COURSE SYLLABUS

Tunxis Community College
Education That Works For a Lifetime

Course Title:	Commercial HVAC Systems & Analysis	**Date submitted:**	May 2020 (AAC: 20-16)
Department:	STEAM		
Curriculum:	Tech Studies: Energy Management Option		

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 122
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 G: General HI: History HU: Humanities LA: Liberal Arts FL: Foreign Language 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/F

Prerequisites:

C- or higher in PHY 121 – General Physics I AND NRG 123 – Energy Efficiency Methods

Corequisites:

None

Other Requirements:

None

Catalog Course Description:

Familiarity with and the analysis of building HVAC systems is a basic necessity for commercial energy auditors. Students will gain an understanding of the operation, control, and application of various types of commercial HVAC Systems by touring mechanical rooms around campus to identify different parts of the commercial HVAC system (boilers, chillers, air handlers). Hands-on lab enables students to analyze the operation, efficiency, and programming of these systems. Data logging may be included for calculations and analysis.

Topical Outline: List course content in outline format.

1. Heating and cooling load calculations for quantification of HVAC loads
2. Psychrometrics of air conditioning processes and air conditioning systems
3. Furnaces, boilers and other heating equipment operations and control theory.
4. Review Air conditioning systems and equipment: from PTAC to Advanced VAV
5. Refrigeration Systems:
    a. Vapor-compression refrigeration cycle, absorption refrigeration, heat pumps
6. Fluid flow in ductwork and piping systems, and quantification with field instruments.

	7. Fans and air distribution devices. Pumps and hydronic systems. Affinity Laws. 8. Central Plant Equipment: Boilers, Chillers, Cooling Towers controls and operations 9. HVAC Control Overview for simple and built up systems 10. HVAC Energy Reduction/Conservation Concepts and Strategies
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 do the following: 1. Demonstrate their understanding of various system components and controls for commercial building heating, cooling, ventilation, refrigeration, and humidity control. 2. Use appropriate energy calculations to determine heating and cooling usage; determine system energy efficiency; calculated psychometrics, log and analyze data from actual system operations. 3. Develop an understanding of how systems are designed and controlled versus the way they actually operate. 4. Be familiar with mechanical rooms and gathering critical information from equipment as well as interacting/working with facilities personal. 5. Learn to read and understand a fan/pump curves and their relationship to energy along with understanding application of affinity laws.
	TECH STUDIES PROGRAM, ENERGY OPTION: *(Numbering reflects Program Outcomes as they appear in the college catalog)* 2. utilize the tools, materials, techniques, and technical processes of engineering and technology when solving technical problems 6. identify energy conversion processes and their relation to engineering and technology **ENERGY CERTIFICATE:** 1. demonstrate a basic understanding of energy, it's measurement and varied approaches to conserving/saving 2. demonstrate a basic understanding of commercial building systems and be able to explain their operation, interactions, and their energy use. 3. demonstrate an increased proficiency with spreadsheets, charts, and graphs in Excel 4. practice technical writing and oral skills and will create technical documents
	GENERAL EDUCATION: *(Numbering reflects General Education Outcomes as they appear in the college catalog)* None
Evaluation: List how the above outcomes will be assessed.	Assessment will be based on the following criteria: Assignments/Spreadsheets Quizzes Exams Project Class Participation Lab

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.	"Fundamentals of HVACR," Third Edition, 2017, Carter Stanfield and David Skaves, Hardcopy packaged with MyLab HVAC ISBN-13: 978-0-13-489507-9, Digital eBook packaged with MyLab HVAC ISBN-13: 978-0-13-401792-1, eBook subscription with MyLab HVAC access ISBN ISBN-13: 978-0-13-443597-8 **Desired:** Collaboration with Director of Facilities
Textbook(s)	Recommended text, latest version of: Air Conditioning Principles and Systems – An Energy Approach, Pita.