



Commissioning Provider Curriculum Course Catalog

Training Overview

The Commissioning Provider curriculum consists of four modules that culminate with a laboratory where participants will perform actual commissioning of systems and equipment. Participants will learn fundamentals of the commissioning process, the technical elements of commissioning; including operational knowledge of the individual systems and equipment components and analytical skills required to determine system and equipment optimization. Laboratory activities will provide the opportunity to observe and manipulate building systems and equipment to verify operational performance. Courses may also be taken a-la-carte for continuing education purposes.

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Pricing Options

Full Track

Commissioning Provider Full Program: \$2,800 (Best Value)	Commissioning Provider Online Curriculum: \$2,400	Commissioning Provider Laboratory*: \$1,400
Access to the online curriculum for one year	Access to online curriculum for one year	Tuition fees for 5 day in-person laboratory
Tuition fees for 5 day in-person laboratory	CEU credit for completed online coursework	CEU credit for completed online coursework and laboratory component
CEU credit for completed online coursework and laboratory component	Certificate of Completion for online coursework	Certificate of Completion upon successful completion of online curriculum and lab
Certificate of Completion upon successful completion of online curriculum and lab component		

*Completion of the online curriculum is a pre-requisite for the Laboratory

Continuing Education Credits

Courses may be taken as part of an entire track, or a-la-carte. All courses are eligible for Continuing Education Credits through the American Institute of Architects (AIA). Continuing education pricing for each course is included after the course description. Note: Earlier revisions of this course catalog included AIA Sustainable Design Credits; these are now covered under Health, Safety, Welfare Learning Unit Hours (LU/HSW).

Module 1 – Fundamentals of Commissioning

In this module, participants will learn fundamental processes of commissioning for new and existing buildings. The module content focuses on phases of the commissioning process, commissioning procedures, required documentation and project deliverables. (2 courses, 17 lessons, approximately 6 instructional hours)

Course 1: New Construction Building Commissioning

This course provides instruction on the phases of new construction building commissioning including pre-design, design, design review and specifications and construction (submittals, site observations, functional performance testing and document review). Course content also covers O&M training and operation and occupancy phases.

Lesson 1: Pre-Design Phase

Lesson 2: Design Phase – Cx Plan

Lesson 3: Design Review & Specifications

Lesson 4: Construction Phase–Submittal Review

Lesson 5: Construction Phase–Site Observations

Lesson 6: Construction Phase—Functional Performance Testing

Lesson 7: Construction Phase—Document Review

Lesson 8: O&M Training

Lesson 9: Operation & Occupancy Phase

After completing these lessons, participants will be able to identify all phases of commissioning for new construction and describe the basic commissioning activities that are performed in each phase.

Individual CEUs and Course Price: 2 AIA LU/HSW; – \$ 140

Course 2: Existing Building Commissioning

This course provides instruction on the phases of existing building commissioning (EBCx) including scoping & planning, building walk-through, the EBCx plan, investigation, implementation, handoff and ongoing commissioning.

Lesson 1: Scoping & Planning Phase–Goals & Documents

Lesson 2: Scoping & Planning Phase–Building Walk-Through

Lesson 3: EBCx Plan

Lesson 4: Investigation Phase–Reviewing & Interviewing

Lesson 5: Investigation Phase–Analyzing Facility Performance

Lesson 6: Investigation Phase–Testing, Monitoring & Reporting

Lesson 7: Implementation Phase

Lesson 8: Handoff Phase–Training, System Manuals & Reporting

Lesson 9: Ongoing Commissioning Phase

After completing these lessons, participants will be able to identify all phases of existing building commissioning, describe the commissioning activities performed in each phase and outline a successful EBCx plan.

Individual CEUs and Course Price: 3.75 AIA General LUs; – \$265

Module 2: Commissioning Systems & Equipment

In this module, participants will learn the fundamentals of building system and equipment operations and describe the various types of building systems and equipment and how these systems operate. This module discusses the building thermal envelope, facility operating requirements, facility energy considerations and energy analysis. Participants will be introduced to mechanical systems and equipment, including air handling units, chilled water systems, hot water and steam heating, boilers, chillers, domestic water systems, electrical systems and equipment and control systems. Participants in this module will be able to identify and describe the basic operation of building systems and equipment. (13 courses, 54 lessons, approximately 19 instructional hours)

Course 1: Facility Envelope Components

This course provides instruction on exterior building systems, facility envelope components, and the typical construction drawings. Thermal characteristics, below grade and wall systems and fenestration and roofing systems are thoroughly described.

Lesson 1: Building Thermal Envelope

Lesson 2: Building Thermal Envelope–Thermal Characteristics

Lesson 3: Building Thermal Envelope–Below Grade & Wall Systems

Lesson 4: Building Thermal Envelope–Fenestration & Roofing Systems

After completing these lessons, participants will be able to identify and describe all components of the building envelope including foundations, glazing, windows, doors, walls and roofing. Participants will be able to discuss characteristics of the building thermal envelope such as R-values, U-values and moisture control.

Individual CEUs and Course Price: 1 AIA General LUs; – \$70

Course 2: Operating Requirements

This course provides instruction on facility operating requirements, including occupancy and facility characteristics and typical room conditions.

Lesson 1: Occupancy & Facility Characteristics

Lesson 2: Room Conditions

After completing these lessons, participants will be able to list facility classifications, explain occupancy schedules and list typical factors that influence room conditions, such as temperature, humidity, pressure and lighting levels.

Individual CEUs and Course Price: 1 AIA General LUs - \$70

Course 3: Facility Energy Considerations

This course provides instruction on facility energy considerations including design conditions and weather data, energy reduction requirements, regulations and incentives, energy analysis and energy economic calculations.

Lesson 1: Design Conditions & Weather Data

Lesson 2: Energy Reduction Requirements, Regulations & Incentives

Lesson 3: Energy Analysis

Lesson 4: Energy Economic Calculations

After completing these lessons, participants will be able to describe how weather data is used for basic energy analysis activities, identify energy reduction requirements and guidelines and perform basic energy economics calculations.

Individual CEUs and Course Price: 1.75 AIA LU/HSW; – \$125

Course 4: Introduction to Mechanical Systems & Equipment

This course provides an introduction to mechanical systems and equipment, including mechanical drawings, fan terms, types and configurations, pump components and characteristics, heat exchanger types and characteristics, motor fundamentals, motor types and efficiencies, variable frequency drive (VFD) applications and characteristics, as well as piping systems and accessories.

Lesson 1: MEP Fundamentals - Mechanical Drawings

Lesson 2: Fan Terms, Types & Configurations

Lesson 3: Pump Components & Characteristics

Lesson 4: Heat Exchanger Types & Characteristics

Lesson 5: Motor Fundamentals

Lesson 6: Motor Types and Efficiencies

Lesson 7: Variable Frequency Drive Applications & Characteristics

Lesson 8: Piping Systems & Accessories

After completing these lessons, participants will be able to describe the uses of mechanical drawing and documents and define and explain mechanical terminology such as fan laws, pump curves, motor efficiencies, open and closed loop piping systems, as well as expansion and compression systems.

Individual CEUs and Course Price: 2.75 AIA General LUs; – \$195

Course 5: Mechanical Systems & Equipment – Air Handling Equipment

This course provides instruction on air handling equipment including psychrometric analysis, air handler components and configuration, make-up air and heat recovery systems, and terminal air flow devices.

Lesson 1: Air Handling Equipment

Lesson 2: Principles of Psychrometrics

Lesson 3: Psychrometric Analysis

Lesson 4: Air Handler Components & Configuration

Lesson 5: Make-up Air & Heat Recovery Systems

Lesson 6: Duct Terminal Air Flow Devices

Lesson 7: Room Terminal Air Flow Devices

After completing these lessons, participants will be able to identify and describe the fundamental components of air handling equipment and describe influencing factors such as psychrometric airflow, sensible and latent heat, mixed air conditions, coil performance and supply air conditions.

Individual CEUs and Course Price: 2.5 AIA LU/HSW; – \$175

Course 6: Mechanical Systems and Equipment – Cooling Equipment

This course provides instruction on cooling equipment including unitary cooling equipment, evaporative cooling equipment, chillers and cooling towers.

Lesson 1: Principles of Vapor Compression Refrigeration

Lesson 2: Unitary Cooling Equipment

Lesson 3: Evaporative Cooling Equipment

Lesson 4: Chillers and Cooling Towers 1

Lesson 5: Chillers and Cooling Towers 2

After completing these lessons, participants will be able to identify the basic components and characteristics of cooling equipment such as vapor compression refrigeration, heat pump operation, direct and indirect evaporative cooling and water-side economizers. Participants will also be able to discuss operation and maintenance considerations for evaporative condensers, chillers and cooling towers.

Individual CEUs and Course Price: 1.75 AIA LU/HSW; – \$125

Course 7: Combustion & Boilers

This course provides instruction on heating equipment, including furnaces and heaters.

Lesson 1: Heating Equipment

Lesson 2: Furnaces & Heaters

After completing these lessons, participants will be able to explain the process of combustion and describe components, operations and efficiencies of boilers, warm air furnaces, space heaters, unit heaters and radiant heaters.

Individual CEUs and Course Price: 1 AIA General LUs; – \$70

Course 8: Chilled Water Systems

This course provides instruction on hydronic heating and cooling and describes condenser water systems.

Lesson 1: Hydronic Heating & Cooling

Lesson 2: Describe Condenser Water Systems

After completing these lessons, participants will be able to explain the layout and components of major chilled water systems, diagram a condenser water system and discuss operation and maintenance considerations of chilled water systems.

Individual CEUs and Course Price: 1 AIA General LUs; – \$70

Course 9: Hot Water & Steam Heating

This course provides instruction on hot water heating systems and steam systems.

Lesson 1: Hot Water Heating Systems 1

Lesson 2: Hot Water Heating Systems 2

Lesson 3: Steam Systems 1

Lesson 4: Steam Systems 2

After completing these lessons, participants will be able to diagram hot water heating systems and explain hot water and steam system considerations and components, such as water temperature, terminal heating units, condensate return systems, and operation and maintenance considerations of hot water heating and steam systems.

Individual CEUs and Course Price: 1.25 AIA General LUs; – \$90

Course 10: Domestic Water Systems

This course provides instruction on domestic water distribution systems and domestic hot water (DHW) systems.

Lesson 1: Domestic Water Distribution Systems

Lesson 2: Domestic Hot Water Systems

After completing these lessons, participants will be able to describe water-consuming fixtures and water-saving features, circulation, controls systems, solar water heating systems and identify key components and discuss operation and maintenance considerations for water distribution and DHW systems.

Individual CEUs and Course Price: 1 AIA LU/HSW; – \$70

Course 11: Electrical Systems and Equipment

This course provides instruction on electrical drawings and documents, electrical distribution systems, lighting systems, lighting controls and renewable energy systems.

Lesson 1: Electrical Drawings & Documents

Lesson 2: Electrical Distribution Systems 1

Lesson 3: Electrical Distribution Systems 2

Lesson 4: Lighting Systems

Lesson 5: Lighting Controls

Lesson 6: Renewable Energy Systems

After completing these lessons, participants will be able to use electrical drawings and documents to locate electrical components and determine system operation and electrical load capacity. Participants will also be able to list and explain various terms and principles for lighting systems, controls and solar photovoltaic systems.

Individual CEUs and Course Price: 1.75 AIA LU/HSW; – \$125

Course 12: Control System Fundamentals

This course provides an overview of control system terms, types of control systems, modes of operation and control system elements.

Lesson 1: Control System Terms

Lesson 2: Types of Control Systems

Lesson 3: Modes of Operation

Lesson 4: Control System Elements

After completing these lessons, participants will be able to define and explain the terms, elements, process, actions and elements of controls and controls systems, identify key characteristics of electronic, pneumatic, and (DDC) controls systems and discuss key operational features of controls including on-off, floating and proportional and the various modes of controls.

Individual CEUs and Course Price: 1.75 AIA LU/HSW; – \$125

Course 13: Control Systems

This course provides instruction on DDC systems and control system drawings and documents.

Lesson 1: DDC Systems 1

Lesson 2: DDC Systems 2

Lesson 3: Control System Drawings & Documents

After completing these lessons, participants will be able to discuss distinguishing features and capabilities of direct digital DDC controls including system controllers, controls system versions and capacities, as well as using controls for trending and monitoring. Participants will also be able to describe network and system architecture and read and write a control's sequence of operations.

CEUs and Course Price: 1 AIA LU/HSW; – \$70

Module 3 – Systems Performance & Analysis

In this module, participants will learn the performance of the building operation and system design. This module emphasizes the analysis of air distribution systems, hydronic heating and cooling systems, electrical systems, control systems, functional performance testing, system evaluation and installation requirements. Participants will be able to identify the building's operational system design and diagnose common issues and resolutions. (9 courses, 33 lessons, approximately 12 instructional hours)

Course 1: Design Review

This course provides instruction on mechanical, plumbing and electrical design review.

Lesson 1: Mechanical Design Review

Lesson 2: Plumbing Design Review

Lesson 3: Electrical Design Review

After completing these lessons, participants will be able to explain several of the most common construction document review items for mechanical, electrical and plumbing systems.

CEUs and Course Price: 1 AIA LU/HSW; – \$70

Course 2: Mechanical System Analysis – Air Distribution Systems

This course provides instruction on the analysis of packaged HVAC equipment, air moving equipment, duct design and space airflow and general exhaust.

Lesson 1: Analysis of Packaged HVAC Equipment

Lesson 2: Analysis of Air Moving Equipment

Lesson 3: Analysis of Duct Design

Lesson 4: Analysis of Space Airflow & General Exhaust

After completing these lessons, participants will be able to explain equipment analysis methodology, identify installation related deficiencies, recognize common programming and setup errors and identify deficiency resolutions of air distribution systems.

CEUs and Course Price: 1.25 LU/HSW; – \$90

Course 3: Mechanical System Analysis – Hydronic Heating and Cooling

This course provides instruction on analysis of chilled water systems, hot water heating systems, hydronic piping systems, hydronic pumping systems and terminal units.

Lesson 1: Analysis of Chilled Water Systems

Lesson 2: Analysis of Hot Water Heating Systems

Lesson 3: Analysis of Hydronic Piping Systems

Lesson 4: Analysis of Hydronic Pumping Systems & Terminal Units

After completing these lessons, participants will be able to explain common evaluation approaches to heating and cooling systems along with common deficiencies and resolutions. Participants will also be able to identify piping and pumping installation and operational issues and resolutions.

CEUs and Course Price: 1 AIA LU/HSW; – \$70

Course 4: Mechanical System Analysis – Testing, Adjusting and Balancing

This course provides instruction on testing, adjusting and balancing of air and water systems.

Lesson 1: Air Testing, Adjusting & Balancing

Lesson 2: Air Testing, Adjusting & Balancing Issues

Lesson 3: Water Testing, Adjusting & Balancing

Lesson 4: Water Testing, Adjusting & Balancing Issues

After completing these lessons, participants will be able to explain purpose of air and water testing, adjusting and balancing along with procedures and reporting. Participants will also be able to analyze system performance and identify deficiencies and resolutions.

CEUs and Course Price: 1 AIA LU/HSW; – \$70

Course 5: Electrical System Analysis

This course provides instruction on the analysis of electrical distribution systems, lighting systems and photovoltaic systems.

Lesson 1: Analysis of Electrical Distribution Systems

Lesson 2: Analysis of Lighting Systems

Lesson 3: Analysis of Photovoltaic Systems

After completing these lessons, participants will be able to identify installation and operational deficiencies and resolutions of electrical, lighting and photovoltaic systems.

CEUs and Course Price: 1 AIA LU/HSW; – \$70

Course 6: Control System Analysis – Direct Digital Controls (DDC)

This course provides instruction on direct digital controls, energy efficiency control strategies, DDC installation and programming issues and DDC sensor installation and operational issues.

Lesson 1: Direct Digital Controls

Lesson 2: Energy Efficiency Control Strategies

Lesson 3: DDC Installation and Programming Issues

Lesson 4: DDC Sensor Installation & Operational Issues

After completing these lessons, participants will be able to explain the different types of DDC controls and explain energy efficiency controls strategies, including time-of-day programming, duty cycling and demand limiting and response. Participants will also be able to explain point-to-point installation checkout and discuss hardware and programming issues.

CEUs and Course Price: 1.5 AIA LU/HSW; – \$105

Course 7: Control System Analysis – Air Handling Units and Hydronic Systems

This course provides instruction on the analysis of duct static pressure and variable air volume (VAV) terminal control, VAV reheat and supply air temperature control, economizer control and analysis of outside air control.

Lesson 1: Analysis of Duct Static Pressure and VAV Terminal Control

Lesson 2: Analysis of VAV Reheat & Supply Air Temp Control

Lesson 3: Economizer Control

Lesson 4: Analysis of Outside Air Control

After completing these lessons, participants will also be able to explain the analysis and identify operational deficiencies and resolutions of duct performance, VAV reheat and supply air temp controls, economizer controls and outside air control.

CEUs and Course Price: 1.5 AIA LU/HSW; – \$105

Course 8: Functional Performance Testing

This course provides instruction on functional performance test development for HVAC, plumbing, electrical and lighting.

Lesson 1: Functional Performance Test Development: HVAC

Lesson2: Functional Performance Test Development: Plumbing

Lesson 3: Functional Performance Test Development: Electrical

Lesson 4: Functional Performance Test Development: Lighting

After completing these lessons, participants will develop functional performance tests for heating, ventilating, air conditioning (HVAC), plumbing, electrical and lighting systems.

CEUs and Course Price: 1.75 AIA LU/HSW; – \$125

Course 9: System Evaluation

This course provides instruction on monitoring, trending, analyzing, monitoring and evaluating system performance.

Lesson 1: Monitoring and Trending

Lesson 2: Analyzing Monitoring & Trending Results

Lesson 3: Measurement & Verification Fundamentals Compare

After completing these lessons, participants will be able to describe the purpose of monitoring, trending, basic data types, sources and parameters for trend data and compare trending and monitoring analysis tools and explain trending points for identifying performance issues. Participants will also be able to record system data, measurements and verify performance.

CEUs and Course Price: 1.5 AIA LU/HSW; – \$105

Module 4 – Commissioning Laboratory

Completion of all Commissioning Provider online coursework is required to attend the Commissioning Laboratory. This module will be conducted in a laboratory environment and focuses on hands-on activities related to the commissioning of systems and equipment. The exercises covered in the Commissioning Laboratory include analyzing interval meter energy data, conducting a commissioning review of drawings and submittals, analyzing trend data, verifying sensor calibration, reviewing the building automation system (BAS), developing functional performance test forms, verifying construction checklists, observing functional performance tests, analyzing pump performance, and developing a Commissioning Progress report. (5 days, 40 instructional hours)

The laboratory activities are actual activities that would be conducted as part of a new building commissioning process or existing building commissioning process.

Exercise A: Participants will analyze whole building interval meter energy data for a sample building to identify energy usage patterns and potential items to investigate related to optimizing the energy performance of the building.

Exercise B: Participants will perform a commissioning review of design drawings and construction submittals for a sample new construction project.

Exercise C: Participants will analyze trend data from a BAS to verify system performance and identify optimization opportunities.

Exercise D: Participants will verify sensor location, calibration and point mapping for a sample set of BAS sensors.

Exercise E: Participants will review the BAS graphical user interface, and will compare the programmed HVAC equipment operating schedule with the needs of the building.

Exercise F: Participants will develop functional performance test forms for an air handler and a lighting system.

Exercise G: Participants will verify completed construction checklists for an air handler.

Exercise H: Participants will observe and document functional performance testing related to an air handler, lighting system, and chilled water pump.

Exercise I: Participants will analyze the pump performance data gathered in Exercise H, and determine optimization opportunities for the pump.

Exercise J: Participants will develop a Commissioning Progress Report based on the activities conducted and deliverables developed in exercises A through I.