

# APPRENTICESHIP (APR)

## **APR-104LM** Reading Schematics and Symbols

2 credits, Not Offered Every Term

A basic course of study that will develop the student's understanding of reading schematics and symbols through lectures and hands-on examples.

## **APR-104MA** Print Reading

3 credits, Not Offered Every Term

Introduction to basic print reading. Students will use the principles of orthographic projection and current industry standards as they apply this knowledge to interpreting manufacturing prints.

## **APR-106MA** Advanced Applied Geometric Dimensioning and Tolerancing for Manufacturing

1-3 credits, Not Offered Every Term

Introduces participants to the application of gauging and inspection using Geometric Dimensioning and Tolerancing (GDT). Students will identify inspection equipment and inspect GDT characteristics while experiencing their manufacturing implications. Variable Credit: 1-3 credits.

Prerequisites: APR-104MA

## **APR-108LM** ARC Flash Electrical Safety

1 credits, Not Offered Every Term

This electrical safety training course provides the student with a basic understanding of safe workplace practices from industry standards and recommended practices, including NFPA 70E, IEEE, NEC, NESC and OSHA requirements.

## **APR-109PB** Plumbing Conservation Systems

2 credits, Fall/Winter/Spring

This course introduces the student to the different plumbing systems in use today that reflect new technology and methods which conserve our natural resources. Solar Energy, Rainwater Harvesting, Reclaimed Water Systems, Vacuum and other minimum water consumptions systems.

Recommended: Student must be a currently registered Plumbing Apprentice with Area I, Joint Apprenticeship Training Committee

## **APR-110UM** Initial Meterman Training

4 credits, Not Offered Every Term

This course is designed to instruct Meterman apprentice candidates on understanding the basic functions of a Meterman Journeyman. Required: Student Petition.

## **APR-111LE** Residential Technologies

4 credits, Not Offered Every Term

During this course the student will receive an overview of the wide range of topics relating to residential technologies and in-depth instruction and hands-on experience on select topics. The course will cover home theater, multi-zone audio and video, HD television, networking, home automation, cabling techniques and applicable National Electrical Code articles. There will be an emphasis on how these systems integrate with each other.

Required: Student Petition.

Prerequisites: APR-115LE

## **APR-111MA** Manual Machining I

4 credits, Not Offered Every Term

This course is an introduction to machine tool operation and precision measurement. It covers elementary operation of drill presses, bandsaws, lathes, and milling machines. The course includes external threading. Recommended Prerequisite Or Corequisite: APR-104MA and MTH-050

## **APR-111UE** Line Estimator Basic I: Tools and Equipment

4 credits, Not Offered Every Term

This course covers the principles and concepts that govern field operations. Students will learn to explain and summarize the basics of electric utility energy systems. The focus is on estimator field responsibilities and equipment used in the field.

## **APR-111UL** Outside Electrical Basic Theory I

5 credits, Fall

Fundamentals of outside electrical apprenticeship related training. National Electrical Code standards, basic electrical Direct Current (DC) theory including Ohms law, electrical terminology, mathematical applications in electrical energy, rigging and safe work practices.

Required: Student Petition.

Required: Acceptance into Line-Electrician Apprenticeship program

## **APR-111UM** Metering: Basics I

5 credits, Fall

In this course students will examine first-year apprentice responsibilities including job conduct, absenteeism, sexual harassment, drug use and safety. Also, students will begin the first step of electrical trade theory by reviewing math concepts including percentages, scientific notation, metric prefixes, ratios and proportions, and equations. As the lessons progress, electrical topics such as current, voltage, resistance, Ohm's Law, power, and DC series and parallel circuits will be introduced.

Required: Student Petition.

## **APR-111UW** Basic Substation Wireman I

5 credits, Fall

In this course, students will examine apprentice responsibilities including job conduct, absenteeism, sexual harassment, drug use and safety. Students will also begin the first step of electrical trade theory by studying basic math concepts, including whole numbers, fractions, decimals, percentages and equations. As the lessons progress, electrical components such as current, voltage, resistance, Ohm's Law and power will be introduced. This course is part of the NJATC Substation curriculum. Required: Student Petition.

## **APR-112LE** Basic Trade, Code & Safety

4 credits, Not Offered Every Term

Covers the basic fundamentals of low voltage cabling, fundamentals of workplace safety as it applies to construction in general and specific trade environments, and an overview of the current national electrical code and trade-related mathematics. Required: Student Petition.

Required: Acceptance into Limited Energy Apprenticeship program

## **APR-112MA** Manual Machining II

4 credits, Not Offered Every Term

This course is a continuation of machine tool operations. It covers set-up and operation of the vertical milling machine, lathe boring techniques, surface grinding and screw thread nomenclature.

Prerequisites: APR-111MA

## **APR-112UE** Line Estimator Basic II: Electrical Theory

4 credits, Not Offered Every Term

This course covers the principles and concepts that govern electrical field operations. Students will utilize math and electric theory applications in the field. The focus is on electric utility systems.

**APR-112UL** Outside Electrical Basic Theory II

5 credits, Winter

Instructs first year, second term apprentices in electrical-related training. National Electric Code (NEC) standards, application of electrical Direct Current (DC) theory, including Ohms law, electrical grid components, rigging, OSHA regulations, electrical terminology and mathematical applications. Required: Student Petition.

Prerequisites: APR-111UL

**APR-112UM** Metering: Basics II

5 credits, Winter

This course is designed to further first-year apprentice training by building on the concepts of electrical trade theory and introducing students to the aspects of substation safety. Apprentices will have the opportunity to use analog or digital meters to measure voltage, current, and resistance in DC circuits. Fundamentals of substation safety will be explored including responsibilities, personal protective equipment, fall protection, grounding and electrical hazard awareness. Required: Student Petition.

Prerequisites: APR-111UM

**APR-112UW** Basic Substation Wireman II

5 credits, Winter

Basic Substation Wireman II will build on the concepts of electrical trade theory and introduce students to the aspects of substation safety. Students will have the opportunity to use analog or digital meters to measure voltage, current, and resistance in DC circuits. Fundamentals of substation safety will be explored including responsibilities, personal protective equipment (PPE), fall protection, grounding and electrical hazard awareness. This course is part of the NJATC substation curriculum.

**APR-113LE** Specialized Control Systems

4 credits, Not Offered Every Term

Introduces specialized control systems, equipment and control devices with a physical, code and safety view. Control design and applications, installation, maintenance and measurements of low- and high-voltage systems will be covered. Required: Student Petition.

Required: Acceptance into Limited Energy Apprenticeship program

**APR-113MA** Manual Machining III

4 credits, Not Offered Every Term

This course is a continuation of machine tool operations. Topics covered include offset boring heads, rotary tables, indexing devices, taper attachments and cylindrical grinding. Additional emphasis is also placed on inspections technique, technical math and optical comparators.

Prerequisites: APR-112MA

**APR-113UE** Line Estimator Basic III: Wire Circuits

4 credits, Not Offered Every Term

This course covers principles and concepts that govern safe wiring and circuit applications, safe working procedures, Ohm's Law calculations and use of aerial lift in field operations. The focus is on electric utility systems. Required: Student Petition.

Required: Acceptance into Line Estimator Apprenticeship program

**APR-113UL** Outside Electrical Basic Theory III

5 credits, Spring

Instruct first year, third term apprentices on fundamentals of electrical components and their application, National Electrical Code (NEC) standards, application of electrical Direct Current (DC) theory including Ohm's law, underground distribution, mathematical applications and safe work practices. Required: Student Petition.

Prerequisites: APR-112UL

**APR-113UM** Metering: Basics III

5 credits, Spring

This course continues first-year apprentice training by applying mathematics, electron theory and all aspects of DC electric circuit evaluation and construction and safe work practices. Required: Student Petition.

Prerequisites: APR-112UM

**APR-113UW** Basic Substation Wireman III

5 credits, Spring

Basic Substation Wireman III continues student training with the study of substation construction from prints to superstructure and bus design. Students will learn about various types of substation prints and drawings including single-line diagrams and schematics. This course will explore attributes of substation construction including foundations, platforms, ground grids, steel structures and the use of a boom truck and lift calculations. This course is part of the NJATC substation curriculum.

Required: Student Petition.

Prerequisites: APR-112UW

**APR-114LE** Data Communications

4 credits, Not Offered Every Term

This course provides a comprehensive understanding of Data Communications and Networking with practical application. Hands-on terminations of common cabling types (including optical fiber) and installation methods and standards. Required: Student Petition.

Required: Acceptance into Limited Energy Apprenticeship program

**APR-115LE** Amplified Systems

4 credits, Not Offered Every Term

This course will cover audio theory, design and installation of audio and related systems and applicable National Electrical Code articles. There will be an emphasis on how amplified systems integrate with telecommunications equipment. Specific audio systems include intercom, loudspeaker paging, sound reinforcement and multi-zone. This course will also cover telecom basics including circuit types, PBXs and key systems and troubleshooting. Required: Student Petition.

Required: Acceptance into Limited Energy Apprenticeship program

**APR-115UW** Substation Metering & Relay Overview

2 credits, Not Offered Every Term

This course introduces the apprentice to the duties of Substation Metering & Relay Technicians. It outlines how to perform testing, calibration, maintenance, installation and trouble shooting on new or existing equipment and circuit installation. It also details how to obtain line fault data and investigate equipment outages throughout the system on substations and/or switch yard equipment. In addition, this course provides the student with one-on-one time spent in the field with a Substation Metering & Relay Technician.

Required: Attend all required days to be eligible for program credits

**APR-116LE** Security Systems

4 credits, Not Offered Every Term

Covers the fundamentals of designing, installing, and integration of a typical burglar (security) system and an access control system. Students will understand what the minimum required components are for each type of system, as well as what type of components are best suited for a given situation. A basic understanding for programming shall be provided. National Electric Codes relevant to these systems shall be reviewed. Required: Student Petition.

Required: Acceptance into Limited Energy Apprenticeship program

**APR-116UM Network Data Operations (NDO) Overview**

1 credits, Not Offered Every Term

This course will give the meterman apprentice an overview of smart meter operations and associated systems/servers including Meter Data Collection (MDC), Sensus, Total Metering Solution (TMS), and MV90, the industry standard for information collection and storage. The Meterman Apprentice will gain a better understanding of the process around the use of smart meter data, including validation of the usage to ensure accurate readings as well as an understanding of alarms the meter can trigger out in the field.

**APR-117PB Plumbing Basic Trade & Code**

3 credits, Not Offered Every Term

Introduction to plumbing trade, tools and safety; mathematical functions review, scale rulers and gauges; related science relative to water, sewage, gases and dangers of waste products.

Required: Acceptance into Plumbers Apprenticeship program

**APR-117UM Special Tester Overview**

2 credits, Not Offered Every Term

Apprentices will experience the daily duties of Special Testers as they do power quality testing and troubleshooting. They will learn what computer skills and applications are required, and meet the many work groups that Special Testers come in contact with. Required: Student Petition.

**APR-118UL Transformer Connections I**

1 credits, Fall/Winter/Spring/Summer

Designed to instruct apprentices or journey-level workers on the basic fundamentals of transformer bank connections: delta-delta, wye-wye, wye-delta, open-delta, open-delta-wye and single-phase regulators and conditions that can cause backfeed. Transformer Training is required to be taken each of the three years of a line apprenticeship in order to meet degree requirements.

Required: Journeyman lineman or second step apprentice

**APR-118UM Leadman Repairman Overview**

2 credits, Not Offered Every Term

Apprentices will experience the daily duties of Leadman Repairman as they investigate customer service calls and install, maintain and remove customer services. Required: Student Petition.

**APR-119PT Basic Trade & Safety**

2 credits, Not Offered Every Term

Covers the history of painting, painting trade careers, professionalism in the painting trade, safety, and painting equipment & tools. Required: Student Petition.

Required: Acceptance into Painters Apprenticeship program

**APR-121UE Line Estimator Theory I: Operations**

4 credits, Not Offered Every Term

This course covers the principles and concepts of electrical laws, codes, work safety habits, electrical calculations and electrical apparatus for power line work. The focus is on installation process for transformers, test equipment and field equipment.

Required: Acceptance into Line Estimator Apprenticeship program

**APR-121UL Outside Electrical Fundamental Theory I**

5 credits, Fall

Instruct second-year apprentices on the principles and concepts of electrical laws, codes, work safety habits, electrical calculations, electrical apparatus for power line work and the installation process for transformers, test equipment and field equipment.

Prerequisites: APR-113UL

**APR-121UM Metering: Fundamentals I**

5 credits, Fall

This course is designed to instruct second-year apprentices on the fundamentals of AC theory including the following: DC review, trigonometry review, Resistive-Capacitive (RC), Resistive-Inductive (RL), Resistive-Capacitive-Inductive (RLC) circuits, series and parallel resonance. Required: Student Petition.

Prerequisites: APR-113UM

**APR-121UW Fundamental Substation Wireman I**

5 credits, Fall

Fundamental Substation Wireman I continues to explore high voltage substation equipment including transformers, switches, and reactive equipment. Students will also build on their knowledge of Direct Current (DC) theory while beginning the study of the fundamentals of Alternating Current (AC) theory. This course is part of the NJATC substation curriculum. Required: Student Petition.

Prerequisites: APR-113UW

**APR-122UE Line Estimator Theory II: Standards**

4 credits, Not Offered Every Term

This course covers the principles and concepts of codes that dictate performance standards and safe work practices found in OSHA 1910.269. The focus is on interpreting schematic drawings, reading blue prints and staking sheets, methods for storing explosives, crane set up and criteria for safe boom lift.

Required: Acceptance into Line Estimator Apprenticeship program

**APR-122UL Outside Electrical Fundamental Theory II**

5 credits, Not Offered Every Term

Instruct second-year, second term apprentices on outside electrical apprenticeship related training as it applies to math, construction standards, vectors and safe work practices in electrical energy applications. Required: Student Petition.

Prerequisites: APR-111UL, APR-112UL, and APR-113UL

**APR-122UM Metering: Fundamentals II**

5 credits, Winter

This course is designed to instruct second-year apprentices on the graphic representation of system parameters (i.e. currents & voltages) and the various transformer line-ups that create those parameters.

Required: Student Petition.

Prerequisites: APR-121UM

**APR-122UW Fundamental Substation Wireman II**

5 credits, Winter

Fundamental Substation Wireman II identifies the role that transformers play in substations and takes a closer look at on-the-job safety. Included will be information on transformer construction, connections, tap changers and protection, as well as an introduction to transformer test instruments. Safety aspects will include lock-out/tag-out procedures, transformer hazards, grounding and step and touch potentials. Safety will be covered in greater detail, focusing on protective grounding live-line tools and arc flash compliance. This course is part of the NJATC substation curriculum. Required: Student Petition.

Prerequisites: APR-121UW

**APR-123UE Line Estimator Theory III: Power Line**

4 credits, Not Offered Every Term

This course covers electrical laws, work safety habits and electrical apparatus for power line work. The focus on safe working loads, street lighting circuits, connectors, conductors and ways to protect lines from abnormal voltage. Required: Student Petition.

Required: Acceptance into Line Estimator Apprenticeship program

**APR-123UL** Outside Electrical Fundamental Theory III

5 credits, Spring

Instruct the second year apprentice on cable applications, steps to restoring service, identification and care of hot line tools, lifting and digging operations with a mobile crane, traffic signal industry overview and basics of street lighting maintenance. Required: Student Petition.

Prerequisites: APR-122UL

**APR-123UM** Metering: Fundamentals III

5 credits, Spring

This course is designed to instruct second-year apprentices on the fundamentals of power calculations based on mathematical and planar approaches. Required: Student Petition.

Prerequisites: APR-122UM

**APR-123UW** Fundamental Substation Wireman III

5 credits, Spring

Fundamental Substation Wireman III students will develop a journey level understanding of cable splicing, fiber optic cables and power transformer maintenance while beginning detailed studies of other major substation equipment. This course is part of the NJATC substation curriculum.

Required: Student Petition.

Prerequisites: APR-122UW

**APR-125IE** DC Theory

3 credits, Not Offered Every Term

Understanding DC Theory including atom's structures, static electricity, magnetism, resistors, series and parallel circuits as well as combination circuits. Required: Student Petition.

**APR-127PB** Plumbing Fittings & Materials

3 credits, Not Offered Every Term

Methods of identifying and joining plastic, copper, cast iron, steel, glass and other piping materials as well as piping connections and plumbing code.

Required: Acceptance into Plumbers Apprenticeship program

**APR-128UL** Transformer Connections II

2 credits, Not Offered Every Term

Instruct apprentices or journey-level workers on the fundamentals of transformer bank connections: delta-delta, wye-wye, wye-delta, open-delta, open-delta-wye and single-phase regulators and conditions that can cause backfeed. Transformer training is required to be taken each of the three years of a line apprenticeship in order to meet degree requirements.

Required: Student Petition.

Prerequisites: APR-118UL

**APR-129PT** Basic Surface & Preparation

2 credits, Not Offered Every Term

This course continues with additional painting equipment, identifying types of surfaces, hand and mechanical cleaning of surfaces, protecting adjacent surfaces and improving surfaces to be painted. Required: Student Petition.

Prerequisites: APR-119PT

**APR-130LM** Basic Electricity I

3 credits, Fall

Explores fundamentals of AC and DC electricity. Includes: atomic structure, direct current, alternating current, Ohm's law, series, parallel, and combination circuits, DC circuit theorems, production of DC voltages, magnetic principles, transformers, motors and generators.

**APR-131LM** Basic Electricity II

3 credits, Winter

Covers application of several theories learned in previous term. Additional topics will include: motors, controls, alignment, pulleys and gears, troubleshooting theory, power distribution and lighting, electrical wiring and schematics.

Recommended Prerequisites: APR-130LM

**APR-131UE** Electric Utility System Operation (EUSO)

3 credits, Not Offered Every Term

This course covers the principles and concepts that govern field operations. Students will explain and summarize the basics of electric utility energy systems. The focus is on understanding electrical utility operations and maintenance of the power grid.

Required: Acceptance into Line Estimator Apprenticeship program

**APR-132LM** Basic Electricity III

3 credits, Spring

This course offers continued study in the control of industrial electric motors. Concepts in the application of relays, motor starters, switches and overload protection are explored from both a practical and theoretical viewpoint. Wiring techniques and electrical devices for residential, commercial and industrial facilities are presented along with hands-on activities. Additional topics include: electrical conductors, installation materials, and the scope of work performed by licensed electricians.

Recommended Prerequisites: MFG-130 and MFG-131

**APR-132UE** Estimator Navigational Mapping

3 credits, Not Offered Every Term

Principles and concepts that govern field operations. Explain and summarize the basics of electric utility energy systems. Focus is on computer applications used to manage service to customers. Required: Student Petition.

Required: Acceptance into Line Estimator Apprenticeship program

**APR-133UE** Estimator Facility Point Inspection

3 credits, Not Offered Every Term

This course covers the principles and concepts that govern field operations. Students will explain and summarize the basics of electric utility energy systems. The focus is on permits, regulation, contracts, facility point inspections and what comprises the estimator's tool box.

Required: Acceptance into Line Estimator Apprenticeship program

**APR-134IE** Residential Wiring I

3 credits, Not Offered Every Term

The focus is on the fundamentals of electrical installations in residential; based on the National Electrical Code (NEC) and Oregon Electrical Specialty Code (OESC). Required: Student Petition.

**APR-134UE** Estimator Phase Design

3 credits, Not Offered Every Term

This course covers the principles and concepts that govern field operations. Students will explain and summarize the basics of electric utility energy systems. The focus is on single and three phase construction projects. Required: Student Petition.

Required: Acceptance into Line Estimator Apprenticeship program

**APR-135IE** Residential Wiring II

3 credits, Not Offered Every Term

Focuses on the fundamentals of electrical installation in residential based on the National Electrical Code (NEC) and Oregon Specialty Code (OESC). Required: Student Petition.

Prerequisites: APR-134IE

**APR-135UE Estimator Metering**

3 credits, Not Offered Every Term

This course covers the principles and concepts that govern field operations. Students will explain and summarize the basics of electric utility energy systems. The focus is on theory, tools, motors and controllers, the grid, and computer applications.

Required: Acceptance into Line Estimator Apprenticeship program

**APR-136IE Electrical Design I**

3 credits, Not Offered Every Term

Provides design criteria for single family and multifamily dwelling as well as outbuilding, by using the National Electric Code (NEC) and Oregon Specialty Electrical Code (OESC) to design and calculate electrical service and other aspects of a residence. Required: Student Petition.

**APR-136UE Estimator Transformer Training**

3 credits, Not Offered Every Term

This course covers the principles and concepts that govern field operations. Students will explain and summarize the basics of electric utility energy systems. The focus is on beginning to end site management for residential and commercial sites.

Required: Acceptance into Line Estimator Apprenticeship program

**APR-137PB Plumbing Basic Installation & ISO**

3 credits, Not Offered Every Term

Installation practices: plumbing fixtures, valves and fittings. Blueprint Reading: lines, scale rulers, sketching, symbols, detail sketching, orthographic projection, isometric & oblique sketches.

Required: Acceptance into Plumbers Apprenticeship program

**APR-137UE Estimator Field Functions**

3 credits, Not Offered Every Term

This course covers the principles and concepts that govern field operations. Students will explain and summarize the basics of electric utility energy systems. The focus is on estimator field responsibilities and equipment used in the field.

Required: Acceptance into Line Estimator Apprenticeship program

**APR-138UL Transformer Connections III**

2 credits, Not Offered Every Term

Instruct apprentices or journey-level workers on the fundamentals of transformer bank connections: delta-delta, wye-wye, wye-delta, open-delta, open-delta-wye and single-phase regulators and conditions that can cause backfeed. Transformer training is required to be taken each of the three years of a line apprenticeship in order to meet degree requirements.

Required: Student Petition.

Prerequisites: APR-128UL

**APR-139PT Hand & Mechanical Cleaning**

2 credits, Not Offered Every Term

Preparation of painting surfaces: identifying proper process for cleaning and preparation as well as the improvement of surfaces to be painted.

Required: Student Petition.

Prerequisites: APR-119PT

**APR-145IE Grounding & Bonding**

3 credits, Not Offered Every Term

Discusses what grounding is and its proper terms. It also discusses why effective grounding is needed and how effective grounding can be made a part of the electrical system. Required: Student Petition.

**APR-147PB Plumbing Math**

3 credits, Not Offered Every Term

This course will introduce students to basic math and specifically plumbing math as well as an in depth study of job-site safety. Required: Student Petition.

**APR-149PT Basic Applications**

2 credits, Not Offered Every Term

Covers brushing & rolling paints and conventional spraying techniques, as well as special devices, and troubleshooting techniques. Required: Student Petition.

Prerequisites: APR-139PT

**APR-155IE Motors & Transformers**

3 credits, Not Offered Every Term

Covers basic generator, AC and DC motor and transformer construction and theory, as well as calculations involving motors and transformers.

Practical use of the NEC will be introduced. Required: Student Petition.

**APR-157PB Plumbing Pipe Sizing & Advanced Math**

3 credits, Not Offered Every Term

Learn water pipe sizing & materials, water treatment, sewage, drainage, stacks, distribution systems, cross-connection protection, hot water heater types and the related codes. Advance mathematical skills to include square roots, cube roots, offsets, area and volume calculations, and lead & oakum.

Required: Acceptance into Plumbers Apprenticeship program

**APR-159PT Basic Covering & Problem Solving**

2 credits, Not Offered Every Term

Covers more advanced brushing, rolling, spraying and application techniques, as well as wood finishing and failures and remedies related to substrates, surface preparation and application. Required: Student Petition.

Prerequisites: APR-149PT

**APR-165IE AC Theory**

3 credits, Not Offered Every Term

Understand AC Theory, Basic Trigonometry and vectors. Understand inductance in AC circuits and resistance-inductive series and parallel circuits. AC circuits containing capacitors. Required: Student Petition.

Prerequisites: APR-125IE

**APR-167PB Plumbing Welding and Print Reading**

3 credits, Not Offered Every Term

Blueprint Reading: rough-in sheets, single line drawings, detail drawings and sections. Welding: Gas welding, cutting theory, soldering, brazing and cutting; flat and vertical weld and shielded metal-arc welding.

Required: Acceptance into Plumbers Apprenticeship program

**APR-169PT Advanced Coating**

2 credits, Not Offered Every Term

Covers color & sheen of paints, special coatings, including roof and floor coatings. Required: Student Petition.

Required: Acceptance into Painters Apprenticeship program

Prerequisites: APR-159PT

**APR-177PB Plumbing Related Science**

3 credits, Not Offered Every Term

Installation practices: venting materials, sizing, and hangers and sewage pumps and ejectors. Related science: water properties, pressure, hydraulics, and traps; air, manometers, pressure testing and air chambers. Rigging & hoisting: safety, concepts, knots & hitches, hoists & pulleys, ladders & scaffolds, and hand signals. Required: Student Petition.

Required: Acceptance into Plumbers Apprenticeship program

Prerequisites: APR-167PB



**APR-185IE** Electrical Systems

3 credits, Not Offered Every Term

This course will illustrate different electrical systems from branch circuits and feeders to electrical services. The National Electrical Code (NEC) NFPA 70 requirements for equipment will also be covered in this course. Required: Student Petition.

**APR-187PB** Plumbing Related Codes

3 credits, Not Offered Every Term

Building Code and Mechanical Code requirements that affect plumbing installations including a review of Fire and Life-Safety Codes relative to plumbing installation. Required: Student Petition.

Required: Acceptance into Painters Apprenticeship program

**APR-197PB** Plumbing Backflow Prevention

1 credits, Not Offered Every Term

All facets of backflow prevention and protection related to Codes and Laws. Includes clean water requirements, recognizing dangerous cross connections between potable and non-potable water systems, as well as a lab in which to demonstrate and provide hands-on opportunity for proper use of backflow devices, installation and repair and testing.

Required: Student Petition.

Prerequisites: APR-137PB

**APR-201MA** CNC I: Set-Up and Operation

4 credits, Not Offered Every Term

This is the first course in the CNC sequence. Students will learn basic skills including how to properly set-up and operate both CNC milling and turning centers. Students will also learn G & M codes related to basic machine set-up and operation. Designed for persons with little or no previous CNC experience.

**APR-202LM** Electrical Code Level I

4 credits, Not Offered Every Term

Provides a working knowledge of the National Electrical Code (NEC). Assists LME apprentices in preparing for the state electrical exam. Topics include definitions, requirements for electrical installations, identification and use of electrical conductors, wiring, circuit-protection, wiring methods, materials, and electrical safety standards.

**APR-202MA** CNC II: Programming and Operation

4 credits, Not Offered Every Term

This is the second course in the CNC sequence. Students will learn G&M-code programming for milling and turning while they build their set-up and operation skills. There will also be an introduction to set-up probing, 4-axis mill programming and machining, sub-programming and process documentation.

Prerequisites: APR-111MA, APR-201MA, MTH-050

**APR-203LM** Electrical Code-Level II

4 credits, Not Offered Every Term

Provides a working knowledge of the National Electrical Code (NEC). Topics include installation code requirements for the following: electrical equipment for general use such as motors, luminaries, air conditioners, cords, switchboards and panel boards. Also covers special occupancies which will assist students in locating and understanding electrical code requirements for hazardous locations such as gas stations, spray paint booths, aircraft hangars, health care facilities, places of assembly, theaters, manufactured buildings, mobile homes, temporary locations, etc. Electrical standards will be emphasized.

**APR-203MA** CNC III: Applied Programming and Operation

4 credits, Not Offered Every Term

This is the third course in the CNC sequence. Students will build their CNC programming, set-up, and operation skills. They will work individually or in small groups to design, program, manufacture, and test advanced projects using CNC mills, CNC lathes, multi-axis/process machine tools, and various software applications.

Prerequisites: APR-202MA and MTH-080

**APR-204LM** Electrical Code-Level III

4 credits, Not Offered Every Term

Provides a working knowledge of the National Electrical Code (NEC). Assists LME apprentices in preparing for the state electrical exam. Topics include special equipment, special conditions, and communications systems. Covers State of Oregon statutes and amendments, building code division rules, license requirements and responsibilities, supplemental code reference materials, safety standards and practice exams.

**APR-205PB** Service Plumbing

3 credits, Not Offered Every Term

Course will teach the plumbing apprentice basic skills required to service and repair a plumbing system. The apprentice will have an opportunity to learn methods used by a plumber to trouble shoot a plumbing system and restore it to working order. Required: Student Petition.

Prerequisites: APR-177PB

**APR-207PB** Municipal Systems

2 credits, Fall/Winter/Spring

This course introduces the student to the different municipal systems that deliver water to, and dispose of water and waste from the private plumbing systems in use today. Course content includes potable water sources, public delivery methods including gravity and pressure. In addition, wastewater collection including grease and hazardous effluent, stormwater conveyance, and disposal, as well as administration, regulation and management of public utilities are covered.

Recommended: Student must be a currently registered Plumbing Apprentice with Area I, Joint Apprenticeship Training Committee

**APR-217LE** Integrated Systems

4 credits, Not Offered Every Term

Covers the equipment used in CCTV systems, as well as the methods used to integrate these components into systems that meet the surveillance needs of different users. The course work will cover basic system components as well as specific application criteria and terminology. The student will also achieve a working knowledge of the National Electrical Code (NEC) as it applies to these technologies.

Required: Student Petition.

Required: Acceptance into Limited Energy Apprenticeship program

**APR-217PB** Advanced Plumbing Installation

3 credits, Not Offered Every Term

Plumbing theory and association skills and knowledge related to residential, commercial and industrial installation of appliances, fixture fittings and trim, gas code, piping, controls and regulators, as well as mathematics relative to elevations, leveling and transit. Required: Student Petition.

Prerequisites: APR-177PB

**APR-218LE** Fire Alarm Systems

4 credits, Not Offered Every Term

This course covers the basics of Fire Alarm systems for the Limited Energy License A and B. The class will cover the basics of National Fire Protection Association (NFPA) 72 and National Electrical Codes (NEC) 760. It will cover the different styles of circuits, wiring and devices and their components. Students will also learn system drawing and math.

Required: Student Petition.

Required: Acceptance into Limited Energy Apprenticeship program

**APR-219LE** ADA & Code

4 credits, Not Offered Every Term

Covers review of math dealing with Ohm's Law, Kershov's Law, trigonometry, voltage drop calculations and how to calculate horsepower to amperage depending on what type of electricity is being used. Also included are the newest changes in the National Electrical Code (NEC), basic Americans with Disabilities (ADA) requirements and test preparation for the Journey Level Limited Energy exam. Required: Student Petition.

Required: Acceptance into Limited Energy Apprenticeship program

**APR-219PT** Advanced Graphics & Texturing

2 credits, Not Offered Every Term

Covers advanced techniques in graphics, glazing, antiquing, stippling, mottling, texturing and stenciling. Required: Student Petition.

Prerequisites: APR-169PT

**APR-223LM** Instrumentation & Controls

3 credits, Winter

Course instruction covers areas of process measurement, control and data acquisition. Common sensors and actuators and their applications are also presented.

Recommended Prerequisites: APR-130LM

**APR-227PB** Plumbing Gas Venting & Drains

3 credits, Not Offered Every Term

Introduces apprentices to the basic venting of gas appliances, mathematics to calculate offsets for plumbing systems, and cylindrical & rectangular tanks; storm drain systems and isometric drawings.

Required: Student Petition.

Prerequisites: APR-217PB

**APR-229PT** Advanced Techniques

2 credits, Not Offered Every Term

Continues with various paint texturing techniques: marbleizing, gilding, graining, lining and striping, as well as trade math & measuring, job planning and blueprint reading. Required: Student Petition.

Prerequisites: APR-219PT

**APR-231UE** Line Estimator Responsibility I: Live Line

4 credits, Not Offered Every Term

This course covers the principles and concepts that govern field responsibilities related to line maintenance. The focus is on ground resistance, pole replacement and live line maintenance, fiber optic types, and codes and standards for installation procedures. Required: Student Petition.

Required: Acceptance into Line Estimator Apprenticeship program

**APR-231UL** Outside Electrical Advanced Theory I

5 credits, Fall

Instruct third year, first term apprentices on outside electrical apprenticeship training as it applies to distribution circuits and capacitors, inductance, AC theory, transformers single and three phase voltages and connections, troubleshooting and testing, personal protective grounding, National Electric Safety Code (NESC) standards, and safe work practices. Required: Student Petition.

Required: Second-year outside electrical theory

**APR-231UM** Metering: Advanced I

5 credits, Fall

This course will 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. Required: Student Petition.

Prerequisites: APR-123UM

**APR-231UW** Advanced Substation Wireman I

5 credits, Fall

Advanced Substation Wireman I students will learn about local union by-laws, worker benefits, and labor management relations and their responsibilities as a journey-level worker. Also non-standard equipment such as static volt-ampere reactive (VAR) compensators, gas insulation stations. Additional topics include System Control and Data Acquisition (SCADA), and alternative energy sources. This course is part of the NJATC substation curriculum. Required: Student Petition.

Prerequisites: APR-123UW

**APR-232UE** Line Estimator Responsibility II: Substation

4 credits, Not Offered Every Term

This course covers the principles and concepts that govern field responsibilities related to substation line maintenance. The focus is on voltage regulation, circuit protection, high voltage fuses, air break switches, transformers, and related safety issues and procedures.

Required: Student Petition.

Required: Acceptance into Line Estimator Apprenticeship program

**APR-232UL** Outside Electrical Advanced Theory II

5 credits, Winter

Instruct third year, second term apprentices on outside electrical apprenticeship training as it applies to distribution capacitors, capacitor switching, breakers and switches, rubber protective devices, live-line tools, live-line work practices, primary and single-phase revenue metering, substation safety procedures, substation construction and advanced math applications. Required: Student Petition.

Required: Second-year outside electrical theory

Prerequisites: APR-231UL

**APR-232UM** Metering: Advanced II

5 credits, Winter

Designed to instruct third-year apprentices on the subject of advanced fundamentals of metering including the following: rates and tariffs, demand metering, Kilovolt-Ampere-Reactance (KVAR) and Kilovolt Amps (KVA) metering, special metering (compensation metering, bidirectional flow (net metering), and totalization, pulse metering (pulse weights, pulse initiation, and totalization). Required: Student Petition.

Prerequisites: APR-231UM

**APR-232UW** Advanced Circuit Theory & Troubleshooting I

5 credits, Winter

This course is designed to instruct third year wireman students on the advanced theory and application of outside electrical substation related training as it applies to a working understanding of algebra, electron theory and all aspects of AC & DC electric circuit evaluation, reading substation construction prints, National Electric Code (NEC) codes for construction and safe work practices. Required: Student Petition.

Prerequisites: APR-231UW

**APR-233UE** Line Estimator Responsibility III: Field Responsibility  
4 credits, Not Offered Every Term

This course covers the principles and concepts that govern field responsibilities related to line maintenance. The focus is on hot stick procedures, installing substation control equipment, locating cable faults, power factor, harmonics and functions of control equipment.

Required: Acceptance into Line Estimator Apprenticeship program

**APR-233UL** Outside Electrical Advanced Theory III

5 credits, Spring

Instruct third year, third term apprentices on outside electrical apprenticeship training as it applies to primary fusing and fuse principles, reclosers and sectionalizers, substation equipment, line fault current and voltage regulation, capacitors, power factor/harmonics, fiber optics including: fiber type, cable type, codes and standards, aerial construction, and underground construction, alternative energy sources and journeymen responsibilities. Required: Student Petition.

Required: Second-year outside electrical theory

Prerequisites: APR-232UL

**APR-233UM** Metering: Advanced III

5 credits, Spring

This course is designed to instruct third-year apprentices on the subject of advanced fundamentals of metering including the following: meter software programs (error codes, service test editing, interpretation of instrumentation vectors, interval data, and programming), meter communications, general system troubleshooting, power quality and harmonics, Automated Meter Infrastructure (AMI)/Automated Meter Reading (AMR) and the Smart Grid. Required: Student Petition.

Prerequisites: APR-232UM

**APR-233UW** Advanced Circuit Theory & Troubleshooting II

5 credits, Spring

This course is designed to instruct third-year wireman students on the advanced theory and application of outside electrical substation related training as it applies to a working understanding of algebra, electron theory and all aspects of AC & DC electric circuit evaluation, reading substation construction prints, National Electric Code (NEC) codes for construction and safe work practices. Required: Student Petition.

Prerequisites: APR-232UW

**APR-235IE** Special Installations

3 credits, Not Offered Every Term

Covers special occupancies, special equipment, special conditions as they pertain to the National Electric Code and Oregon Specialty Code (OESC) it will also touch on communication systems. Required: Student Petition.

**APR-236IE** Motors & Controls

3 credits, Not Offered Every Term

This course is the first of two classes that covers how to properly design and install motor circuits and controls per NEC Article 430, including understanding basic field-installed control devices, push button controls, timers, relays, and working with ladder diagrams. Required: Student Petition.

Prerequisites: APR-236IEL

**APR-236IEL** Motors & Controls Lab

1 credits, Not Offered Every Term

This course is the second of two classes required to teach students the basics of Basic Motor Controls, reversing starters, timers, counters and sensing devices and solid state soft starts. Required: Student Petition.

Prerequisites: APR-236IE

**APR-237IE** Electrical Design II

3 credits, Not Offered Every Term

Provides design criteria for commercial and industrial electrical, by using the National Electric Code (NEC) and Oregon Specialty Code (OESC). To design and calculate service as well as other aspects of commercial and industrial electrical installations. Required: Student Petition.

Prerequisites: APR-136IE

**APR-237PB** Plumbing Water Heater & Circuit Controls

3 credits, Not Offered Every Term

Plumbing concepts relative to energy, temperature, and heat transfer via conduction, convection, and radiation in gas, oil, electric and solar water heaters. Included are water treatment, basic motors & controls, circuit protection, and troubleshooting. Blueprint reading segment covers specifications, floor, site, structural, plumbing, electrical and HVAC plans.

Required: Student Petition.

Prerequisites: APR-227PB

**APR-239PT** Advanced Estimating & Codes

2 credits, Not Offered Every Term

This course covers surface preparation, materials, adhesives and installation of wall covering, as well as potential failures and remedies during the wallcovering process. Also included are wallcovering math & measurement, as well as job planning techniques. Required: Student Petition.

Prerequisites: APR-229PT

**APR-245IE** NEC Analysis I

3 credits, Not Offered Every Term

This course teaches how the National Electrical Code (NEC) NFPA 70 is arranged, covering its introduction, chapters, articles, parts, and sections. The student will learn to navigate and understand the relationship each part of the Code has to the other parts and will develop an in-depth comprehension of the verbiage and layout of the NEC to become adept at using the Code. Required: Student Petition.

**APR-247PB** Advanced Plumbing Code I

3 credits, Not Offered Every Term

This course is designed to prepare the apprentice for the plumbing journeyman exam. It introduces the Uniform Plumbing Code and covers additional plumbing laws and rules. The student will work with the plumbing code book to learn definitions and general regulations, acceptable methods and materials for plumbing installations and will prepare for the State plumbing examination. Required: Student Petition. Required: Successful completion of 1st, 2nd, and 3rd years of Plumbing related training

**APR-254MA** Mill/Turn Machining

3 credits, Not Offered Every Term

This class will introduce students to CNC mill-turn machines, their programming, and setup procedures. The course will explore limitations, advantages, and configurations of typical mill/turn machines including rotation style and set-up orientation. Post processing and virtual machine simulation will also be discussed.

Prerequisites: APR-203MA

**APR-255IE** NEC Analysis II

3 credits, Not Offered Every Term

This course takes an in-depth look at Chapters 1-3 of the National Electrical Code (NEC) NFPA 70 and incorporates Oregon and Washington rules and statutes. Required: Student Petition.



**APR-257PB** Advanced Plumbing Code II

3 credits, Not Offered Every Term

This course is designed to prepare the apprentice for the plumbing journeyman exam. It is a continuation of Advanced Plumbing Code I, and covers additional plumbing codes, analysis of definitions, plumbing theory and design, and vents, traps, and storm drain systems. Medical Gas installation will be reviewed. Required: Student Petition.

Prerequisites: APR-247PB

**APR-265IE** NEC Analysis III

3 credits, Not Offered Every Term

This course takes an in-depth look at Chapters 4 and 5 of the National Electrical Code (NEC) NFPA 70. Oregon OAR 918 and ORS 479 as well as Washington RCW 19.28 and WAC 296-46B will be covered in this course. Required: Student Petition.

**APR-267PB** Advanced Plumbing Code III

3 credits, Not Offered Every Term

This course is designed to prepare the apprentice for the plumbing journeyman exam. It is a continuation of Advanced Plumbing Code II, and covers additional plumbing codes, analysis of definitions, plumbing theory and design, advanced preparation for the State Journeyman Plumber's Exam, and overview of the entire code book. Required: Student Petition.

Prerequisites: APR-257PB

**APR-275IE** NEC Analysis IV

3 credits, Not Offered Every Term

This course takes an in-depth look at Chapters 6 - 8 of the National Electrical Code (NEC) NFPA 70 as well as Oregon Administrative Rules (OARs) and Washington Administrative Code (WAC). Test-taking procedures and preparation for journey-level electrical exam are emphasized. Required: Student Petition.

**APR-276PB** Plumbing Review I

3 credits, Not Offered Every Term

This course is designed to prepare the apprentice for the plumbing journeyman exam. It is the first of three Advanced Plumbing Code classes and covers additional plumbing codes, analysis of definitions, plumbing theory and design, advanced preparation for the State Journeyman's Plumbers exam and overview of the entire code book. Required: Student Petition.

Required: Successful completion of 1st, 2nd, and 3rd years of Plumbing related training

**APR-277PB** Plumbing Review II

3 credits, Not Offered Every Term

This course is the second of three classes designed to provide the fourth year apprentice with a computer-assisted overview of previous courses and an opportunity to explore advanced plumbing topics. Required: Student Petition.

Prerequisites: APR-267PB

**APR-287PB** Plumbing Review III

3 credits, Not Offered Every Term

This course is the last of three classes designed to provide the fourth year apprentice with a computer-assisted overview of previous courses and an opportunity to explore advanced plumbing topics. Required: Student Petition.

Prerequisites: APR-277PB

**APR-291IE** National Electrical Code (NEC) Exam Preparation I

3 credits, Not Offered Every Term

This course is designed to prepare students for the electrical general journey level examinations for the States of Oregon and Washington. The course is based on tests designed to challenge the student to navigate the National Electric Code and Oregon and Washington rules and standards. Each test is designed to simulate the three-hour, 52 question general journey level tests. This course is one of four with the same design and theme which each have a unique set of tests to enhance the students' knowledge. Required: Student Petition. Required: Completion of four years of apprenticeship classes

**APR-292IE** National Electrical Code (NEC) Exam Preparation II

3 credits, Not Offered Every Term

This course is designed to prepare students for the electrical general journey level examinations for the States of Oregon and Washington. The course is based on tests designed to challenge the student to navigate the National Electric Code and Oregon and Washington rules and standards. Each test is designed to simulate the three-hour, 52 question general journey level tests. This course is two of four with the same design and theme which each have a unique set of tests to enhance the students' knowledge. Required: Student Petition. Required: Completion of four years of apprenticeship classes. Must be at least 18 years of age

**APR-293IE** National Electrical Code (NEC) Exam Preparation III

3 credits, Not Offered Every Term

This course is designed to prepare students for the electrical general journey level examinations for the States of Oregon and Washington. The course is based on tests designed to challenge the student to navigate the National Electric Code and Oregon and Washington rules and standards. Each test is designed to simulate the three-hour, 52 question general journey level tests. This course is three of four with the same design and theme which each have a unique set of tests to enhance the students' knowledge. Required: Student Petition. Required: Completion of four years of apprenticeship classes

**APR-294IE** National Electrical Code (NEC) Exam Preparation IV

3 credits, Not Offered Every Term

This course is designed to prepare students for the electrical general journey level examinations for the States of Oregon and Washington. The course is based on tests designed to challenge the student to navigate the National Electric Code and Oregon and Washington rules and standards. Each test is designed to simulate the three-hour, 52 question general journey level tests. This course is four of four with the same design and theme which each have a unique set of tests to enhance the students' knowledge. Required: Student Petition. Required: Completion of four years of apprenticeship classes