

APSM 180C: BUILDING AUTOMATION & CONTROLS 3

Foothill College Course Outline of Record

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

Description

Students will gain an overview of building automation and controls used in HVAC systems. Students will develop an understanding of the network wiring and wireless controls within a control system as they apply to building automation controls in a HVAC system.

Course Objectives

The student will be able to:

- Identify common considerations for mounting controllers
- Describe common considerations for installing controller power
- Identify common considerations and configurations for communication network wiring
- Describe wireless systems
- Identify common procedures for testing building automation systems (BASs)
- Define network topology and describe the operation of an Ethernet network
- Describe common Ethernet hardware components and connecting media
- Identify common methods for troubleshooting Ethernet networks
 - Explain the functions of web-based control systems, network security, and the Internet of Things
- Describe installing and updating servers and web-based supervisory controllers
- Describe some common considerations for troubleshooting web-based control systems

Course Content

- Identify common considerations for mounting controllers
 - Develop an understanding of controller mounting methods and requirements vary with the manufacturer and application
- Describe common considerations for installing controller power

- Determine the size of a building automation system controller power supply by adding the power requirements of the components in the building automation
- Identify common considerations and configurations for communication network wiring
 - Explain that the control network configuration used is based on the building layout, conductor or cable selection, and manufacturer recommendations
- Describe wireless systems
 - Explain that wireless building automation system control system advantages include ease of installation, no required physical changes to historic structures, ease of future modifications, and low installation costs
- Identify common procedures for testing building automation systems (BASs)
 - Accurately use test equipment, such as a digital multi-meter (DMM), is required to receive precise test results
- Define network topology and describe the operation of an Ethernet network
 - Explain that the network is the hardware (equipment), software (programs), and interconnecting media that enable reliable, high-speed data transmission
- Describe common Ethernet hardware components and connecting media
 - Describe how each node on the network must have an adapter card connected to the connecting media used for the network
- Identify common methods for troubleshooting Ethernet networks
 - Understand that software configuration errors cause most of the problems with a network
- Describe the functions of web-based control systems, and network security
 - The student will understand that any PC that supports a standard web browser can be used to access the control system
- Describe installing and updating servers and web-based supervisory controllers
 - Describe how installation of a web-based supervisory controller may be for a new system or an upgrade from an older BAS
- Describe some common considerations for troubleshooting web-based control systems
 - The student will be able to explain how in-depth network problems with a web-based control system should be addressed by a professional IT technician; however, several simple checks can be used to solve common problems

Lab Content

Students will identify and install a wireless control system within an operational electronic control panel.

Special Facilities and/or Equipment

- Laboratory with sheet metal service tools and sample system components
- Personal protective equipment
- 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

- a. [Sample reading assignment: From the textbook, read assigned sections on DDC controls](#)
- b. [Sample writing assignment: Compose a list of electronic components and their function in the building control system](#)

Discipline(s)

Sheet Metal