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

COURSE OUTLINE

ACHP 244 – AIR CONDITIONING II

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CANINO SCHOOL OF ENGINEERING TECHNOLOGY
MECHANICAL & ENERGY TECHNOLOGY
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A. **TITLE:** Air Conditioning II

B. **COURSE NUMBER:** ACHP244

C. **CREDIT HOURS:** 3

D. **WRITING INTENSIVE COURSE (OPTIONAL):** N/A

E. **COURSE LENGTH:** 15 weeks per semester

F. **SEMESTER(S) OFFERED:** Spring (fourth semester)

G. **HOURS OF LECTURE, LABORATORY, RECITATION, TUTORIAL, ACTIVITY:**
2 hours lecture and 3 hours laboratory per week.

H. **CATALOGUE DESCRIPTION:**
Cooling loads are calculated for various types of commercial structures. Computers are used to calculate loads. Air conditioning equipment and systems are studied to determine their application to meet load, comfort and energy conservation requirements. The laboratory portion of the course includes the determination, with instruments, of the performance characteristics of cooling coils, heating coils, a water chiller, cooling tower, etc.

I. **PRE-REQUISITES/CO-COURSES:** ACHP 243 – Air Conditioning I

J. **GOALS (STUDENT LEARNING OUTCOMES):**
By the end of this course, the student will be able to:

Course Objective	*Institutional SLO*
a. Perform Building Cooling load Calculation	2. Crit. Thinking 3. Prof. Competence
b. Select components for air conditioning systems	2. Crit. Thinking 3. Prof. Competence
c. Analyze heat recovery systems	2. Crit. Thinking 3. Prof. Competence
d. Evaluate AC equipment for energy conservation guidelines	2. Crit. Thinking 3. Prof. Competence
e. Describe controls as applied to air conditioning systems	1. Communication 3. Prof. Competence

K. **TEXTS:** Air Conditioning Principles and Systems: An Energy Approach by Edward Pita - John Wiley

L. **REFERENCES:** ASHRAE Handbook-Fundamentals
Manufacturer's Catalogs
Other ASHRAE Handbooks

M. **EQUIPMENT:** None

N. **GRADING METHOD:** (P/F, A-F, etc.) A-F

O. **MEASUREMENT CRITERIA/METHODS:** Exams & Laboratory Reports

P. **DETAILED TOPICAL OUTLINE:** See attached

Q. **LABORATORY OUTLINE:** See attached

DETAILED OUTLINE: LECTURE - RECITATION
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I. Cooling Load Calculations
  A. Heat Storage Effect
    1. Instantaneous vs. space cooling load
  B. Room Heat Gain
    1. Conduction through exterior structure
    2. Conduction through interior structure
    3. Solar radiation through glass
    4. Design conditions
    5. Lighting
    6. People
    7. Equipment
    8. Infiltration
    9. Heat transfer to surroundings
  C. Cooling Loads
    1. Peak room cooling load
    2. Peak building load
    3. Refrigeration or cooling load
    4. Ventilation
    5. Heat gain to ducts
    6. Fan and pump heat
    7. Temperature swing
    8. Supply air conditions
  D. Commercial Cooling Load Calculations
    1. Commercial load calculations by the ASHRAE method
    2. Commercial load calculations by computer
  E. Residential Cooling Loads
    1. Heat gain through structure
    2. Heat gain through windows
    3. People and appliances
    4. Infiltration and ventilation
    5. Duct heat gains and leakage
    6. Latent and total cooling load
  F. Summary of Residential Cooling Load Calculations
    G. Energy Conservation Considerations for Reducing Cooling Loads
II. Air Conditioning Systems and Equipment
    A. Systems Classification by Cooling/Heating Fluid Distribution
    1. All-air systems
    2. All-water systems
    3. Air-water combination systems
  B. All-Air Systems
    1. Single zone system
    2. Reheat system
    3. Multizone system

4. Variable volume system
5. Dual duct system

C. All-Water Systems
1. Air-water systems
2. All-water systems

D. Unitary Versus Central Systems
1. Room units
2. Unitary air conditioners
3. Rooftop units
4. Air handling units

E. Cooling and Heating Coils
1. Dx coils
2. Water coils
   a. Heating
   b. Cooling
3. Coil selection

F. Air Cleaning
1. Objectives of air cleaning
2. Classification of contaminants
3. Method of duct removal
4. Method of testing filters
5. Types of air cleaners
6. Selection of air cleaners
7. Energy requirements of air cleaners
8. Energy conservation

G. Heat Pumps
1. Application
   a. Heating and cooling
   b. Heat pump application to solar energy systems
   c. Heat pump selection

III. Energy Utilization and Conservation

A. Standards and Codes

B. Sources of Energy

C. Principles of Energy Utilization
1. Measuring energy utilization in equipment
   a. Power producing equipment
   b. Cooling equipment (C.O.P. and E.E.R.)
   c. The heat pump
   d. Heating equipment
   e. Pumps and fans
   f. Existing building H.V.A.C. systems
   g. New building H.V.A.C. systems
2. Heat recovery
   a. Air to air
   b. Refrigeration cycle heat recovery
   c. Lighting heat

3. Total energy systems
4. Energy conservation methods and considerations
   a. Building construction
   b. Design criteria
   c. System design
   d. Controls
   e. Installation
   f. Operation and maintenance
5. Computers in H.V.A.C. systems
   a. Computer programming
   b. Programming languages

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LIST OF LABORATORY EXPERIMENTS AND/OR PROJECTS

1. AUTOCAD Drawing of Laboratory Trane Climate Changer
2. Chilled Water Coil Capacity Test. (Variable C.F.M. with Constant G.P.M.)
3. Air Mixing, Pre-Heating, and Humidification
4. Re-Heat and Fan Control
5. Cooling Tower Capacity
6. Cooling Load Calculations by Computer