

# APPRENTICESHIP: ELECTRICIAN (APEL)

## APEL 112 • RESIDENTIAL ELECTRICAL AIR CONDITIONING & REFRIGERATION; TELEPHONE SYSTEMS

<b>Units:</b>	3
<b>Hours:</b>	24 lecture, 51 laboratory per quarter (75 total per quarter)
<b>Prerequisite:</b>	Per California Code of Regulations, this course is limited to students admitted to the Electrical Apprenticeship Program.
<b>Advisory:</b>	Not open to students with credit in APRT 112.
<b>Degree and Credit Status:</b>	Degree-Applicable Credit Course
<b>Foothill GE:</b>	Non-GE
<b>Transferable:</b>	None
<b>Grade Type:</b>	Letter Grade (Request for Pass/No Pass)
<b>Repeatability:</b>	Not Repeatable

An introduction to air conditioning and refrigeration systems used in residential applications; telephone systems. Students study the wiring, circuitry, and controls in these systems. Continued study of the National Electrical Code as it relates to current and load calculations. Review of A/C and D/C theory.

## APEL 113 • RESIDENTIAL ELECTRICAL SYSTEMS: BASIC SECURITY, SOLAR POWER, HOME AUTOMATION & LIFE SAFETY

<b>Units:</b>	3
<b>Hours:</b>	24 lecture, 51 laboratory per quarter (75 total per quarter)
<b>Prerequisite:</b>	Per California Code of Regulations, this course is limited to students admitted to the Electrical Apprenticeship Program.
<b>Advisory:</b>	Not open to students with credit in APRT 113.
<b>Degree and Credit Status:</b>	Degree-Applicable Credit Course
<b>Foothill GE:</b>	Non-GE
<b>Transferable:</b>	None
<b>Grade Type:</b>	Letter Grade (Request for Pass/No Pass)
<b>Repeatability:</b>	Not Repeatable

A study of residential electrical systems and installation practices. Home automation, including home theater. Fundamentals of solar power systems and recommended practices. Life safety systems. Expanded study of the National Electrical Code as it relates to communication circuits, and water applications, such as pools and fountains.

## APEL 120 • ORIENTATION TO THE ELECTRICAL TRADE

<b>Units:</b>	4
<b>Hours:</b>	24 lecture, 72 laboratory per quarter (96 total per quarter)
<b>Prerequisite:</b>	Per California Code of Regulations, this course is limited to students admitted to the Electrical Apprenticeship Program; student is a registered State indentured apprentice.
<b>Advisory:</b>	Not open to students with credit in APRT 120.
<b>Degree and Credit Status:</b>	Degree-Applicable Credit Course
<b>Foothill GE:</b>	Non-GE
<b>Transferable:</b>	None
<b>Grade Type:</b>	Letter Grade (Request for Pass/No Pass)
<b>Repeatability:</b>	Not Repeatable

Orientation to the commercial/industrial electrical industry with an introduction to electrical theory, tools, materials, wiring methods, and job skills. Review of mathematics as applied in the electrical construction trades.

## APEL 120A • ORIENTATION TO THE ELECTRICAL TRADE, CPR & FIRST AID

<b>Units:</b>	5
<b>Hours:</b>	36 lecture, 84 laboratory per quarter (120 total per quarter)
<b>Prerequisite:</b>	Per California Code of Regulations, this course is limited to students admitted to the San Francisco Inside Wireman Electrical Program.
<b>Advisory:</b>	Not open to students with credit in APEL 120.
<b>Degree and Credit Status:</b>	Degree-Applicable Credit Course
<b>Foothill GE:</b>	Non-GE
<b>Transferable:</b>	None
<b>Grade Type:</b>	Letter Grade (Request for Pass/No Pass)
<b>Repeatability:</b>	Not Repeatable

Orientation to the commercial/industrial electrical industry with an introduction to electrical theory, tools, materials, wiring methods, and job skills. Review of mathematics as applied in the electrical construction trades. Industry applications, hands-on labs. CPR, first aid, job orientation topics: sexual harassment and drug abuse.

## **APEL 121 • ELECTRON THEORY; BASIC BLUEPRINT READING; DC THEORY; NATIONAL ELECTRICAL CODE INTRODUCTION**

<b>Units:</b>	4
<b>Hours:</b>	24 lecture, 72 laboratory per quarter (96 total per quarter)
<b>Prerequisite:</b>	Per California Code of Regulations, this course is limited to students admitted to the Electrical Apprenticeship Program.
<b>Advisory:</b>	Not open to students with credit in APRT 121.
<b>Degree and Credit Status:</b>	Degree-Applicable Credit Course
<b>Foothill GE:</b>	Non-GE
<b>Transferable:</b>	None
<b>Grade Type:</b>	Letter Grade (Request for Pass/No Pass)
<b>Repeatability:</b>	Not Repeatable

Introduction to the National Electrical Code (NEC), DC theory, principles of magnetism and electromagnetism, basic blueprint reading.

## **APEL 121A • ELECTRON THEORY; AC & DC ELECTRICAL THEORY; NEC INTRODUCTION; PARALLEL & COMBINATION CIRCUITS**

<b>Units:</b>	5
<b>Hours:</b>	36 lecture, 84 laboratory per quarter (120 total per quarter)
<b>Prerequisite:</b>	Per California Code of Regulations, this course is limited to students admitted to the San Francisco Inside Wireman Electrical Program.
<b>Advisory:</b>	Not open to students with credit in APRT 121.
<b>Degree and Credit Status:</b>	Degree-Applicable Credit Course
<b>Foothill GE:</b>	Non-GE
<b>Transferable:</b>	None
<b>Grade Type:</b>	Letter Grade (Request for Pass/No Pass)
<b>Repeatability:</b>	Not Repeatable

Introduction to the National Electrical Code (NEC), applied codeology toward the National Electrical Code. Discuss and demonstrate basic AC and DC electrical generation. Ohm's Law, understand DC parallel and combination circuits. Basic three-phase AC.

## **APEL 122 • CODEOLOGY; TEST EQUIPMENT; PIPE BENDING; BLUEPRINTS**

<b>Units:</b>	4
<b>Hours:</b>	24 lecture, 72 laboratory per quarter (96 total per quarter)
<b>Prerequisite:</b>	Per California Code of Regulations, this course is limited to students admitted to the Electrical Apprenticeship Program.
<b>Advisory:</b>	Not open to students with credit in APRT 122.
<b>Degree and Credit Status:</b>	Degree-Applicable Credit Course
<b>Foothill GE:</b>	Non-GE
<b>Transferable:</b>	None
<b>Grade Type:</b>	Letter Grade (Request for Pass/No Pass)
<b>Repeatability:</b>	Not Repeatable

Study of the National Electrical Code, AC theory, and basic fundamentals of using blueprints.

## **APEL 122A • CODEOLOGY; NEC CODE; TEST EQUIPMENT; PIPE BENDING; BLUEPRINTS**

<b>Units:</b>	5
<b>Hours:</b>	36 lecture, 84 laboratory per quarter (120 total per quarter)
<b>Prerequisite:</b>	Per California Code of Regulations, this course is limited to students admitted to the San Francisco Inside Wireman Electrical Program.
<b>Advisory:</b>	Not open to students with credit in APRT 122.
<b>Degree and Credit Status:</b>	Degree-Applicable Credit Course
<b>Foothill GE:</b>	Non-GE
<b>Transferable:</b>	None
<b>Grade Type:</b>	Letter Grade (Request for Pass/No Pass)
<b>Repeatability:</b>	Not Repeatable

Study of the National Electrical Code, applied codeology, and basic fundamentals of using blueprints. Instruction on usage of test equipment and pipe bending tools.

## **APEL 123 • AC THEORY; TRANSFORMERS; INTERMEDIATE NATIONAL ELECTRICAL CODE**

<b>Units:</b>	4
<b>Hours:</b>	24 lecture, 72 laboratory per quarter (96 total per quarter)
<b>Prerequisite:</b>	Per California Code of Regulations, this course is limited to students admitted to the Electrical Apprenticeship Program.
<b>Advisory:</b>	Not open to students with credit in APRT 123.
<b>Degree and Credit Status:</b>	Degree-Applicable Credit Course
<b>Foothill GE:</b>	Non-GE
<b>Transferable:</b>	None
<b>Grade Type:</b>	Letter Grade (Request for Pass/No Pass)
<b>Repeatability:</b>	Not Repeatable

Study of AC theory, transformer fundamental design and function. Expanded study of the National Electrical Code. Students will learn the fundamentals of AC theory and how it relates to transformer design. They will also learn to understand how National Electrical Codes are applied for the safe and proper installation of transformers.

## **APEL 123A • GROUNDING & BONDING, OVERCURRENT PROTECTION, CODE & PRACTICES, BLUEPRINTS, CODEOLOGY SKILLS**

<b>Units:</b>	5
<b>Hours:</b>	36 lecture, 84 laboratory per quarter (120 total per quarter)
<b>Prerequisite:</b>	Per California Code of Regulations, this course is limited to students admitted to the San Francisco Inside Wireman Electrical Program.
<b>Degree and Credit Status:</b>	Degree-Applicable Credit Course
<b>Foothill GE:</b>	Non-GE
<b>Transferable:</b>	None
<b>Grade Type:</b>	Letter Grade (Request for Pass/No Pass)
<b>Repeatability:</b>	Not Repeatable

Intended for apprentices to become trained in electrical grounding and bonding. Focus on learning the electrical code and overcurrent protective devices (OCPD). Apprentices will demonstrate their ability to read residential, commercial, and industrial blueprints and to perform circuit layouts. This course meets the requirements of electrical safety standards for 3rd year apprentices who are pursuing their certificate.

## **APEL 124 • DC/AC THEORY REVIEW; ELECTRONICS; INDUSTRIAL BLUEPRINTS**

<b>Units:</b>	4
<b>Hours:</b>	24 lecture, 72 laboratory per quarter (96 total per quarter)
<b>Prerequisite:</b>	Per California Code of Regulations, this course is limited to students admitted to the Electrical Apprenticeship Program.
<b>Advisory:</b>	Not open to students with credit in APRT 124.
<b>Degree and Credit Status:</b>	Degree-Applicable Credit Course
<b>Foothill GE:</b>	Non-GE
<b>Transferable:</b>	None
<b>Grade Type:</b>	Letter Grade (Request for Pass/No Pass)
<b>Repeatability:</b>	Not Repeatable

Review of DC/AC theory. The study of overcurrent protection and the implementation of safe work practices.

## **APEL 124A • DC/AC THEORY REVIEW; ELECTRONICS; INDUSTRIAL BLUEPRINTS; TRANSFORMERS, GROUNDING; ELECTRICAL SYSTEMS**

<b>Units:</b>	5
<b>Hours:</b>	36 lecture, 84 laboratory per quarter (120 total per quarter)
<b>Prerequisite:</b>	Per California Code of Regulations, this course is limited to students admitted to the San Francisco Inside Wireman Electrical Program.
<b>Advisory:</b>	Not open to students with credit in APRT 124.
<b>Degree and Credit Status:</b>	Degree-Applicable Credit Course
<b>Foothill GE:</b>	Non-GE
<b>Transferable:</b>	None
<b>Grade Type:</b>	Letter Grade (Request for Pass/No Pass)
<b>Repeatability:</b>	Not Repeatable

Review of AC/DC theory. Study of electronics principles and applications, and industrial blueprint reading. Transformer installation, grounding, and electrical systems.

## **APEL 125 • NEC GROUNDING; OVERCURRENT PROTECTION; TRANSFORMER CONNECTIONS**

<b>Units:</b>	4
<b>Hours:</b>	24 lecture, 72 laboratory per quarter (96 total per quarter)
<b>Prerequisite:</b>	Per California Code of Regulations, this course is limited to students admitted to the Electrical Apprenticeship Program.
<b>Advisory:</b>	Not open to students with credit in APRT 125.
<b>Degree and Credit Status:</b>	Degree-Applicable Credit Course
<b>Foothill GE:</b>	Non-GE
<b>Transferable:</b>	None
<b>Grade Type:</b>	Letter Grade (Request for Pass/No Pass)
<b>Repeatability:</b>	Not Repeatable

This course covers grounding and bonding of transformers, fire alarm systems and industrial blueprint reading.

## **APEL 125A • FIRE ALARM SYSTEMS, EMERGENCY COMMUNICATION SYSTEMS, PUBLIC EMERGENCY SYSTEMS**

<b>Units:</b>	5
<b>Hours:</b>	36 lecture, 84 laboratory per quarter (120 total per quarter)
<b>Prerequisite:</b>	Per California Code of Regulations, this course is limited to students admitted to the Electrical Apprenticeship Program.
<b>Degree and Credit Status:</b>	Degree-Applicable Credit Course
<b>Foothill GE:</b>	Non-GE
<b>Transferable:</b>	None
<b>Grade Type:</b>	Letter Grade (Request for Pass/No Pass)
<b>Repeatability:</b>	Not Repeatable

Introduction to fire alarm systems and their components. Students will be required to demonstrate knowledge in alarm system interfaces, safety control functions, advanced detection topics, emergency communications system, public emergency systems, and supervising stations. Comprehension of residential fire alarm systems, telephone, and security basics is covered in detail. This course meets the requirements of electrical safety standards for 3rd year apprentices who are pursuing their certificate.

## **APEL 126 • MOTORS; MOTOR CONTROL; LIGHTING PROTECTION**

<b>Units:</b>	4
<b>Hours:</b>	24 lecture, 72 laboratory per quarter (96 total per quarter)
<b>Prerequisite:</b>	Per California Code of Regulations, this course is limited to students admitted to the Electrical Apprenticeship Program.
<b>Advisory:</b>	Not open to students with credit in APRT 126.
<b>Degree and Credit Status:</b>	Degree-Applicable Credit Course
<b>Foothill GE:</b>	Non-GE
<b>Transferable:</b>	None
<b>Grade Type:</b>	Letter Grade (Request for Pass/No Pass)
<b>Repeatability:</b>	Not Repeatable

A study of different motor types and controls with emphasis on protecting the motors and the buildings they are in with lightning protection systems. Reading and interpretation of schematic drawings.

## **APEL 127 • DIGITAL ELECTRONICS; MOTOR SPEED CONTROL; ADVANCED NATIONAL ELECTRICAL CODE**

<b>Units:</b>	4
<b>Hours:</b>	24 lecture, 72 laboratory per quarter (96 total per quarter)
<b>Prerequisite:</b>	Per California Code of Regulations, this course is limited to students admitted to the Electrical Apprenticeship Program.
<b>Advisory:</b>	Not open to students with credit in APRT 127.
<b>Degree and Credit Status:</b>	Degree-Applicable Credit Course
<b>Foothill GE:</b>	Non-GE
<b>Transferable:</b>	None
<b>Grade Type:</b>	Letter Grade (Request for Pass/No Pass)
<b>Repeatability:</b>	Not Repeatable

The use of Boolean algebra in the development of logic circuits and logic control. Introduction to the principles of motor speed control. Review of AC theory. Expanded coverage of the National Electrical Code.

## **APEL 128 • PROGRAMMABLE LOGIC CONTROLLERS; LOW-VOLTAGE SYSTEMS & HIGH-VOLTAGE SYSTEMS**

<b>Units:</b>	4
<b>Hours:</b>	24 lecture, 72 laboratory per quarter (96 total per quarter)
<b>Prerequisite:</b>	Per California Code of Regulations, this course is limited to students admitted to the Electrical Apprenticeship Program.
<b>Advisory:</b>	Not open to students with credit in APRT 128.
<b>Degree and Credit Status:</b>	Degree-Applicable Credit Course
<b>Foothill GE:</b>	Non-GE
<b>Transferable:</b>	None
<b>Grade Type:</b>	Letter Grade (Request for Pass/No Pass)
<b>Repeatability:</b>	Not Repeatable

Introduction to programmable controllers, alarm systems, telephone wiring, instrumentation, and high voltage testing.

## **APEL 129 • NATIONAL ELECTRICAL CODE REVIEW**

<b>Units:</b>	4
<b>Hours:</b>	24 lecture, 72 laboratory per quarter (96 total per quarter)
<b>Prerequisite:</b>	Per California Code of Regulations, this course is limited to students admitted to the Electrical Apprenticeship Program.
<b>Advisory:</b>	Not open to students with credit in APRT 129.
<b>Degree and Credit Status:</b>	Degree-Applicable Credit Course
<b>Foothill GE:</b>	Non-GE
<b>Transferable:</b>	None
<b>Grade Type:</b>	Letter Grade (Request for Pass/No Pass)
<b>Repeatability:</b>	Not Repeatable

Review of the National Electrical Code and preparation for the California State Certification Test. Jobsite management, system testing, fiber optics; heating, air conditioning, and refrigeration systems.

## **APEL 135 • RESIDENTIAL ELECTRICAL ORIENTATION; SAFETY & CODE INTRODUCTION**

<b>Units:</b>	3
<b>Hours:</b>	24 lecture, 51 laboratory per quarter (75 total per quarter)
<b>Prerequisite:</b>	Per California Code of Regulations, this course is limited to students admitted to the Electrical Apprenticeship Program.
<b>Advisory:</b>	Not open to students with credit in APRT 135.
<b>Degree and Credit Status:</b>	Degree-Applicable Credit Course
<b>Foothill GE:</b>	Non-GE
<b>Transferable:</b>	None
<b>Grade Type:</b>	Letter Grade (Request for Pass/No Pass)
<b>Repeatability:</b>	Not Repeatable

Orientation to the electrical industry with a residential emphasis; on-the-job safety; identification of tools and materials; review of basic math. Introduction to the National Electrical Code.

## **APEL 136 • RESIDENTIAL ELECTRICAL D/C THEORY; BLUEPRINT READING**

<b>Units:</b>	3
<b>Hours:</b>	24 lecture, 51 laboratory per quarter (75 total per quarter)
<b>Prerequisite:</b>	Per California Code of Regulations, this course is limited to students admitted to the Electrical Apprenticeship Program.
<b>Advisory:</b>	Not open to student with credit in APRT 136.
<b>Degree and Credit Status:</b>	Degree-Applicable Credit Course
<b>Foothill GE:</b>	Non-GE
<b>Transferable:</b>	None
<b>Grade Type:</b>	Letter Grade (Request for Pass/No Pass)
<b>Repeatability:</b>	Not Repeatable

Introduction to D/C electrical theory and circuitry as it relates to residential installations; conductors used in electrical wiring. Also introduces blueprint reading, including architectural and engineering symbols and scale.

## **APEL 137 • RESIDENTIAL ELECTRICAL A/ C THEORY & CIRCUITRY**

<b>Units:</b>	3
<b>Hours:</b>	24 lecture, 51 laboratory per quarter (75 total per quarter)
<b>Prerequisite:</b>	Per California Code of Regulations, this course is limited to students admitted to the Electrical Apprenticeship Program.
<b>Advisory:</b>	Not open to students with credit in APRT 137.
<b>Degree and Credit Status:</b>	Degree-Applicable Credit Course
<b>Foothill GE:</b>	Non-GE
<b>Transferable:</b>	None
<b>Grade Type:</b>	Letter Grade (Request for Pass/No Pass)
<b>Repeatability:</b>	Not Repeatable

Introduction to A/C electrical theory and circuitry as they relate to residential installations; job costing and industrial standards. Further study of the National Electrical Code focusing on codeology. Expanded development of blueprint reading skills.

## **APEL 138 • RESIDENTIAL WIRING LAYOUT & INSTALLATION**

<b>Units:</b>	3
<b>Hours:</b>	24 lecture, 51 laboratory per quarter (75 total per quarter)
<b>Prerequisite:</b>	Per California Code of Regulations, this course is limited to students admitted to the Electrical Apprenticeship Program.
<b>Advisory:</b>	Not open to students with credit in APRT 138.
<b>Degree and Credit Status:</b>	Degree-Applicable Credit Course
<b>Foothill GE:</b>	Non-GE
<b>Transferable:</b>	None
<b>Grade Type:</b>	Letter Grade (Request for Pass/No Pass)
<b>Repeatability:</b>	Not Repeatable

Study of electrical wiring methods, circuitry, and conduit installation in residential applications. Students practice wiring layout for residential housing. Continued study of the National Electrical Code as it relates to circuits, grounding, and cable assemblies.