APEL 123A: GROUNDING & BONDING, OVERCURRENT PROTECTION, CODE & PRACTICES, BLUEPRINTS, CODEOLOGY SKILLS

Foothill College Course Outline of Record

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

Student Learning Outcomes

- The student will learn the safe and approved methods using over current protection for residential wiring installation
- the student will learn the National Electrical Code on grounding a single family dwelling

Description

Intended for apprentices to become trained in electrical grounding and bonding. Focus will be 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.

Course Objectives

The student will be able to:
A. Correctly ground and bond electrical equipment
B. Correctly size grounded and bonding conductors
C. Perform sizing for over current protection
D. Identify the different types of fuses and breakers
E. Read blueprints and understand job costs and takeoffs
F. Install and connect a transformer
G. Apply harmonics on a circuit
H. Recognize arc flash hazards and how to correct them

Course Content

A. Electrical Grounding and Bonding
1. Understanding proper grounding and bonding to protect and save lives

2. Understanding proper grounding and bonding to protect equipment

B. Conductors
1. Using the Conductor tables in the National Electric Code
2. Locating electrical code for proper equipment grounding, electrode and conductor grounding
3. Sizing grounding conductors per ampacity
4. Sizing grounding electrodes per ampacity
C. Over Current Protection Devices
1. Using tables in the National Electric Code for sizing current protection
2. Sizing fuse per circuit load
3. Sizing the circuit breaker for various system loads
D. Fuses and Breakers
1. Understanding the difference between fuses and breakers
2. Recognizing the difference between instantaneous noninstantaneous circuit breakers
3. Utilizing a time delay fuse
E. Blueprint Reading and Cost Estimating
1. Reading commercial, industrial, and residential blueprints
2. Project job costing and estimating
3. Performing takeoffs to calculate actual job costs
F. Transformer Installations
1. Installation, sizing, and connecting transformers
2. Using the National Electric Code for transformer applications
3. Connecting transformers using proper tools and gages
G. Harmonics
1. Harmonics and its effect on a circuit
2. Understanding byproducts of harmonics and potential damage it can cause
3. Correcting and preventing problems resulting from harmonics
H. Arc Flash Hazards
1. Understanding the hazards of arc flashes
2. Recognizing the dangers of arc flashes and the proper ways to prevent them

Lab Content

Students will work individually and in teams on proper wiring and grounding of electrical systems. Safe working practices for on-the-job training include, but are not limited to:
A. Equipment safety
B. Fire protection
C. Electrostatic Discharge (ESD)
D. Safe handling practices

Special Facilities and/or Equipment

A. Work benches
B. Ground panels
C. Bond panels
D. Transformers
E. Power tools
F. Hand tools
G. Computer
H. Overhead projector

Method(s) of Evaluation

Methods of Evaluation may include but are not limited to the following:

A. Results of quizzes and tests
B. Classroom and laboratory participation
C. Maintaining a daily student log of work activities
D. Results of hands-on laboratory tests

Method(s) of Instruction

Methods of Instruction may include but are not limited to the following:

A. Lecture
B. Lab Assignments
C. Group Discussion
D. Demonstration

Representative Text(s) and Other Materials

Applied Grounding and Bonding. National Joint Apprenticeship Training Committee. Marlboro, MD, 2014.
Grounding and Bonding Workbook. National Joint Apprenticeship Training Committee. Marlboro, MD, 2014.
Code and Practices 3 Workbook. National Joint Apprenticeship Training Committee. Marlboro, MD, 2017.
Electrical Safety-Related Work Practices. National Joint Apprenticeship Training Committee. Marlboro, MD, 2017.

Types and/or Examples of Required Reading, Writing, and Outside of Class Assignments

A. Reading assignment from the textbook.
1. Read chapters 1-18
B. Writing assignment from the NJATC Grounding and Bonding Workbook.
1. Complete writing assignments on pages 1-129

Discipline(s)

Electricity