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

COURSE OUTLINE

ACHP 306 - ENERGY SYSTEMS TECHNOLOGY

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CANINO SCHOOL OF ENGINEERING TECHNOLOGY
MECHANICAL & ENERGY TECHNOLOGY
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A. TITLE: Energy Systems Technology

B. COURSE NUMBER: ACHP 306

C. CREDIT HOURS: 3

D. WRITING INTENSIVE COURSE: NA

E. COURSE LENGTH: 15

F. SEMESTER(S) OFFERED: Fall or Spring

G. HOURS OF LECTURE, LABORATORY, RECITATION, TUTORIAL, ACTIVITY:
2 – one hour lecture and 1 – two hour recitation

H. CATALOGUE DESCRIPTION: The student will develop skills utilized in HVAC systems design, from the basic principles of heat transfer through detailed sizing and selection of various HVAC systems.

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

J. OBJECTIVES: Upon completion of this course, students will be able to:

Course Objective	*Institutional SLO*
a. Analyze and design the basic HVAC systems in a building	2. Crit. Thinking 3. Prof. Competence
b. Calculate heating, air conditioning, and ventilation loads for buildings	2. Crit. Thinking 3. Prof. Competence
c. Utilize psychometrics in an air conditioning system design	1. Communication 2. Crit. Thinking 3. Prof. Competence
d. Determine the fluid flow conditions necessary to HVAC systems	2. Crit. Thinking 3. Prof. Competence

K. TEXTS: ASHRAE, Principles of Heating, Ventilating, and Air Conditioning, 7th edition, 2013, Atlanta, GA

L. REFERENCES:

ASHRAE, Handbooks of Fundamentals, Atlanta, GA
ASHRAE, Handbook of Refrigeration, Atlanta, GA
ASHRAE, Handbook of HVAC Applications, Atlanta, GA
ASHRAE, Handbook of HVAC Systems and Equipment, Atlanta, GA

M. EQUIPMENT:

N. GRADING METHOD: A-F

O. EVALUATION CRITERIA/METHODS: Exams, homework, projects

P. DETAILED TOPICAL OUTLINE:

I. Heating Loads
   A. Heat Transfer
   B. Overall thermal resistance
   C. Overall heat transfer coefficient
   D. Heat transfer losses
   E. Infiltration and ventilation loads
   F. Design conditions
   G. Building heat loads

II. Furnaces and Boilers
   A. Warm air furnaces
   B. Water boilers
   C. Steam boilers
   D. Controls
   E. Energy use and efficiency

III. Hydronic Piping Systems and Terminal Units
   A. Piping arrangements - series, parallel, combinations
   B. Three and four pipe systems
   C. Terminal units - fintube, radiators, convectors, radiant panels, unit heaters, fan oil units, induction units
   D. System water temperatures and flow rates

IV. Cooling Load Calculations
   A. Cooling load calculation procedure
   B. Conduction loads
   C. Solar radiation loads
   D. Design conditions
   E. Lighting, equipment, and people loads
   F. Ventilation and infiltration loads
   G. Total Building Loads

V. Psychrometrics
   A. Properties of air
   B. The Psychrometric chart
   C. The air conditioning process on the chart
      1. Sensible heat
      2. Latent heat
   D. Coil Process
   E. Sensible Heat Ratio

VI. Fluid Flow in Piping and Ducts
   A. The continuity equation
   B. The flow energy equation
   C. Pressure losses in closed and open systems
   D. Total, static and velocity pressures
   E. Use of “Trane Ductulator”
   F. Use of “Bell & Gossett System Syzer”

G. Duct design methods - equal friction and static regain methods

VII. Fans and Air Distribution Devices
- A. Fan types
- B. Fan performance curves
- C. Fan rating and selection
- D. Fan laws
- E. Air distribution devices
- F. Sound Control

VIII. Centrifugal Pumps, Expansion Tanks, and Venting
- A. Pump types
- B. Principle of operation
- C. Pump curves and selection
- D. System characteristics and curves
- E. Net Positive Suction Head
- F. Air Control and Venting
- G. Compression tank sizing

IX. Air Conditioning Systems and Equipment
- A. System classification
- B. Zones - single and multiple
- C. Reheat, multizone, dual duct, and VAV
- D. All water systems
- E. Air - Water systems
- F. Unitary units
- G. Rooftop units
- H. Air handling units

Q. LABORATORY OUTLINE: N/A