

APPRENTICESHIP (APR)

APR 100 Trade Skills Fundamentals (4 Credits)

Introduces basic construction and maintenance skills used in various crafts and on skilled trade job sites. Examines concepts in safety. Covers use of trade vocabulary, math, hand and power tools, blueprint reading, basic rigging, and material handling. P/NP grading.

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 105 Building a Career in the Skilled Trades (4 Credits)

Prerequisites with concurrency: APR 100.

Introduces the apprenticeship industry and the requirements necessary to enter an apprenticeship program. Includes basic employability skills like finding employment opportunities, communication, and basic resume writing. P/NP grading.

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 160 Plumbing Skills Fundamentals (4 Credits)

Explore plumbing profession and learn about employer expectations. Includes workplace safety principles, plumbing terminology, basic trade math (including offsets), an overview of common tools and materials, reading plumbing drawings, and an introduction to the Uniform Plumbing Code (UPC) with Oregon Amendments, covering administration, definitions, and general regulations. Intended for Oregon state-registered apprentices working in the plumbing trade and offers a foundational introduction to essential trade skills.

APR 161 Plumbing Materials and Fixtures (4 Credits)**Prerequisites:** APR 160.

Covers relevant safety and code requirements. Introduces piping system components, connection methods, and installation techniques. Addresses proper selection and application of code-compliant fixtures and faucets. Explores math and science principles related to plumbing tasks. Teaches navigation of the tables in the Uniform Plumbing Code. Tailored for Oregon state-registered apprentices in the plumbing trade and provides an introduction to the types of pipes and fittings used in plumbing applications.

APR 162 Plumbing Basic Waste Water Systems (2 Credits)**Prerequisites:** APR 161.

Introduces DWV systems, explores the properties of water, guides selection of appropriate water pipe sizes, and explains fundamentals of backflow prevention. Covers hot water heaters, with practical troubleshooting exercises for both electric and gas models. Reviews the Uniform Plumbing Code, focusing on relevant articles to ensure compliance. Designed for Oregon state-registered apprentices in the plumbing trade.

APR 163 Plumbing Calculations and Print Reading (4 Credits)**Prerequisites:** APR 162.

Focuses on using the Pythagorean Theorem to calculate angles accurately. Develops skills for interpreting civil, architectural, structural, mechanical, plumbing, and electrical drawings for the installation of plumbing systems. Introduces techniques for creating isometric drawings, performing material takeoffs, and utilizing approved submittal data. Presents methods for attaching and routing DWV and water supply piping while meeting structural and code requirements. Designed for registered apprentices in the plumbing trade.

APR 164 Plumbing Basic Installation 1 (4 Credits)**Prerequisites:** APR 163.

Presents techniques for installing and testing water supply piping, as well as basic plumbing fixtures, valves, and faucets. Introduces principles of electricity commonly applied in plumbing-related systems and the interaction between plumbing and electrical components. Establishes proper methods for the installation and testing of water heaters, including compliance with federal guidelines and industry best practices. Reviews code requirements to ensure all installations meet regulatory standards and industry expectations. Designed for registered apprentices in the plumbing trade.

APR 165 Plumbing Basic Installation 2 (2 Credits)**Prerequisites:** APR 164.

Reviews proper techniques for installing and testing water heaters to ensure safe and efficient operation. Develops skills in and provides hands-on practice in identifying, troubleshooting, and repairing water heaters, plumbing fixtures, valves, and faucets. Emphasizes importance of following federal guidelines and performing up to industry standards. Examines and applies code requirements as well as regulatory expectations to ensure high-quality installations and repairs. Designed for registered apprentices in the plumbing trade.

APR 180 Co-op Work Experience Apprenticeship (1-4 Credits)**Prerequisites:** Instructor approval required.

Provides experience in which students apply previous apprenticeship classroom learning in an occupational setting. Credits depend on the number of hours worked. P/NP grading. Repeatable for credit.

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 260 Plumbing Water Supply Systems (4 Credits)**Prerequisites:** APR 165.

Presents how to size water piping in all applications and how to treat potable water for private and public water systems. Explores sizing waste and vent piping, installing water heaters, and diagnosing gas and electric water heaters. Applies trade calculations like basic offsets and math concepts of geometry. Reinforces safety in the workplace, plumbing tools, code definitions, and hands-on troubleshooting. Familiarizes learners with Uniform Plumbing Code (UPC) with Oregon Amendments, administration, definitions, and general regulations. Designed for registered apprentices in their third-year of the plumbing trade.

APR 261 Plumbing Piping Sizing and Systems (4 Credits)**Prerequisites:** APR 260.

Introduces the principles and hazards of backflow prevention. Reviews different types of vents that can be installed in a drain, waste and vent systems, sewage pumps, sump pumps, corrosive waste products, and safety issues. Includes instruction on sizing drains, waste, drain-waste-vent systems (DWVs), and indirect waste piping. Provides hands-on lab work on plumbing with waste, water, gas, and vents. Designed for registered apprentices in the plumbing trade.

APR 262 Plumbing Advanced Waste Systems (2 Credits)**Prerequisites:** APR 261.

Focuses on essential skills for advanced applications. Emphasizes sizing and installation of gas piping through theoretical instruction and hands-on practice. Explores the sizing of storm drainage systems, green plumbing techniques, and sustainable practices, such as rainwater and graywater harvesting. Covers the installation, sizing, and troubleshooting of compressed air lines and ensures a comprehensive understanding of these systems. Designed for Oregon state-registered apprentices in the plumbing trade.

APR 263 Plumbing Code & Test Preparation I (4 Credits)**Prerequisites:** APR 262.

This introductory course establishes a solid foundation in the Uniform Plumbing Code and essential plumbing concepts. Students will learn the core principles of code compliance, safety standards, and best practices for plumbing installation. Through a combination of theoretical instruction and practical exercises, learners will build the skills and confidence needed to interpret and apply the code in real-world scenarios. Designed for apprentices starting their preparation for the Oregon Building Codes Journeyman Plumbing exam, this course provides the groundwork for success in the plumbing trade.

APR 264 Plumbing Code & Test Preparation II (2 Credits)

Prerequisites: APR 263.

Building on the foundational knowledge from Plumbing Code and Test Preparation I, this course delves deeper into the Uniform Plumbing Code and its practical applications. Students will enhance their skills in troubleshooting, navigating complex plumbing systems, and adhering to industry standards. Emphasis is placed on interpreting advanced code concepts and applying them in professional contexts. The combination of theoretical instruction and hands-on practice ensures students are well-equipped for the challenges of the plumbing trade and exam preparation.

APR 265 Plumbing Code & Test Preparation III (2 Credits)

Prerequisites: APR 264.

This advanced course is the culmination of the Plumbing Code and Test Preparation series, designed to fully prepare registered apprentices for the Oregon Building Codes Journeyman Plumbing exam. Students will refine their mastery of the Uniform Plumbing Code, focusing on high-level troubleshooting, installation techniques, and comprehensive code compliance. Through in-depth theoretical learning and rigorous practical exercises, learners will gain the expertise and confidence necessary to excel on the exam and meet the demands of professional plumbing work.

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.