COURSE SYLLABUS

Tunxis Community College

Education That Works For a Lifetime

Course Title:	Commercial Energy Use Analysis & Simulations	**Date submitted:**	4/26/18 (AAC: 18-20)
Department:	Business & Technology		
Curriculum:	Energy Management Program		

Course Descriptors: Make certain that the course descriptors are consistent with college and Board of Trustees policies, and the current course numbering system.

Course Code: (eg. ACC 101)	NRG*241
Course Type:	X/D

A: Clinical B: Lab D: Distance Learning
I: Individual/Independent L: Lecture N: Internship
M: Seminar P: Practicum U: Studio
X: Combined Lecture/Lab Y: Combined Lecture/Clinical/Lab Z: Combined Lecture/Studio

Elective Type:	G

AH: Art History E: English FA: Fine Arts FL: Foreign Language G: General HI: History HU: Humanities LAS: Liberal Arts & Sciences M: Math S: Science SS: Social Science

Credit Hours:	3
Developmental: (yes/no)	No
Contact Hours: Lecture:	2
Clinical:	0
Lab:	2
Studio	0
Other:	0
TOTAL:	4
Class Maximum:	24
Semesters Offered:	Sp

Prerequisites:

C- or better in Blueprint Reading (CTC*), Intermediate Algebra (MAT*137)or Intermediate Algebra for Liberal Arts (MAT*137L) or Elementary & Intermediate Algebra Combined (MAT*139), Commercial HVAC Systems & Analysis (NRG*122), and Energy Efficiency Methods (NRG*123) or permission of Program Coordinator

Corequisites:

None

Other Requirements:

None

Ability Based Education (ABE) Statement

At Tunxis Community College students are assessed on the knowledge and skills they have learned. The faculty identified the General Education Abilities critical to students' success in their professional and personal lives. In every class, students are assessed on course abilities, sometimes program abilities, and, in most classes, at least one General Education Ability. Students will receive an evaluation of the degree to which they have demonstrated or not demonstrated that General Education Ability.

Catalog Course Description:

Provides students with exposure to the entire energy analysis process with a "hands-on" implementation of an actual building energy study and an energy modeling exercise using EQuest software.

Topical Outline: List course content in outline format.

Week 1 &2 - Introduction to course, energy use in commercial buildings, calculate EUI

Week 2 &3 - Introduction to conducting commercial building energy audits

Week 3 & 4 - Review data logging applications, review drawings of buildings and prepare for initial walk-through of building

Week 5 & 6 - Review data logging applications, review drawings of buildings and prepare for initial walk-through of building

Week 6 & 7 - Discuss possible ECMs, Scoping Report

Week 8 & 9 - Bin Data Analysis

Week 9 & 10 - Analyze results, develop ECMs and calculations for ECMs Technical report development basics

Week 11& 12 - Continue work on Final Project –ECM calculations

Week 12 & 13 - Continue work on Final Project

Week 13 & 14 - Continue work on Final Project

Finals Week - Team Presentations and Final Project Reports due

Outcomes:
Describe measurable skills or knowledge that students should be able to demonstrate as evidence that they have mastered the course content.

Upon successful completion of this course, the student will be able to:

- distinguish between different activities involved in a comprehensive energy analysis effort, i.e., plan review, walk- through, identification of Energy Conservation Measures (ECMs), cost estimating, energy savings calculations and report writing
- demonstrate an understanding of the preparation requirements for doing a commercial building energy analysis
- use appropriate energy audit forms and develop good record keeping habits.
- demonstrate an understanding of, recognize, and describe major energy using systems found in typical commercial buildings
- use common auditing and field measurement instruments during actual audit including light meter, ammeter, and digital data logging instruments
- show familiarity with a broad range of energy conservation measure technologies
- prepare cost estimates for at least one energy conservation measure
- show familiarity with good cost estimating techniques for energy conservation measures
- calculate savings for at least one energy conservation measure
- distinguish between the commonly used methods for computing energy savings for energy conservation measure including manual methods (hours of operation and connected load), variable degree-day calculations, bin methods and hourly simulations

PROGRAM: *(Numbering reflects Program Outcomes as they appear in the college catalog)*

1. evaluate energy use patterns of residential and commercial buildings
2. recommend energy efficiency and renewable energy solutions for high energy consuming buildings
3. demonstrate an understanding of the interaction between energy consuming building systems and based on that understanding make energy consumption recommendations
4. produce energy evaluation technical reports and make presentations leading to project implementation
5. develop and evaluate inferences and predictions that are based on collected data
6. read and analyze building blue prints including floor, mechanical, and electrical plans
7. use problem-solving techniques & mathematics to transform concepts into energy related projects

	GENERAL EDUCATION: *(Numbering reflects General Education Outcomes as they appear in the college catalog)* **7. Quantitative Reasoning -**Students will learn to recognize, understand, and use the quantitative elements they encounter in various aspects of their lives. Students will develop a habit of mind that uses quantitative skills to solve problems and make informed decisions. **Demonstrates**: Interprets numerical information and applies sufficient laws of logic and mathematics to solve problems using numbers, symbols, graphs and/or descriptions. **Does Not Demonstrate:** Misinterprets numerical information or insufficiently applies laws of logic and mathematics to solve problems using numbers, symbols, graphs and/or descriptions.
Evaluation: List how the above outcomes will be assessed.	The modeling project will utilize the college campus facilities as the subject buildings. Students will develop a calibrated energy simulation of the building, and then simulate the effect of at least one energy efficiency improvement. In lieu of a final exam, each student will present the results of their simulation(s) in the final week of class. Presentations will involve both written report and oral presentation. Class Assignments Scoping Report Class Project Final Presentation
Instructional Resources: List library (e.g. books, journals, on-line resources), technological (e.g. Smartboard, software), and other resources (e.g. equipment, supplies, facilities) required and desired to teach this course.	Computer classroom, and collaboration with Director of Facilities
Textbook(s)	• Procedures for Commercial Building Energy Audits, 2nd Edition (ASHRAE) • Building Energy Simulation Guidelines Packet • EQUEST Software (provided on CD by instructor) • DOE2.2. Documentation (provided on CD by instructor) • Energy Analysis Resources (provided on CD by instructor) • Integrating Energy Engineering & Performance Modeling into the Design Process • Various hand-outs (by instructor) • Architect Scale and 3-Ring Binder