NOVA COLLEGE-WIDE COURSE CONTENT SUMMARY
AIR 240 – DIRECT DIGITAL CONTROLS (DDC) I (3 CR.)

Course Description

Studies the principles of direct digital controls. Presents common terms used within the HVAC control industry. Covers the function and operating characteristics of sensors, controllers, and final control devices. Highlights transfer function for a control devise and details the development of equations for typical control transfer functions. Lecture 2 hours. Laboratory 2 hours. Total 4 hours per week.

General Course Purpose

To develop in the student an ability to understand the application, read, design wiring and schematic diagrams of commercial refrigeration systems, air conditioning systems and heat pump systems.

Course Prerequisites/Corequisites

None.

Course Objectives

Upon completing the course, the student will be able to:

- Unit 1: The Basics of HVAC Controls
  - 1. Explain the most commonly used HVAC Control Systems
  - 2. Explain control actions
  - 3. List the types of control actions
- Unit 2: Control Systems Terminology
  - 1. Accurately define the various control terms presented
  - 2. Use correct terminology to describe basic processes
  - 3. Read and understand published articles describing fundamental control applications.
- Unit 3: The Basic of Direct Digital Controls
  - 1. Explain a basic DDC system design
  - 2. List the type of DDC signals
  - 3. Explain the characteristics of DDC signal
  - 4. Identify DDC Signals
  - 5. Develop a point list
  - 6. Design DDC Systems Architecture
  - 7. Explain Sequence of operations
  - 8. Be familiar with system specifications
- Unit 4: DDC Controllers
  - 1. Explain DDC Controllers Fundamentals
  - 2. Describe DDC Controller Design
  - 3. Describe the types of controllers
  - 4. Be familiar with Smart Sensors
  - 5. Be familiar with Smart Actuators
- Unit 5: DDC System Architecture
  - 1. List OSI reference models
  - 2. Explain the function of each OSI Reference Layer.
  - 3. List most common topology in DDC Networking
  - 4. Explain how each topology work
  - 5. Be familiar with practical topology scenarios
  - 6. List the most common network access method
  - 7. Explain how each network access method works
  - 8. Explain what is a Local Area Network (LAN)

    - 9. List the most common LAN
    - 10. List the most common Physical Layer Standards
    - 11. Discuss the most common Physical Layer Standards
    - 12. Explain what is a Physical Media
    - 13. Be familiar with practical DDC Systems Architecture Designs
- Unit 6: DDC System Compatibility
    - 1. Explain what is an Open System
    - 2. Explain what is an Closed System
    - 3. Explain what is a Proprietary and Non-proprietary System
    - 4. Be familiar with BACnet and LonWorks
- Unit 7: Elements of a Transfer Function
    - 1. Describe the purpose of a transfer function.
    - 2. Describe the purpose and characteristics of various mathematical elements that make up transfer functions.
    - 3. Describe the effects of a transfer function on the output signal of a device.

Major Topics to be Included

1. The Basics of HVAC Controls
2. Control Systems Terminology
3. The Basics of Direct Digital Control
4. DDC Controllers
5. DDC System Architecture
6. DDC System Compatibility
7. Elements of a Transfer Function