

Prepared by the Department of Natural Sciences & Life Fitness
Date of Departmental Approval: 2/5/07
Date approved by Curriculum and Programs: October 17, 2007

Effective: Fall 2007

1. Course Number: ENV172
Course Title: Commercial Energy Audits

2. Description: This course offers an interactive approach for students to understand, compile, and conduct an energy audit for commercial facilities. It has been customized for the Cape Cod region and will emphasize regional issues.

3. Student Learning Outcomes (instructional objectives; intellectual skills):

Upon successful completion of this course, students are able to do the following:

- Identify the components of a commercial energy audit.
- List the elements of an energy audit.
- Identify the first steps in the audit process.
- List and identify the components of a lighting/controls audit.
- Identify energy conservation opportunities for HVAC.
- Identify energy conservation opportunities for the building shell.
- Identify energy conservation opportunities for motors, pumps, compressed air, coolers, freezers, cooking equipment, dish washing apparatus, vending machines, etc.
- Identify, understand, and analyze indoor air quality (IAQ) issues in commercial facilities
- Prepare and use various utility energy programs.
- Compare and rate other energy programs.
- Use and describe the function of the various tools of the trade.
- Conduct a commercial energy audit.
- Develop the actual report with supporting documentation.
- Deliver the report in a clear, concise manner.
- Identify additional resources available to the auditor.

4. Credits: 3 credits

5. Satisfies General Education Requirement: No

6. Prerequisite: ENV171 Energy Efficiency and Conservation

7. Semester(s) Offered: Spring

8. Suggested General Guidelines for Evaluation: Tests and quizzes are used to evaluate the students.

9. General Topical Outline (Optional):

I. Introduction and Energy Audit Definitions

- A. Introduction and Welcome:
- B. Anatomy of a Commercial Energy Audit: What are we trying to accomplish?
- C. Additional discussion: The whole building approach / unplanned for results.

II. Identify the First Steps in the Audit Process.

- A. Arrival on site
- B. Additional discussion: Pass out example of Commercial Energy Audit and dissect.

III. Lighting and Controls

- A. The lighting audit
- B. Lighting Controls
- C. Additional discussion: The physiology of a lighting audit. Enlisting occupants to "help" with the process.

IV. Heating, Ventilating, and Air Conditioning

- A. Heating
- B. Cooling
- C. Ventilation
- D. Hot water
- E. Check with occupants...ok?
- F. Note condition of systems
- G. Energy codes
- H. Calculations
- I. Recommend upgrade

V. Building Shell

- A. Shell measures
- B. Additional discussion: Peaked vs. flat roofs.

VI. Motors and Pumps and Coolers

- A. Motors. Discuss Motor-Up software but demo will come at a later date.
- B. Pumps.
- C. Compressed air.
- D. Coolers.
- E. Freezers.
- F. Cooking equipment.
- G. Dishwashing equipment.
- H. Vending Machines.

VII. Indoor Air Quality...the show stopper

- A. General discussion...IAQ issues today vs. past. What to look for in a commercial building.
- B. Integrated pest management – bad and good.
- C. Practical steps and solutions – drains, stones, smoke
- D. Mold and mildew...identify
- E. IAQ triangle...source, driving force, and pathway.
- F. Moisture control and barriers.

VIII. Utility / Energy Service Providers Presentations

- A. Guest speaker...on energy efficiency.

IX. Certifications and Awards

- A. Guest speaker...Building Operator Certification.
- B. Guest speaker...LEED certification.
- C. Guest speaker...Certified Energy Manager.

X. Tools of the Trade

- A. Light meter – when to use, where, how to use. Demo tool.
- B. Camera, Digital
- C. Tape recorder.
- D. Magnetic Ballast detector – pass out spinning top.
- E. MotorUp software.
- F. Comcheck performance lighting software. CO2 monitors.
- G. Smoke...a last resort for IAQ issues.
- H. Tape measure
- I. Flashlight
- J. All in one tool
- K. Energy Star Building portfolio manager and benchmarking.

XI. Field Trip

XII. Audit Presentations