionally apprentices will learn about different types of meter test equipment, AMI/AMR, Telemetry and Smart grid.

APR 241 Building Codes and Installation Manuals (4 Credits)

This course is an overview of the mechanical codes as related to the HVAC industry in commercial and residential applications. In addition, installation manuals will be explored as to proper installation and usage of HVAC equipment. During the term there will be three field trips to visit job sites where students will identify code applications and violations.

APR 242 Duct Fabrication/Design (4 Credits)

Introduction to duct design, different styles of duct design, and multilevel duct system design. Heat loss, heat gain calculations and instruction on use of duct calculators.

APR 243 General Fabrication (4 Credits)

This course is the study of the sheet metal trade as it is applied to general-needs metal work. The work studied is that outside of the traditional HVAC and architectural scope as studied in previous terms with a broader base of skills to be learned, such as custom, decorative and artistic finished products.

APR 244 Project Supervision (4 Credits)

Introduction to construction management skills as they apply to project supervision.

APR 299 Selected Topics: Apprenticeship (1-4 Credits)

Provides a learning experience in apprenticeship not currently available; this course is in development to be proposed as a permanent course.