COURSE OUTLINE OF RECORD

Number: ENVS G133         TITLE: Energy Audit I

ORIGINATOR: Marius Cucurny       EFF TERM: Fall 2010
FORMERLY KNOWN AS:
CROSS LISTED COURSE:

SEMESTER UNITS: 4.0
HRS LEC: 72.0        HRS LAB: 0.0        HRS OTHER: 0.0
CONTACT HRS TOTAL: 72.0
STUDY NON-CONTACT HRS RECOMMENDED: 144.0

CATALOG DESCRIPTION:
This course introduces the student to the concepts of energy efficiency, energy conservation and energy auditing and assessment. Students will learn to inspect, test, and measure energy usage in buildings. In addition, students will learn to recommend energy efficient steps to reduce building energy usage through practical and cost-effective installation of insulation and retrofitting of energy efficient doors, windows, and appliances.

JUSTIFICATION FOR COURSE:

PREREQUISITES:
COREQUISITES:
ADVISORIES:

ASSIGNED DISCIPLINES:
Ecology
Environmental technologies (environmental hazardous material technology, hazardous material abatement, environmentally conscious manufacturing, waste water pretreatment, air pollution control technology, integrated waste management, water treatment, sewage treatment)

MATERIAL FEE: Yes [ ] No [X] Amount: $0.00
CREDIT STATUS: Noncredit [ ] Credit - Degree Applicable [X] Credit - Not Degree Applicable [ ]
GRADING POLICY: Pass/No Pass [X] Standard Letter [X] Not Graded [ ] Satisfactory Progress [ ]
OPEN ENTRY/OPEN EXIT: Yes [ ] No [X]
TRANSFER STATUS: CSU Transferable[X] UC/CSU Transferable[ ] Not Transferable[ ]
BASIC SKILLS STATUS: Yes [ ] No [X] LEVELS BELOW TRANSFER: Not Applicable
CALIFORNIA CLASSIFICATION CODES: Y - Not Applicable
NON CREDIT COURSE CATEGORY: Y - Not applicable, Credit Course

REPEATABLE ACCORDING TO STATE GUIDELINES: No [X] Yes [ ] NUMBER REPEATS:
REQUIRED FOR DEGREE OR CERTIFICATE: No [ ] Yes [X]
Energy Auditor(Certificate of Achievement)
Energy Efficiency and Renewable Energy Degree(Associate in Arts)

GE AND TRANSFER REQUIREMENTS MET:

COURSE LEVEL STUDENT LEARNING OUTCOME(S) Supported by this course:
1. Identify the type, size, condition, and rate of energy consumption for each major energy consuming device in buildings.

2. Recommend appropriate energy conservation, operation, and maintenance procedures.

3. Estimate labor and materials costs for energy retrofits.

4. Project savings expected from energy retrofits.

COURSE OBJECTIVES:
1. Identify the type, size, condition, and rate of energy consumption for each major energy consuming device in buildings.
2. Recommend appropriate energy conservation, operation, and maintenance procedures.
3. Estimate labor and materials costs for energy retrofits.
4. Project savings expected from energy retrofits.

COURSE CONTENT:

LECTURE CONTENT:

A. Introduction
   1. Energy-past and present
      a. Energy history
      b. Energy sources compared and contrasted
      c. Relating energy to home usage
   2. Wise energy use
      a. Conservation of energy at home
      b. Economic effectiveness of retrofits
      c. Prioritization of energy efficiencies
      d. Energy audits purpose
      e. Quality of installation
      f. Energy professional’s goals and objectives
   3. Energy and the consumer
      a. Consumer energy education
      b. Use of utility bills for determination of energy usage.
   4. Energy-efficiency ratings of buildings
      a. Methods of monitoring energy
      b. Energy calculations
      c. Energy rating systems, CE, UL, EnergyStar and Energuide
      d. Determination of the cost benefits of retrofits

B. Principles of energy
   1. Nature of energy
      a. Definition of energy
         1. Laws of thermodynamics
         2. Temperature and heat
         3. Latent heat versus sensible heat
         4. Heat and work
         5. Energy versus power
         6. Energy versus force
         7. Pressure and flow relationships
   2. Energy transformation and heat flow
      a. Energy transformation; mechanical to electrical, and etc.
      b. Energy transport
      c. Heat flow
   3. Energy, comfort, climate
      a. Temperature
b. Humidity
4. Conversion of energy for home use
   a. Combustion heating
   b. Electrical resistance heating
   c. Refrigeration cycle
   d. Lighting
5. Electric circuits, components and devices
   a. Electrical laws and principles
   b. Series, parallel and combination circuits
   c. Power and load calculations
6. Control circuits
   a. Transformers and power supplies
   b. Solenoids
   c. Temperature sensing
   d. Potentiometers
   e. Current, voltage and power control devices
7. Home electrical wiring
   a. Service instruments and equipment
   b. Sizing wire to current and voltage
   c. Insulation and environmental conditions
   d. Grounding and isolation
C. Energy and building shell
1. Building construction
   a. Structural design and energy issues
   b. Single family considerations
   c. Mobile and modular home considerations
   d. Multifamily building considerations
2. Building-shell heat flow
   a. Heat transmission
   b. Air leakage
   c. Fenestration
3. Building inspection and diagnosis
   a. Thermal boundary
   b. Visual inspection
   c. Diagnostic procedures for buildings
   d. Calculation of building heat flows
   e. Calculation of heat load
   f. Calculations with computer programs
D. Air infiltration
1. Air-sealing principles
   a. Air pressure and flow
   b. Pressures driving air leakages
2. Blower-door testing
   a. Preparation and set-up
   b. Blower door measurements
   c. Minimum ventilation requirement (MVR)
   d. House pressure limits
   e. Economic limits
3. Air leakage to building interiors
   a. Air leakage diagnostic methods
   b. Tracer gas testing
   c. Infrared scanners
4. Duct-air leakage
   a. Duct testing strategies
5. Air-sealing methods and materials
a. Air sealing materials and application
E. Insula

METHODS OF INSTRUCTION:
A. Lecture:
B. Independent Study:

INSTRUCTIONAL TECHNIQUES:

COURSE ASSIGNMENTS:
Reading Assignments
Text Websites Trade magazines and handouts

Out-of-class Assignments

Writing Assignments
Writing a complete energy audit report.

METHODS OF STUDENT EVALUATION:
Midterm Exam
Final Exam
Short Quizzes
Written Assignments
Essay Examinations
Objective Examinations
Report
Projects (ind/group)
Problem Solving Exercises
Oral Presentations
Skills Demonstration

Demonstration of Critical Thinking:
Recognize all of a buildings important energy savings opportunities and choose the most promising. Translate energy savings into dollars and compare projected savings with each energy saving conservation measures cost. Educate building residents about how they can use energy more efficiently and save money.

Required Writing, Problem Solving, Skills Demonstration:
Writing a complete energy audit report.

TEXTS, READINGS, AND RESOURCES:

TextBooks:

LIBRARY:
Adequate library resources include: Non-Print Materials

Comments:

Attachments:
Attached Files