

**STATE UNIVERSITY OF NEW YORK
COLLEGE OF TECHNOLOGY
CANTON, NEW YORK**



COURSE OUTLINE

ACHP 412 – ENERGY ANALYSIS & AUDIT

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**CANINO SCHOOL OF ENGINEERING TECHNOLOGY
MECHANICAL AND ENERGY TECHNOLOGY
June 2015**

- A. TITLE: Energy Analysis & Audit
- B. COURSE NUMBER: ACHP 412
- C. CREDIT HOURS: 3
- D. WRITING INTENSIVE COURSE: NA
- E. WEEKS PER SEMESTER: 15
- F. SEMESTER(S) OFFERED: Fall/Spring
- G. HOURS OF LECTURE, LABORATORY, RECITATION, TUTORIAL, ACTIVITY:
3 – 1 hour lectures per week
- H. CATALOG DESCRIPTION:

This course provides skills to perform an energy analysis of future commercial buildings and the audit of existing building through the study of energy standards and codes use in the United States. HVAC and architectural drawings are reviewed through case studies and actual buildings are audited providing students with the necessary skills to reduce energy cost in to the future of building development.

- I. PRE-REQUISITES/CO-COURSES: Junior level status.
- J. STUDENT LEARNING OUTCOMES: Students will be able to:

<u>Course Objective</u>	<u>Institutional SLO</u>
a. Evaluate potential energy losses from architectural drawings	2. Crit. Thinking 3. Prof. Competence
b. Perform energy audits on small commercial buildings	2. Crit. Thinking 3. Prof. Competence
c. Create energy use model to simulate an actual building	2. Crit. Thinking 3. Prof. Competence
d. Assess power usage of lights and building equipment	2. Crit. Thinking 3. Prof. Competence
e. Characterize the building envelope and evaluate the insulation with air sealing	2. Crit. Thinking 3. Prof. Competence

- K. TEXTS: 90.1 User's Manual, ASHRAE, 2013
ANSI/ASHRAE/IESNA Standard 90.1 Energy Standards for Buildings Except Low-Rise Residential Buildings, ASHRAE, 2013
- L. REFERENCES: 2013 ASHRAE Fundamentals' Handbook, ASHRAE, 2013

2014 ASHRAE HVAC Systems and Equipment Handbook,
ASHRAE, 2014

2015 ASHRAE Applications Handbook, ASHRAE, 2007

- M. EQUIPMENT: None
- N. GRADING METHOD: A – F
- O. MEASURE CRITERIA/METHODS:
Homework
Exams
Oral Presentation/ Research Paper/Research Project
- P. DETAILED TOPICAL OUTLINE:
- I. Purpose
 - A. Overview of energy analysis and audits
 - B. Scope of standards and codes
 - II. Administration and enforcement
 - A. New buildings
 - B. Existing buildings
 - C. Documentation
 - D. Conflicts with other laws
 - III. Building Envelope
 - A. Design consideration
 - B. Climate considerations
 - C. Insulation
 - D. Fenestration and doors
 - E. Air leakage
 - F. Intentional make-up air
 - IV. HVAC Systems
 - A. Design consideration
 - B. Mechanical equipment efficiency
 - C. Load calculations
 - D. Controls –Direct digital or analog
 - E. System insulation
 - F. Duct construction
 - G. Prescriptive pathway of energy flow
 - H. Compliance with standard
 - V. Water heating
 - A. System sizing
 - B. Equipment efficiency
 - C. Temperature controls
 - D. Distribution losses
 - E. Swimming pools
 - F. Compliance with standards

- VI. Power
 - A. Electrical loads
 - B. Voltage drops
 - C. Peak loads
- VII. Lighting
 - A. Design considerations
 - B. Lighting controls
 - C. Exterior lighting requirements
 - D. Exit lighting
 - E. Interior lighting requirements
 - F. Luminaire wattage ratings
 - G. Space by space lighting design
- VIII. Energy Cost Modeling
 - A. Simulation
 - B. Energy cost budgets
 - C. Building performance rating
 - D. Energy purchasing