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

COURSE OUTLINE

ACHP 401 BUILDING AUTOMATION SYSTEMS

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CANINO SCHOOL OF ENGINEERING TECHNOLOGY
MECHANICAL & ENERGY TECHNOLOGY
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A. TITLE: Building Automation Systems

B. COURSE NUMBER: ACHP 401

C. CREDIT HOURS: 3

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

E. COURSE LENGTH: 15

F. SEMESTER(S) OFFERED: Fall

G. HOURS OF LECTURE, LABORATORY, RECITATION, TUTORIAL, ACTIVITY: 3 –one hour lectures

H. CATALOGUE DESCRIPTION:

This course presents a detailed study of building automation controls as applied in our modern facilities. Integration of building environmental controls along with life safety, security and maintenance functions are studied. The various proprietary protocol as well as BACNET is presented. Digital and analog inputs to central and remote processors which in turn control devices to maintain building environmental conditions, safety, and security will be studied. Networking topics studied in prerequisite courses will be integrated in to the application of these automation systems. Students will work with software to operate these systems as well as specify equipment to meet the goals with the facility.

I. PRE-REQUISITES/CO-COURSES:

Pre-requisites: CITA 200, Data Communications and Networking, ACHP 253, Domestic and Commercial Heating I

J. STUDENT LEARNING OUTCOMES:

Course Objective	*Institutional SLO*
a. Analyze control loops in terms of component devices	2. Crit. Thinking 3. Prof. Competence
b. Describe the concept of feedback and the difference between open and closed loop systems	1. Communication 3. Prof. Competence
c. Assess the adequacy of control diagrams and their written sequence of operation	2. Crit. Thinking 3. Prof. Competence
d. List common sensor and actuator types and describe their operation	1. Communication 3. Prof. Competence
e. Discuss two types of communication protocol used in DDC control	1. Communication 3. Prof. Competence

K. TEXTS: ASHRAE, Fundamentals of HVAC Control Systems, Altanta, 2009

L. REFERENCES: ASHRAE Fundamentals, HVAC Systems, Application Handbooks

M. EQUIPMENT:

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

O. MEASUREMENT CRITERIA: Homework, quizzes, exams, projects

P. DETAILED TOPICAL OUTLINE:

1. Control theory and terminology
   A. Purposes of control
   B. Control actions
   C. Energy sources
2. Control Devices
   A. Thermostats, humidistats, pressure transducers, humidity sensors
   B. Valves, dampers, and relays
3. Fundamental of control systems
   A. Control loops- open and closed
   B. Control systems type
   C. Feedback
   D. Block diagram
4. Evolution of direct digital control
   A. Pneumatic to electronic control systems
   B. Performance benefits of the DDC systems
   C. Hardware and system components
   D. System Architecture
5. DDC components and operating cycle
   A. Microprocessor
   B. Power supply
   C. Input and output processing
   D. Operator interface
   E. Network configuration
   F. Programming for cycle execution
   G. Input and output signals – digital and analog
6. DDC field devices
   A. Sensors – temperature, pressure, differential pressure, humidity, flow, occupancy, current, security, power factor
   B. Actuators – electric, pneumatic, electronic
   C. Final control devices
   D. Monitoring devices – flow, KW, and demand
7. Interface of DDC with operator and network
8. Control sequence and documentation

A. Single zone
B. Multiple zone – VAV, Multizone, Run-around heat pump, radiant floor, two and four pipe systems
C. Economizers
D. Boiler and chillers

9. Application to building control
A. Typical applications
B. Introduction to various manufacturers and their language

Q. LABORATORY OUTLINE: N/A