

# APSM 180B: BUILDING AUTOMATION & CONTROLS 2

## Foothill College Course Outline of Record

| Heading                            | Value  |
|------------------------------------|--|
| <b>Effective Term:</b>             | Summer 2023  |
| <b>Units:</b>                      | 2  |
| <b>Hours:</b>                      | 18 lecture, 22 laboratory per quarter (40 total per quarter)   |
| <b>Prerequisite:</b>               | Per California Code of Regulations, this course is limited to students admitted to the Sheet Metal Apprenticeship Program. |
| <b>Degree &amp; Credit Status:</b> | Degree-Applicable Credit Course  |
| <b>Foothill GE:</b>                | Non-GE   |
| <b>Transferable:</b>               | None   |
| <b>Grade Type:</b>                 | Letter Grade Only  |
| <b>Repeatability:</b>              | Not Repeatable   |

## Description

Students will gain an overview of building automation and controls used in HVAC systems. Students will develop an understanding of operator interfaces, using theory and hands-on application as it applies to building automation controls in an HVAC system.

## Course Objectives

The student will be able to:

1. Define operator interface
2. List common types of on-site operator interfaces
3. Discuss the use of off-site operator interfaces
4. List common types of off-site operator interfaces
5. Identify guidelines when selecting operator interfaces
6. Explain the importance of training personnel in the use of operator interfaces
7. Identify common types of analog inputs/outputs
8. Identify common types of digital inputs/outputs

## Course Content

1. Define operator interface
  - a. Explain how an operator interface is a device that allows an individual to access and respond to building automation system information
2. List common types of on-site operator interface
  - a. Describe how on-site operator interfaces used in large buildings to access and troubleshoot a building automation system include desktop PCs, alarm printers, laptop PCs, and keypad displays
3. Discuss the use of off-site operator interfaces
  - a. Explain that off-site operator interfaces include off-site desktop PCs, off-site portable operator terminals, off-site laptop PCs, pagers, fax machines, cellular communication, email, smart phones, and tablet computers
4. List common types of off-site operator interfaces

- a. Describe that In addition to communication between a building automation system and an off-site desktop PC in the office of the building contractor, communication can also be performed between a building automation system and desktop PCs at the residence of a technician on call
5. Identify guidelines when selecting operator interface
    - a. List the type of guidelines used when selecting operator interfaces
  6. Explain the importance of training personnel in the use of operator interfaces
    - a. Have the student be able to explain how one of the primary reasons for poor customer satisfaction with a building automation system is the lack of an effective training plan and the importance of training personnel in the use of operator interfaces
  7. Identify common types of analog inputs/outputs
    - a. Have the student be able to explain that an analog input (AI) is a device that senses a variable such as temperature, pressure, or humidity and causes a proportional electrical signal change at the building automation system controller
  8. Identify common types of digital inputs/outputs
    - a. Have the student be able to explain that a digital (binary) input is a device that produces an ON or OFF signal and give the example of a thermostat which is a temperature-actuated switch

## Lab Content

Students will identify types of operator interfaces within an operational electronic control panel.

## Special Facilities and/or Equipment

1. Laboratory with sheet metal service tools and sample system components
2. Personal protective equipment
3. When taught via Foothill Global Access, on-going access to computer with email software and hardware; email address

## Method(s) of Evaluation

Methods of Evaluation may include but are not limited to the following:

Results of written quizzes and tests

Responses in class discussions

Comprehensive final project

Demonstration of assigned skills to acceptable level per instructor

## Method(s) of Instruction

Methods of Instruction may include but are not limited to the following:

Lecture

Discussion

Demonstration

Lab assignments followed by discussion

## Representative Text(s) and Other Materials

International Training Institute for the Sheet Metal and Air Conditioning Industry. Electrical Theory. 2017.

International Training Institute for the Sheet Metal and Air Conditioning Industry. Testing, Adjusting and Balancing. 2017.

Auvil, Ronnie J.. HVAC Control Systems. 2017.

These are the standard sheet metal textbooks/workbooks used for this course. Although one or more may not be within five years of the required published date, they are the most current books used when teaching this course.

## **Types and/or Examples of Required Reading, Writing, and Outside of Class Assignments**

1. Sample reading assignment: From the textbook, read assigned sections on DDC controls
2. Sample writing assignment: Compose a list of electronic components and their function in the building control system

## **Discipline(s)**

Sheet Metal