

Certified Controls Specialist Certification Course Syllabus

Course Overview

The Certified Controls Specialist Certification Course is a comprehensive, three-part program designed to provide participants with a foundational to advanced understanding of building control systems, their interaction with HVAC equipment, and their role in energy management and building operation. This course aims to simplify the complex world of controls, empowering students with the knowledge and confidence to effectively troubleshoot, analyze, and communicate about building control systems. The program emphasizes hands-on learning through individual and team exercises involving manipulating graphics, analyzing data, logic programming, and basic functional testing.

Learning Objectives

Upon successful completion of all three levels of this course, participants will be able to:

- Master Building Management Systems (BMS) & HVAC Integration: Understand BMS functionalities, navigate graphics and trending data for diagnostics, and comprehend how control elements interact with HVAC theory and components for optimal performance.
- Troubleshoot and Resolve Control & HVAC Issues: Develop systematic approaches to identify, analyze, and resolve complex problems within both HVAC and integrated control systems, including effective communication with contractors.
- Develop and Execute Functional Performance Tests: Create and apply comprehensive functional performance test procedures to validate system operation, efficiency, and ensure proper commissioning.
- Interpret and Create Sequences of Operation: Identify, write, and analyze basic to complex sequences of operation from system behavior, functional blocks, and written specifications.
- Work with Graphical Logic and Wiring Diagrams: Apply knowledge of graphical logic function blocks to identify issues and create control logic and understand the basics of wiring diagrams.
- Optimize Building Operation and Energy Usage: Utilize controls knowledge to enhance general building operation, improve energy efficiency, and contribute strategically to overall energy management goals.

Target Audience

This course is ideal for facility managers, maintenance technicians, energy managers, building operators, engineers, and anyone involved in the operation, maintenance, or design of building control systems and HVAC equipment. No prior in-depth controls experience is required for Controls 1, but a basic understanding of building systems is beneficial.

Course Format

This course is delivered in three progressive parts (Controls 1, Controls 2, and Controls 3), each building upon the knowledge gained in the previous level. The format combines theoretical instruction with extensive hands-on individual and team exercises, including manipulating graphics, analyzing data, logic programming, and basic functional testing.

Assessment and Deliverables

Assessment will be based on participation in hands-on exercises, completion of practical assignments, and a final certification exam at the end of each course level to demonstrate mastery of the learning objectives. Specific details regarding deliverables will be provided within each course module.

Pre-Requisites

None (CCS course registration and exam registration are separate)

Professional Development Hours

14 PDH credits, upon successful completion of the certification exam

Course Modules and Lessons

CONTROLS 1: INTRODUCTION TO CONTROL BASICS

This introductory course provides a fundamental understanding of control basics, focusing on building management systems and their interaction with HVAC equipment.

Learning Outcomes: By the end of this course, participants should be able to:

- Understand building management systems and their interaction with HVAC equipment.
- Understand the basic elements of a controls system.
- Diagnose high-level issues through graphics and trending.
- Understand basic sequences of operation.
- Understand lighting controls.
- Better communicate with controls contractors.
- Understand how design standards and commissioning play a role.

Key Topics:

- Introduction to the basics of Building Management Systems (BMS)
- Basic HVAC Equipment Overview and Control Interaction
- Introduction to Communication Methods
- Introduction to Controls Strategies and Systems
- Introduction to Sequences of Operation
- BMS Graphics and Data Trending for Diagnostics
- Fundamentals of Lighting Control Systems
- Effective Communication with Controls Contractors
- Role of Design Standards and Commissioning in Controls

CONTROLS 2: HVAC THEORY AND CONTROL INTERACTION

This course builds upon the foundational knowledge from Controls 1, delving deeper into HVAC theory and components, and demonstrating how control systems relate to and manage these systems.

Learning Outcomes: By the end of this course, participants will be better equipped for:

- Understanding HVAC theory and components.
- How control components interact with HVAC systems.
- Troubleshooting HVAC and controls issues.
- Creating your own functional performance test procedure.
- Identifying sequences of operation.

Key Topics:

- Detailed HVAC Components (e.g., coils, fans, pumps, valves)
- Advanced HVAC Theory (e.g., psychometrics, heat transfer)
- Introduction to Modern Dx Systems
- Introduction to Modern Chilled Water and Hot Water Systems
- Control Component Integration with HVAC Systems
- Advanced Troubleshooting Techniques for HVAC and Controls
- Developing Functional Performance Test Procedures
- Analyzing and Identifying Complex Sequences of Operation
- Introduction to Logic Function Blocks

CONTROLS 3: GRAPHICAL LOGIC AND SEQUENCES OF OPERATIONS WORKSHOP

This course focuses on practical application, specifically on graphical logic and sequences of operations, through hands-on individual and team exercises.

Learning Outcomes: By the end of this course, participants should be able to:

- Identify issues through a simulated graphical logic diagram.
- Create a graphical logic function block given a sequence of operation.
- Identify a sequence by looking at function blocks.
- Identify and write basic sequences of operation.
- Understand basics of wiring diagrams.

Key Topics:

- Understanding the goal of Modern Programming and Control Systems
- Introduction to Logic Function Blocks
- Recap and Advanced Concepts of Sequences of Operation
- Individual and Team Workshops on Graphical Logic Diagram Analysis
- Hands-on Creation of Graphical Logic Function Blocks
- Interpreting Function Blocks to Determine Sequences