

# AC R050: ENERGY AUDITING

**Originator**  
aainsworth

**College**

Oxnard College

**Discipline (CB01A)**

AC - AirConditioning&Refrigeration

**Course Number (CB01B)**

R050

**Course Title (CB02)**

Energy Auditing

**Banner/Short Title**

Energy Auditing

**Credit Type**

Credit

**Start Term**

Fall 2021

**Formerly**

ENVT R050

**Catalog Course Description**

Energy auditing is part of the growing industry of green and sustainable technologies; an energy auditor helps to optimize the energy efficiency of a home or building while reducing the client's energy costs. An energy audit can also have a positive impact on the environment by reducing unnecessary energy consumption. This course is designed for the student who has a solid foundation in HVAC/R to learn how to perform detailed home and building inspections and make cost effective recommendations about improving energy efficiency. There is now an expectation in the industry that a technician's knowledge expand beyond just working on a system into understanding how the HVAC system fits into the whole house/building design. Many of the procedures and tests that are performed in an energy audit revolve around the heating and cooling systems and therefore a student interested in taking this course should have foundation level HVAC/R knowledge.

**Taxonomy of Programs (TOP) Code (CB03)**

0945.00 - \*Industrial Systems Technology and Maintenance

**Course Credit Status (CB04)**

D (Credit - Degree Applicable)

**Course Transfer Status (CB05) (select one only)**

C (Not transferable)

**Course Basic Skills Status (CB08)**

N - The Course is Not a Basic Skills Course

**SAM Priority Code (CB09)**

C - Clearly Occupational

**Course Cooperative Work Experience Education Status (CB10)**

N - Is Not Part of a Cooperative Work Experience Education Program

**Course Classification Status (CB11)**

Y - Credit Course

**Educational Assistance Class Instruction (Approved Special Class) (CB13)**

N - The Course is Not an Approved Special Class

**Course Prior to Transfer Level (CB21)**

Y - Not Applicable

**Course Noncredit Category (CB22)**

Y - Credit Course

**Funding Agency Category (CB23)**

Y - Not Applicable (Funding Not Used)

**Course Program Status (CB24)**

1 - Program Applicable

**General Education Status (CB25)**

Y - Not Applicable

**Support Course Status (CB26)**

N - Course is not a support course

**Field trips**

May be required

**Grading method**

Letter Graded

**Does this course require an instructional materials fee?**

No

**Repeatable for Credit**

No

**Is this course part of a family?**

No

**Units and Hours**

**Carnegie Unit Override**

No

**In-Class**

**Lecture**

**Minimum Contact/In-Class Lecture Hours**

52.5

**Maximum Contact/In-Class Lecture Hours**

52.5

**Activity**

**Laboratory**

**Total in-Class**

**Total in-Class**

**Total Minimum Contact/In-Class Hours**

52.5

**Total Maximum Contact/In-Class Hours**

52.5

**Outside-of-Class****Internship/Cooperative Work Experience**

Paid

Unpaid

**Total Outside-of-Class****Total Outside-of-Class****Minimum Outside-of-Class Hours**

105

**Maximum Outside-of-Class Hours**

105

**Total Student Learning****Total Student Learning****Total Minimum Student Learning Hours**

157.5

**Total Maximum Student Learning Hours**

157.5

**Minimum Units (CB07)**

3

**Maximum Units (CB06)**

3

**Student Learning Outcomes (CSLOs)****Upon satisfactory completion of the course, students will be able to:**

- |   |   |
|---|---|
| 1 | Describe the role of an energy auditor and the different types of audits that an energy auditor performs            |
| 2 | Demonstrate the correct use of energy auditing software to gather and analyze energy auditing data                  |
| 3 | Summarize indoor environmental quality hazards that an energy auditor must be cognizant of when performing an audit |
| 4 | Identify safety measures that are necessary for an energy auditor   |

**Course Objectives****Upon satisfactory completion of the course, students will be able to:**

- |    |   |
|----|---|
| 1  | Describe the role of an energy auditor and the different types of audits that an energy auditor performs.                   |
| 2  | List and provide a brief description of the different types of certifications associated with the field of energy auditing. |
| 3  | Explain the functions of the diagnostic equipment that is used by an energy auditor.  |
| 4  | Identify safety measures that are necessary for an energy auditor.  |
| 5  | Demonstrate the correct use of energy auditing software (EnergyPro) to gather and analyze energy auditing data.             |
| 6  | Describe effective customer relation attributes for an energy auditor.  |
| 7  | Identify the steps to perform a successful blower door and duct test.   |
| 8  | List all of the energy audit tests that can be performed using infrared imaging   |
| 9  | Summarize indoor environmental quality hazards that an energy auditor must be cognizant of when performing an audit.        |
| 10 | Describe the steps that are necessary to perform a domestic water audit.  |

## Course Content

### Lecture/Course Content

1. Energy Auditor Overview
  - a. The Energy Auditor
    - i. Role of an energy auditor
    - ii. Structural systems
    - iii. Mechanical systems
    - iv. Types of energy audits
  - b. Diagnostic Equipment
  - c. Certifications
    - i. Green Awareness Certification
    - ii. RESNET/HERS Certification
    - iii. BPI Certification
    - iv. EPA Section 608
    - v. R-410A Safety
2. Safety
  - a. Introduction to OSHA
  - b. Exit Routes, Egress, and Fire Protection
  - c. Personal Protective Equipment
  - d. Basic Hand and Power Tool Safety
  - e. Stairways and Ladder Safety
  - f. Electrical/Ground-fault Protection Safety
3. General Competencies
  - a. Math for Energy Auditor Technicians
  - b. Computer Literacy
4. Energy Auditor Software Training
  - a. National Energy Audit Tool (NEAT)
  - b. EnergyPro Energy Analysis Software
  - c. Mechanical Data Collection
  - d. Baseload Measures
5. Customer Relations
  - a. Recruiting Customers
  - b. Educating Customers
  - c. Soft Skills
    - i. Professional appearance
    - ii. Basic writing for the technician
    - iii. Communication and follow-up
6. Building Pressure Analysis
  - a. Blower Door
  - b. Duct Tester
7. Infrared Imaging
  - a. Insulation Anomalies
  - b. Thermal Bridging
  - c. Air Leakage
  - d. By-pass Leaks
  - e. Wind Washing
8. Indoor Environmental Quality
  - a. Health and Safety
  - b. Carbon Monoxide
  - c. Mold, Lead, and Asbestos
9. Domestic Water
  - a. Water Auditing

### Laboratory or Activity Content

None

## Methods of Evaluation

Which of these methods will students use to demonstrate proficiency in the subject matter of this course? (Check all that apply):

Problem solving exercises  
Written expression

Methods of Evaluation may include, but are not limited to, the following typical classroom assessment techniques/required assignments (check as many as are deemed appropriate):

Objective exams  
Other (specify)  
Projects  
Problem-Solving Assignments  
Quizzes

### Other

Textbook Assignments  
Discussion Participation

## Instructional Methodology

Specify the methods of instruction that may be employed in this course

Class discussions  
Distance Education  
Demonstrations  
Lecture

Describe specific examples of the methods the instructor will use:

- Classroom lecture and energy auditing equipment demonstrations: The instructor will lecture on all energy auditing course topics listed in the course content section and will incorporate energy auditing equipment into the lecture to provide students with demonstrations.
- Frequent quizzes and practice problems will be utilized to assess student comprehension of course content which will also stimulate student/instructor discussion.
- Class discussion related to various types of residential and building energy audits, the instructor will provide real-world examples of energy audits and engage students in a dialogue of the pros and cons of each audit.

## Representative Course Assignments

### Writing Assignments

Students may be required to complete written homework assignments that consist of end-of-chapter questions relating to various aspects of the energy auditing process.

Students may be given energy auditing scenarios and be asked to complete a written summary of recommendations to make the home or building energy efficient.

### Critical Thinking Assignments

Students will be assigned problems describing specific building designs/ conditions with the expectation of using logic and reasoning to build an energy audit plan that, if implemented, would identify ways to improve the buildings energy efficiency. This would include identifying resources needed to both perform the audit and make modifications to the structure and/ or occupants practices.

### Reading Assignments

Students are asked to read the assigned curriculum prior to each class in order to be prepared for the energy auditing course topic that the instructor will cover for a particular class.

Students will be asked to visit websites that host information on energy efficiency and read specific energy auditing information. Examples of sites are [www.escoinst.com](http://www.escoinst.com) (<http://www.escoinst.com>), [www.everblue.edu/RESNET](http://www.everblue.edu/RESNET) (<http://www.everblue.edu/RESNET>), or [www.bpi.org](http://www.bpi.org) (<http://www.bpi.org>)

### Other assignments (if applicable)

Students may be asked to research energy auditing equipment and perform comparative pricing online to familiarize themselves with equipment that may be necessary for an energy auditor but is not currently available in the program.

## Outside Assignments

### Representative Outside Assignments

**Reading:** Students are asked to read the assigned curriculum prior to each class in order to be prepared for the energy auditing course topic that the instructor will cover for a particular class.

Students will be asked to visit websites that host information on energy efficiency and read specific energy auditing information. Examples of sites are [www.escoinst.com](http://www.escoinst.com), [www.everblue.edu/RESNET](http://www.everblue.edu/RESNET), or [www.bpi.org](http://www.bpi.org)

**Writing:** Students may be required to complete written homework assignments that consist of end-of-chapter questions relating to various aspects of the energy auditing process.

Students may be given energy auditing scenarios and be asked to complete a written summary of recommendations to make the home or building energy efficient.

**Other:** Students may be asked to research energy auditing equipment and perform comparative pricing online to familiarize themselves with equipment that may be necessary for an energy auditor but is not currently available in the program.

## District General Education

### A. Natural Sciences

### B. Social and Behavioral Sciences

### C. Humanities

### D. Language and Rationality

### E. Health and Physical Education/Kinesiology

### F. Ethnic Studies/Gender Studies

## CSU GE-Breadth

### Area A: English Language Communication and Critical Thinking

### Area B: Scientific Inquiry and Quantitative Reasoning

### Area C: Arts and Humanities

### Area D: Social Sciences

### Area E: Lifelong Learning and Self-Development

## CSU Graduation Requirement in U.S. History, Constitution and American Ideals:

## IGETC

### Area 1: English Communication

### Area 2A: Mathematical Concepts & Quantitative Reasoning

### Area 3: Arts and Humanities

### Area 4: Social and Behavioral Sciences

### Area 5: Physical and Biological Sciences

### Area 6: Languages Other than English (LOTE)

## Textbooks and Lab Manuals

Resource Type

Textbook

**Classic Textbook**

Yes

**Description**

Fluke Corporation (2011). *Energy Auditing for Industrial Facilities*. American Technical Publishers.

**Resource Type**

Textbook

**Classic Textbook**

Yes

**Description**

Petit, R.F., Collins, T.L., Delatte, E., & Rasmussen, E. (2014). *System Performance: Maximizing Energy Efficiency* (1st). Mount Prospect ESCO Press. 1930044313

**Resource Type**

Other Resource Type

**Description**

Energy auditing related websites such as [www.escoinst.com](http://www.escoinst.com), [www.everblue.edu/RESNET](http://www.everblue.edu/RESNET), and [www.bpi.org](http://www.bpi.org).

**Resource Type**

Other Resource Type

**Description**

Energy auditing equipment manuals.

**Distance Education Addendum****Definitions****Distance Education Modalities**

Hybrid (51%–99% online)  
Hybrid (1%–50% online)  
100% online

**Faculty Certifications**

**Faculty assigned to teach Hybrid or Fully Online sections of this course will receive training in how to satisfy the Federal and state regulations governing regular effective/substantive contact for distance education. The training will include common elements in the district-supported learning management system (LMS), online teaching methods, regular effective/substantive contact, and best practices.**

Yes

**Faculty assigned to teach Hybrid or Fully Online sections of this course will meet with the EAC Alternate Media Specialist to ensure that the course content meets the required Federal and state accessibility standards for access by students with disabilities. Common areas for discussion include accessibility of PDF files, images, captioning of videos, Power Point presentations, math and scientific notation, and ensuring the use of style mark-up in Word documents.**

Yes

## Regular Effective/Substantive Contact

### Hybrid (1%–50% online) Modality:

Method of Instruction	Document typical activities or assignments for each method of instruction
Asynchronous Dialog (e.g., discussion board)	Frequent discussions will be used. Instructor will present a topic such as "Describe how reducing our use of fossil fuels benefits the United States/ World" with expectations that each student will post a reply. In addition, each student will be expected to post a response to at least two of their classmates posts on the topic.
E-mail	Email will be used to communicate with students and to share study materials/ tools.
Face to Face (by student request; cannot be required)	Face to face interactions will be offered to students needing help and for major exams.
Other DE (e.g., recorded lectures)	Frequent use of recorded lectures pertaining to various aspects of energy auditing.

### Hybrid (51%–99% online) Modality:

Method of Instruction	Document typical activities or assignments for each method of instruction
Asynchronous Dialog (e.g., discussion board)	Regular use of asynchronous discussion boards encourages various types of interaction and critical thinking skills among all course participants. Questions and topics posed will allow students to discuss, compare and contrast, identify, and analyze elements of the course outcomes. Students will be required to respond to one another with substantive comments with the intent of creating a dialog. Other discussion boards may be used for Q&A and general class discussion by students and instructor to facilitate student success and strengthen student learning outcomes.
E-mail	E-mail, class announcements and various learning management system tools such as "Message Students Who" and "Assignment Comments", will be used to regularly communicate with all students on matters such as clarification of class content, reminders of upcoming assignments and/or course responsibilities, to provide prompt feedback to students on coursework to facilitate student learning outcomes, or to increase the role of an individual educator in the academic lives of a student. Students will be given multiple ways to email instructor through both the learning management system inbox and faculty provided email accounts.
Face to Face (by student request; cannot be required)	The instructor will hold weekly, scheduled office hours either in person or via-web conferencing, for students to be able to meet and discuss course materials or individual progress. Students can request additional in-person or web conferencing meetings with faculty member as needed. Faculty may encourage online students to form "study groups" in person or online.
Other DE (e.g., recorded lectures)	Faculty will use a variety of ADA compliant tools and media integrated within the learning management system to help students reach SLO competency. Tools may include: <ul style="list-style-type: none"> <li>• Recorded Lectures, Narrated Slides, Screencasts</li> <li>• Instructor created content</li> <li>• OC Online Library Resources</li> <li>• Canvas Peer Review Tool</li> <li>• Canvas Student Groups (Assignments, Discussions)</li> <li>• 3rd Party (Publisher) Tools (MyOpenMath)</li> <li>• Websites and Blogs</li> <li>• Multimedia (YouTube, Films on Demand, 3CMedia, Khan Academy, etc.)</li> </ul>
Synchronous Dialog (e.g., online chat)	Instructor will provide a set time each week where they will be available for synchronous chat and be available in the discussion board and can answer questions in live time.



Video Conferencing	Video Conferencing Video tools such as ConferZoom can be used to provide live synchronous or asynchronous sessions with students. ADA compliance will be upheld with Closed Captioning during the session or of the recorded session. Recordings of all live sessions will be made available within the LMS. Video Conferences will be used to facilitate SLOs and student-to-student group meetings will also be encouraged.
Telephone	Students can request for instructor to call or vice versa in order to answer one-on-one questions about course material or student progress.

**100% online Modality:****Method of Instruction****Document typical activities or assignments for each method of instruction**

Asynchronous Dialog (e.g., discussion board)	Frequent discussions will be used. Instructor will present a topic such as "Describe how reducing our use of fossil fuels benefits the United States/ World" with expectations that each student will post a reply. In addition, each student will be expected to post a response to at least two of their classmates posts on the topic.
E-mail	Email will be used to communicate with students and to share study materials/ tools.
Other DE (e.g., recorded lectures)	Frequent use of recorded lectures pertaining to various aspects of energy auditing.

**Examinations****Hybrid (1%–50% online) Modality**

Online  
On campus

**Hybrid (51%–99% online) Modality**

Online  
On campus

**Primary Minimum Qualification**

AIR COND/REFRIG/HEATING

**Review and Approval Dates****Department Chair**

09/16/2020

**Dean**

09/17/2020

**Technical Review**

10/14/2020

**Curriculum Committee**

10/14/2020

**Curriculum Committee**

12/09/2020

**CCCCO**

MM/DD/YYYY

**Control Number**

CCC000533805

**DOE/accreditation approval date**

MM/DD/YYYY

