

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



**COURSE OUTLINE
ACHP 324 - HVAC LOAD CALCULATION**

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**CANINO SCHOOL OF ENGINEERING TECHNOLOGY
MECHANICAL AND ENERGY TECHNOLOGY
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- A. TITLE: HVAC Load Calculation
- B. COURSE NUMBER: ACHP 324
- C. CREDIT HOURS: 3
- D. WRITING INTENSIVE COURSE: N/A
- E. COURSE LENGTH: 15
- F. SEMESTER(S) OFFERED: Fall/Spring
- G. HOURS OF LECTURE, LABORATORY, RECITATION, TUTORIAL, ACTIVITY:
3 hours lecture
- H. CATALOG DESCRIPTION:

This course introduces the student to the principles and methods of calculating the heating and cooling load of an HVAC system for residential and commercial buildings. The student learns how to design the HVAC systems following the codes and standards of ASHRAE publications. Energy efficiency and conservation are incorporated into the system design for optimal performance. The course is emphasized on computer-based calculations. Computer-assisted calculation and practice are carried out throughout the course.

- I. PRE-REQUISITES/CO-COURSES: Junior level status

- J. GOALS (STUDENT LEARNING OBJECTIVES):

By the end of this course, the students will be able to:

<i>Course Objective</i>	<i>Institutional SLO</i>
a. Define Scope of HVAC Design	1. Communication 3. Prof. Competence
b. Perform HVAC Heating and Cooling Load Calculation of Commercial and Residential Buildings	2. Crit. Thinking 3. Prof. Competence
c. Perform initial energy assessment of an HVAC system when conducting load calculation	2. Crit. Thinking 3. Prof. Competence
d. Conduct a detailed energy audit of an existing building	2. Crit. Thinking 3. Prof. Competence

- K. TEXTS: Instructor developed material

- L. REFERENCES:

ASHRAE Fundamentals Handbook, 2005

Air Conditioning Principles and Systems by Edward G.Pita, Publisher - Wiley, Fourth Edition, 2002

- M. EQUIPMENT: N/A

- N. GRADING METHOD: A - F

O. EVALUATION CRITERIA/METHODS:

Exams, quizzes, homework, projects

P. DETAILED TOPICAL OUTLINE: See attached sheet

Q. LABORATORY OUTLINE: N/A

DETAILED OUTLINE

ACHP 324 - HVAC LOAD CALCULATION

I. Scope and Uses of HVAC

A. Human Comfort

B. HVAC Application Areas

- C. Conditions Controlled by HVAC Systems
 - D. Components of Air Conditioning Systems
 - E. Energy Conservation
 - F. HVAC Energy Performance
- II. Review of Physical Principles
- A. Units
 - B. Mass, Force, Weight, Density, Specific Volume
 - C. Pressure
 - D. Work, Power and Energy
 - E. Heat and Temperature
 - F. Enthalpy
 - G. Energy Equation (First Law of Thermodynamics)
 - H. Solid, Liquid, Vapor and Phase Change
 - I. Sensible Heat and Latent Heat
 - J. Heat Transfer – Conduction, Convection, Radiation
 - K. Ideal Gas Law
- III. HVAC Cooling Load Calculation
- A. Introduction
 - B. Cooling Load Calculation Principles
 - C. Room Heat Gain
 - 1. External – Conduction, Radiation
 - 2. Internal – Conduction, Radiation, Latent
 - 3. Infiltration – Conduction, Convection, Latent
 - 4. System – leakage, fan, pump, ventilation
 - D. Thermo-storage Effect
 - E. Climate Condition and Design Condition
 - F. Commercial Cooling Load
 - 1. Heat Balance Method
 - 2. Radiant Time Series Method
 - 3. Corrected Cooling Load Temperature Difference
Cooling Load Factor Method (CLTD/CLF)
 - 4. Peak Load Calculation
 - 5. System Cooling Load Calculation (Multi-Zone Calculation)
 - 6. HVAC System Operating Schedule
 - G. Residential Cooling Load
 - 1. Residential Features
 - 2. Residential Load Factor Method (RLF)
 - 3. CLTD/CLF Method
 - 4. Peak Load Calculation
 - 5. System Cooling Load Calculation (Multi-Room Calculation)
 - H. Computer Applications
- IV. HVAC Heating Load Calculation
- A. Introduction
 - B. Heat Transfer
 - C. Heating Load Calculation Principles
 - D. Heating Load Versus Cooling Load
 - E. Heat Transfer Losses

1. External
2. Internal
3. Infiltration and ventilation
- F. Climate Condition and Design Condition
- G. Commercial Heating Load
 1. Peak Heating Load Calculation
 2. System Heating Load Calculation (Multi-Zone Calculation)
 3. HVAC System Operating Schedule
- H. Residential Heating Load
 1. Residential Features
 2. Peak Load Calculation
 3. Building Heating Load Calculation (Multi-Room Calculation)
- I. Heating Safety Factors and Load Allowances
- J. Computer Applications

V. Energy Performance

- A. Introduction
- B. Source of Energy
- C. Principles of Energy Utilization
- D. Energy Performance in HVAC
 1. Energy Efficient Design
 2. Energy Conservation
 3. Energy Measurement & Performance Evaluation