CNST A198: ENERGY AUDIT

Item	Value
Curriculum Committee Approval Date	12/02/2020
Top Code	094610 - Energy Systems Technology
Units	3 Total Units
Hours	72 Total Hours (Lecture Hours 45; Lab Hours 27)
Total Outside of Class Hours	0
Course Credit Status	Credit: Degree Applicable (D)
Material Fee	No
Basic Skills	Not Basic Skills (N)
Repeatable	No
Open Entry/Open Exit	No
Grading Policy	Standard Letter (S), • Pass/No Pass (B)

Course Description

This course introduces the student to energy conservation methods for residential HVAC systems. It covers energy auditing procedures used to analyze the performance of residential buildings and the relationship to HVAC system design, including installation techniques, system performance, and potential energy efficiency gains. It will focus on developing the student's knowledge and skills to better understand the concept of whole building performance , and will demonstrate current technologies utilized to measure and verify system performance of HVAC equipment for the purpose of meeting local, state, and federal requirements for improved energy efficiency. The use of specialized tools, instruments and diagnostic procedures for system performance testing of space conditioning equipment is covered. Transfer Credit: CSU.

Course Level Student Learning Outcome(s)

1. Identify codes standards for Title 24 and similar CA energy codes to energy audits.
2. Collect Analyze Data relevant to energy use.
3. Operate energy auditing equipment to verify energy compliance utilizing tools and energy codes in line with HERS Certification process.
4. Inventory appliances and identify opportunities based on state standards for regular maintenance, improvement to existing systems, and opportunities to upgrade to new high efficiency systems.
5. Determine appropriate energy conservation, operation, and maintenance procedures based on audit findings and construction documents.
6. Summarize their findings and proposed solutions in a report, communicate opportunities for improvement to customers in a CalGreen template report.

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Lecture Content

Unit 1 - Introduction to Energy Auditing a. Discuss the basics of what an Energy Audit consists of b. Qualifications necessary to conduct an energy audit c. Review Standards for Building Energy Audits vocabulary of terms, abbreviations and acronyms. Unit 2 - The History of Audits a. Discuss about energy productivity and use in the US b. Impacts on the American economy and trends Unit 3 Codes and Standards font-size: medium; a. Discuss the governmental influence with energy efficiency requirements, mandates and Federal Policies that Impact Energy Efficiency b. Title 24 c. Green Building and Energy Codes Unit 4 - Differences between Residential Commercial Audits ize: medium; a. Discuss the fundamentals of Residential Energy Audits b. Discuss the fundamentals of Commercial Energy Audits Unit 5 - The Different Levels and Types of Energy Efficiency Audits a. Discuss the three classifications of levels of effort with energy analysis b. n bsp;Collect data and analyze to verify energy compliance c. Utilize tools and energy codes in line with HERS Certification process Unit 6 - Energy Efficiency Sustainable Upgrades Practices a. Acquire an understanding of common building upgrades and operational best practices that improve efficiency b. style="font-size: medium; Industry standards and best practices for reviewing building details in gathering specific building information c. Inventory appliances and identify opportunities to upgrade to new high efficiency systems Unit 7 - Walk-Through Analysis - Survey Exercise a. Gain knowledge in how a Walk-Through Analysis Survey is performed using standard models of actions as well as various methods in identifying building details and statistical data b. Determine appropriate energy conservation, operation, and maintenance procedures based on audit findings and construction documents Unit 8 Walk-Through Assessment Report Generation a. Conduct a Walk-Through Analysis Survey with utilizing building information acquired during the site-visit with assembling the information gathered and reviewed toward developing a report b. Summarize their findings and proposed solutions in a CalGreen template report to communicate opportunities for improvement edium;

Lab Content

Unit 1 - Introduction to Energy Auditing a. Analyze utility bills and rates b. Determine rate schedule and calculate actual unit cost per kWh c. Conduct a lighting inventory with attention to incandescent, compact, and linear florescent bulbs using tools like flicker checkers Unit 2 - The History of Audits (Continue labs started in Unit 1) a. Assess lighting levels using a light meter b. Identify opportunities to switch bulbs, delamp, or change behavior, such as keeping the bank of lights near the window off on a sunny day Unit 3 Codes and Standards (While reviewing code sections) a. Identify and measure plug loads when appliances are on and off (phantom loads) using a watt-meter b. Identify opportunities to improve computer energy efficiency settings and eliminate phantom

loads with smart power strips Unit 4 - Differences between Residential Commercial Audits a. Inventory appliances and suggest opportunities to upgrade to Energy Star models or reduce unnecessary appliances b. Identify opportunities for weatherization using a draft detector Unit 5 - The Different Levels and Types of Energy Efficiency Audits a. Collect data and analyze to verify energy compliance b. Utilize tools and energy codes in line with HERS Certification process Unit 6 - Energy Efficiency Sustainable Upgrades Practices a. Check thermostat readings using a thermometer, and check heating and cooling system settings where possible b. Identify and understand typical mechanical systems found in schools, including package units, split systems, and newer ductless systems c. Inventory appliances and identify opportunities to upgrade to new high efficiency systems Unit 7 - Walk-Through Analysis - Survey Exercise a. Identify the type, size, condition, and rate of energy consumption for each major energy consuming device in buildings b. Estimate labor and materials costs for energy retrofits Unit 8 Walk-Through Assessment Report Generation a. Identify opportunities for regular maintenance, improvement to existing systems, and opportunities to upgrade to new high efficiency systems b. Summarize their findings and proposed solutions in a CalGreen template report to communicate opportunities for improvement

Method(s) of Instruction

- Lecture (02)
- DE Live Online Lecture (02S)
- Lab (04)
- DE Live Online Lab (04S)

Instructional Techniques

Instructional methodologies will include, but not necessarily be restricted to, the following: 1. Detailed multimedia/ lectures of each topic covered. 2. Student feedback during each lecture. 3. Detailed illustrative discussion of lecture handout and textbook information. 4. Building plan reading

Reading Assignments

Students will be given a weekly reading assignment 2-3 hours based on the current weeks lesson.

Writing Assignments

The students will be assigned a research paper. They will need to research the energy requirements where they live and turn in a detailed writing assignment. This will be 3-4 hours per week.

Out-of-class Assignments

Students will complete a weekly homework worksheet 2-3 hours based on a reading assignment.

Demonstration of Critical Thinking

1. Tests and quizzes 2. lab projects 3. Weekly writing assignments

Required Writing, Problem Solving, Skills Demonstration

Students will perform the proper implementation of energy audit instruments. Students will write a detailed energy audit research paper

Eligible Disciplines

Air conditioning, refrigeration, heating (solar energy technician): Any bachelor's degree and two years of professional experience, or any associate degree and six years of professional experience. Construction technology: Any bachelor's degree and two years of professional experience, or any associate degree and six years of professional experience.

Textbooks Resources

1. Required California Energy Commission. 2016 Building Energy Efficiency Standards, 2016 ed. California Energy Commission, 2016