

# APSM 128: SMQ-28 HVAC ENERGY CONSERVATION & ENVIRONMENTAL TECHNOLOGY

## Foothill College Course Outline of Record

Heading	Value
Effective Term:	Summer 2021
Units:	2.5
Hours:	30 lecture, 10 laboratory per quarter (40 total per quarter)
Prerequisite:	Per California Code of Regulations, this course is limited to students admitted to the Sheet Metal Apprenticeship 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 be able to calculate or monitor resource material and energy usage.
- Describe green energy and resource conservation responsibilities in HVAC, service, industrial, and architectural sheet metal work.

## Description

This course is an introduction to energy and environmental technologies for the sheet metal and HVAC industry. It includes an introduction to California Title 24 requirements for HVAC systems, duct system testing, assessing utility bill and equipment nameplate data, the LEED point system, and basic heat transfer calculations. It also includes an overview of upcoming energy initiatives in California.

## Course Objectives

The student will be able to:

- Demonstrate an understanding of green construction and energy conservation as it applies to the HVAC industry in California
- Be aware of and research California Title 24 HVAC requirements
- Calculate or monitor resource material and energy usage
- Understand installation of efficient HVAC systems
- Be aware of critical system features likely to be monitored by others

## Course Content

- Demonstrate an understanding of green construction and energy conservation as it applies to the HVAC industry in California
  - Explain the importance of green technology for world energy production and current and future energy demands
  - Describe green responsibilities in HVAC, service, industrial, and architectural sheet metal work
  - Follow green practices on the job

- Be aware of and research California Title 24 HVAC requirements
  - Definition of Title 24 and California Energy Code
  - Introduction to HERS Residential and Commercial MECH form verifications
  - Update on changing requirements
- Calculate or monitor resource material and energy usage
  - Evaluate a utility bill and calculate energy costs
  - Read HVAC equipment nameplates and determine their energy effectiveness
  - Define material heat conductivity and resistance, and climate characteristics as used in heat and cooling load calculations
- Be familiar with the need for and purpose of a total building energy audit
  - Explain the LEED point system and demonstrate its use in the sheet metal industry
- Understand installation of efficient HVAC systems
  - Duct leakage, air flow, and other design concepts
  - Testing, adjusting, and balancing
- Be aware of critical HVAC system features likely to be monitored by others
  - Material conservation
  - Electrical/gas usage
  - Air delivery performance at various conditions
  - Refrigeration system efficiency
  - Installation per design

## Lab Content

The lab content addresses:

- Application of theory in calculating energy loads and other energy and resource requirements for HVAC construction and maintenance work
- Practice using energy and resource accounting systems
- Practice taking measurements on existing and simulated equipment and HVAC systems, using heat-load calculations
- Research new energy requirements in HVAC systems and develop an awareness of Title 24 regulations

## Special Facilities and/or Equipment

- Laboratory equipped with sheet metal tools and HVAC equipment
- Personal protective equipment

## Method(s) of Evaluation

- Results of written quizzes and tests, and comprehensive written final examination  
 Shop participation  
 Assignments that may include outside readings, reports and worksheets  
 Maintenance of a workbook of student's daily work activities

## Method(s) of Instruction

- Discussion  
 Laboratory instruction  
 Demonstration

## Representative Text(s) and Other Materials

International Training Institute. [Energy Audit Manual, Total HVAC Systems, International Training Institute for the Sheet Metal and Air Conditioning Industry \(student manual\)](#). 2010.

International Training Institute. Energy Audit Manual, Total Building, International Training Institute for the Sheet Metal and Air Conditioning Industry (student manual). 2010.

International Training Institute. Energy Audit Manual, Energy Audit Manual, International Training Institute for the Sheet Metal and Air Conditioning Industry (student manual). 2010.

International Training Institute. Green/LEED Construction for the Sheet Metal Industry, International Training Institute for the Sheet Metal and Air Conditioning Industry (student manual). 2010.

These are the standard Sheet Metal textbooks/workbooks used for this course. Although one or more may not be within 5 years of the required published date, they are the most current books used when teaching this course.

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

A. Reading assignment, from textbook:

1. Unit 6, Renewable Energy and LEED

B. Writing assignment, from textbook:

1. Complete the "knowledge check" review questions on page 194 regarding renewable energy and LEED

## **Discipline(s)**

Sheet Metal