

BI 0800 - INTRODUCTION TO ENERGY SURVEYING

Catalog Description

Formerly known as CET 800

Prerequisite: Completion of BI 1 with grade of "C" or better, or equivalent as determined by the program chair

Hours: 40 (24 lecture, 16 laboratory)

Description: Competency-based course of instruction designed to align with the American Society of Heating Refrigeration and Air Conditioning Engineers (ASHRAE) Level-1 energy auditing standards. Provides hands-on experience in residential and commercial energy auditing. Emphasis on principles and sources of energy, detailed facilities evaluation techniques, data collection for energy auditing, establishing baselines, and conducting accurate inventories. Includes workplace safety policies and practices to comply with OSHA guidelines. Students required to secure personal protective equipment as of first class session. (pass/no pass grading) (noncredit)

Course Student Learning Outcomes

- CSLO #1: Explain the key areas of an American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE) Level-1 Energy Audit and the rationale for each.
- CSLO #2: Perform a detailed American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE) Level-1 energy audit to include accurate survey data collection and recording.
- CSLO #3: Identify required safety protocols during energy auditing activities, including adhering to all related OSHA safety standards.

Effective Term

Fall 2020

Course Type

Noncredit

Contact Hours

40

Outside of Class Hours

14

Total Student Learning Hours

54

Course Objectives

Lecture Objectives:

1. Identify and explain the components of an Energy Survey.
2. Understand Energy Surveying Measures.
3. Explain thermodynamics and basic principles of energy.
4. Identify and discuss the various forms of electrical energy.
5. Compare/contrast the various types of building construction.
6. Explain Fenestrations.
7. Display knowledge of roof and ladder safety.
8. Differentiate between the various types of HVAC systems.

9. Compare/contrast the various types of lighting systems.
10. Identify various plug loads.
11. Distinguish and identify domestic hot water systems.
12. Identify and differentiate specialty loads.
13. Define Energy Conservation Measures (ECM).
14. Plot the critical path of a typical energy survey.

Laboratory Objectives:

1. Accurately measure building footprint - perimeter, length, width, depth/height.
2. Accurately map the site with building locations identified.
3. Measure electrical energy values with appropriate meters.
4. Use watts law to accurately calculate various loads.
5. Calculate watt hours and convert to kilowatt hours.
6. Use the thermal imaging gun to evaluate heat loss.
7. Detect fenestration gaps and cracks in the envelope.
8. Size and safely stage a step ladder for a light survey.
9. Use the Clicker/Spinner to test for magnetic ballast.
10. Identify LED – fluorescent replacement lighting opportunities.
11. Locate information plates on various HVAC units.
12. Visually identify split systems.
13. Recognize package units.
14. Locate accessible HVAC filters for visual evaluation.
15. Visually identify various plug loads.
16. Locate online wattages of typical plug-loads.
17. Recognize a specialty load during a survey.
18. Accurately record specialty load data from pool pumps.
19. Recognize typical operation and maintenance issues.
20. Differentiate between O&M and general fenestration issues.

General Education Information

- Approved College Associate Degree GE Applicability
- CSU GE Applicability (Recommended-requires CSU approval)
- Cal-GETC Applicability (Recommended - Requires External Approval)
- IGETC Applicability (Recommended-requires CSU/UC approval)

Articulation Information

- Not Transferable

Methods of Evaluation

- Objective Examinations
 - Example: Students will accurately answer questions on evaluation procedure, steps, and protocols required for accurate energy data collection. Example: Describe the effect of faulty wiring installations on achieving LEED certifications. Points will be assigned to each question and converted to a letter grade.
- Skill Demonstrations
 - Example: Perform hands on demonstrations of competence in proper and safe use of various diagnostic tools/equipment and proper procedures and observing OSHA safety standards. Student performance will be evaluated using a safety rubric.

Repeatable

Yes

Methods of Instruction

- Laboratory
- Lecture/Discussion

Lab:

1. Lab techniques will be presented in a "describe / show / review" methodology. Students will complete a safety test before using equipment and diagnostic devices. Instructor will work with students until they can successfully complete the test with 100% success rate. (Lab Objective 3)

Lecture:

1. Instructor will lecture on the typical methods of energy use collections during a detailed energy survey. Including critical data collection necessary for a complete and accurate energy survey. The student will be given an opportunity to clarify any questions in an instructor-guided discussion. (Lecture Objective 2)

Typical Out of Class Assignments

Reading Assignments

1. Read the chapter that covers step-by-step survey approach. Be prepared to discuss the key areas of the energy survey routine.
2. Research online U.S. Department of Energy surveying archives and be prepared to discuss the survey in class.

Writing, Problem Solving or Performance

1. Prepare a report on the survey routine including pre-site inspection check-list, information collection, and final report.
2. Collect energy bench marking data for the assigned building and prepare detailed spreadsheets based on industry set standards.

Other (Term projects, research papers, portfolios, etc.)

1. Research and prepare a report on the benefits of ASHRAE Level -1 energy surveys.
2. Maintain a class notebook organized by topic that includes lecture notes, lab notes, class handouts, and supplementary materials.

Required Materials

- Energy Auditing Practices: A Guide to Benchmarking, Auditing, and Retrofitting Residential, Commercial, and Industrial Buildings
 - Author: Rich Benkowski, Paul Chapello, Charles Pelkey
 - Publisher: American Technical Publishers
 - Publication Date: 2012
 - Text Edition: 1st
 - Classic Textbook?: No
 - OER Link:
 - OER:

Other materials and-or supplies required of students that contribute to the cost of the course.

Student manuals provided by the instructor.