APEL 129A: OSHA 30, HVAC CONTROLS, ESTIMATING, FOREMAN DEVELOPMENT

Foothill College Course Outline of Record

Heading	Value
Effective Term:	Summer 2025
Units:	6.5
Hours:	72 lecture, 24 laboratory per quarter (96 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

- A student will descrive how a job is estimated and identify leadership principals and skills needed to be a foreman.Ê
- A student will be able to understand practical safeguarding of persons and property from hazards arising from the use of electricity obtain the OSHA 30 certification.

Description

In this course, apprentices will learn HVAC systems and control basics. Students undergo the 30-hour OSHA 30 training segment and receive OSHA 30 certification. Apprentices trained in foreman development will learn and demonstrate basic job management skills. Apprentices will also learn and demonstrate industry-standard estimating practices.

Course Objectives

The student will be able to:

1. Understand workers' rights and employers' responsibilities under OSHA.
2. Identify and describe common occupational hazards in the electrical industry.
3. Protect themselves from work-related hazards.
4. Describe how to file a complaint with OSHA.
5. Demonstrate an understanding of HVAC fundamentals, such as temperature, humidity, filtration, circulation, ventilation, thermodynamics, and heat transfer.
6. Identify the fundamental components of an HVAC control system, such as building automation system inputs and outputs.
7. Distinguish between open-loop and closed-loop HVAC control systems.
8. Describe an HVAC control system's different temperature, humidity, and pressure sensors.
9. Demonstrate basic NEC calculations for air conditioning and refrigeration units.
10. Demonstrate proper wiring of HVAC control systems elements.
11. Demonstrate basic quantity take-off skills using construction prints.
12. Conduct a job estimate cost by calculating labor, material, and equipment costs.

Course Content

1. OSHA 30 certification
    a. Introduction to OSHA
    b. Managing health and safety
    c. Safety and health programs
    d. OSHA Focus 4 hazards - falls
        i. Stairways and ladders
    e. OSHA Focus 4 hazards - struck by
        i. Scaffolds
    f. OSHA Focus 4 hazards - caught in or between
        i. Confined space entry
    g. Personal protective and life saving equipment
    h. Health hazards in construction
    i. OSHA Focus 4 hazards - electrocution
    j. Fire protection and prevention
    k. Tools - hand and power
2. HVAC controls
    a. HVAC fundamentals
    b. Control principles
    c. Cooling
    d. Building automation systems
    e. Indoor air quality and air handlers
    f. Chillers, cooling towers and the refrigeration cycle
3. Estimating
    a. Estimating process and procedures
4. Foreman development
    a. Role of the foreman
    b. Project start-up
    c. Material management
    d. Labor relations
    e. Understanding the estimate
    f. Manloading and scheduling
    g. Managing production
    h. Safety
    i. Communication
    j. Documentation
    k. Change management
    l. Project closeout

Lab Content

Wiring HVAC control systems.

Special Facilities and/or Equipment

1. Audio-visual equipment (slide, video, and overhead projectors).
2. HVAC system control components.

3. When taught via Foothill Global Access, on-going access to computer with software and hardware capable of running video conferencing applications (e.g., Zoom).

Method(s) of Evaluation

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

Results of quizzes and tests
Classroom and laboratory participation
Maintenance of a diary of student's daily work activities
Group discussions

Method(s) of Instruction

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

Lecture
Discussion
Laboratory
Demonstration

Representative Text(s) and Other Materials

Auvil, Ronnie J.. HVAC Control Systems, 4th ed.. 2017.

Mancomm. OSHA Construction Industry Regulations: 29 CFR. 2020.

National Fire Protection Association. NFPA 70 National Electric Code. 2023.

These are the latest available texts for the content being taught. The latest editions will be used as soon as they are available.

Student binders, instructor handouts, system prints, and manufacturers' instructions sheets and manuals.

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

Read Chapter 1 in HVAC Control Systems and answer review questions.

Discipline(s)

Electricity