



PHCC Academy® HVAC 101 Syllabus



Contacts for Registration and Non-LMS Questions - See the State Chapter Partner List:

<https://www.phccweb.org/foundation/phcc-academy-partners/>

If your state is not listed – PHCC Academy staff – AcademySupport@naphcc.org

Course Contact for Technical Problems in Absorb LMS

PHCC Academy Staff

AcademySupport@naphcc.org

Prerequisites

None

Welcome to the PHCC Academy™ Online Apprenticeship-Related Instruction Program!

This program is designed to provide students who cannot attend classes in a traditional apprentice program with the same opportunity to learn the textbook fundamentals of the trade. This training course must be supplemented by your employer, through both technical assistance and on-the-job training in each area of instruction in the book.

Course Goals

- To provide a practical introduction to the HVACR trade
- To familiarize entry-level students with a broad overview of fundamental topics in the HVACR industry
- To provide students with an understanding of energy efficiency concerns in the HVACR field
- To provide students with an understanding of the fundamentals of selling and customer service

Student Responsibilities

- Complete work in a timely manner.
- Read all information and assignments within the learning management system before starting the course.
- Complete all tests in this course as closed-book. Students are on the honor system.
- Complete all assignments with a passing grade of 70 percent or higher.
- Complete the course in 1 year (12 months) or request a 6-month extension before the course expiration date.
- Maintain records of on-the-job training completed.

Employer Responsibilities

- Ensure that all students enrolled are proficient in reading and writing in English at a high school level and possess the self-motivation to complete internet-based coursework.
- Register apprentices with the U.S. Department of Labor, either through your own apprenticeship program or through your PHCC State Chapter Partner's registered apprenticeship program.

- Track the apprentice's on-the-job training hours and document such hours. Documentation records must be maintained by the employer for the duration of the apprentice's employment and must be retained as required by the U.S. Department of Labor.
- Ensure that apprentices are paid a progressively increasing schedule of wages and fringe benefits based on a percentage of the current journey worker wage rate as specified in the Standards of Apprenticeship for the program under which the apprentice is participating.

State Chapter Partner Responsibilities

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- Assist students with ordering textbooks for their courses.
- Act as the primary point of contact for students and employers who register for courses in their state.
- Serve as the liaison between the PHCC Academy and employers of apprentices enrolled in the program in their state.

PHCC Academy Responsibilities

- Ensure that the federal Department of Labor approval for the apprenticeship program is kept current and is updated as needed.
- Administer the learning management system and course offerings for the eLearning program. This includes developing course content and placing it into the learning management system.
- Provide students with learning management system usernames and passwords.
- Provide all administrative functions on the learning management system.
- Coordinate any Advanced Placement Testing with PHCC State Chapter Partners.
- Provide a completion letter and certificate to students upon successful completion of each course.

Required Textbook (Purchased Separately)

Moravek, Joseph (2008). HVACR 101, 1st ed. Clifton Park, NY: Delmar, Cengage Learning.

Assignments

Unit 1 – Introduction to HVACR Concepts

Read Chapter 1 in the HVACR 101 textbook.

Video – Heating and Air Conditioning Fire and Ice

Chapter 1 Review PowerPoint

Read Chapter 2 in the HVACR 101 textbook.

Video – Refrigeration Cycle

Chapter 2 Review PowerPoint

Unit 1 Exam

Unit 2 – First Aid and Safety

Read Chapters 1-12 in the First Aid Manual (found in course).

Video – First Aid in Construction

Video – Safety Music Video

First Aid Review PowerPoint

Safety and First Aid Review Game

Unit 2 Exam

Unit 3 – Basic Electricity

Read Chapter 3 in the HVACR 101 textbook.

Video – Introduction to Circuits and Ohm’s Law

Video – Electric Power

Video – Voltmeter and Ammeter

Chapter 3 Review PowerPoint

Unit 3 Exam

Unit 4 – Basic Thermodynamics

Read Chapter 4 in the HVACR 101 textbook.

Video – Thermal Conduction, Convection, and Radiation

Video – Specific Heat and Latent Heat of Vaporization/Fusion

Video – First Law of Thermodynamics

Video – Second Law of Thermodynamics

Video – Boyle’s Law

Video – Charles’ Law

Video – Dalton’s Law

Chapter 4 Review PowerPoint

Unit 4 Exam

Unit 5 – Basic Refrigeration Cycle

Read Chapter 5 in the HVACR 101 textbook.

Video – PT Chart 101

Video – Scroll Compressors for Refrigeration Applications

Video – Evaporator Coil and Air Handler Assembly

Chapter 5 Review PowerPoint

Refrigeration Cycle Review Game

Unit 5 Exam

Unit 6 – Scheduled Maintenance and Systematic Problem Solving

Read Chapter 6 in the HVACR 101 textbook.

Chapter 6 Review PowerPoint

Read Chapter 7 in the HVACR 101 textbook.

Video – Common Summer HVAC Problems

Video – Is It an Airflow Problem?

Chapter 7 Review PowerPoint

Unit 6 Exam

Unit 7 – Installation and Repair Methods

Read Chapter 8 in the HVACR 101 textbook.

Video – Brazing

Video – Tube Flaring Techniques

Video – Hand and Power Tool Safety

Chapter 8 Review PowerPoint

Unit 7 Exam

Unit 8 – Energy Efficient Installation, Selling and Customer Service

Read Chapter 9 in the HVACR 101 textbook.

Video – Energy Efficient Measurements
Chapter 9 Review PowerPoint
Read Chapter 10 in the HVACR 101 textbook.
Video – Customer Service Teamwork
Video – Customer Service Leadership
Video – Customer Service Persuasion
Video – Customer Service Superiority
Video – Tech Best Practices
Chapter 10 Review PowerPoint
Unit 8 Exam

Final Exam

Course Evaluation



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Prerequisites

HVAC 101 or equivalent

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Course Goals

- To provide a more detailed introduction to HVACR systems and components
- To familiarize students with proper troubleshooting techniques
- To familiarize students with proper installation techniques
- To provide an introduction to psychometrics
- To provide an introduction to basic sizing techniques

Student Responsibilities

- Complete work in a timely manner.
- Read all information and assignments within the learning management system before starting the course.
- Complete all tests in this course as closed-book. Students are on the honor system.
- Complete all assignments with a passing grade of 70 percent or higher.
- Complete the course in 1 year (12 months) or request a 6-month extension before the course expiration date.
- Maintain records of on-the-job training completed.

Employer Responsibilities

- Ensure that all students enrolled are proficient in reading and writing in English at a high school level and possess the self-motivation to complete internet-based coursework.
- Register apprentices with the U.S. Department of Labor, either through your own apprenticeship program or through your PHCC State Chapter Partner's registered apprenticeship program.

- Track the apprentice's on-the-job training hours and document such hours. Documentation records must be maintained by the employer for the duration of the apprentice's employment and must be retained as required by the U.S. Department of Labor.
- Ensure that apprentices are paid a progressively increasing schedule of wages and fringe benefits based on a percentage of the current journey worker wage rate as specified in the Standards of Apprenticeship for the program under which the apprentice is participating.

State Chapter Partner Responsibilities

- Register and enroll students in the appropriate courses on the learning management system.
- Assist students with ordering textbooks for their courses.
- Act as the primary point of contact for students and employers who register for courses in their state.
- Serve as the liaison between the PHCC Academy and employers of apprentices enrolled in the program in their state.

PHCC Academy Responsibilities

- Ensure that the federal Department of Labor approval for the apprenticeship program is kept current and is updated as needed.
- Administer the learning management system and course offerings for the eLearning program. This includes developing course content and placing it into the learning management system.
- Provide students with learning management system usernames and passwords.
- Provide all administrative functions on the learning management system.
- Coordinate any Advanced Placement Testing with PHCC State Chapter Partners.
- Provide a completion letter and certificate to students upon successful completion of each course.

Required Textbook (Purchased Separately)

Moravek, Joseph and Hohman, John (2009). HVACR 201, 1st ed. Clifton Park, NY: Delmar, Cengage Learning.

Assignments

Unit 1 – Refrigeration Cycle Review, Compressors, and Refrigerants and Lubrication

Read Chapter 1 in the HVACR 201 textbook.

Chapter 1 Review PowerPoint

Read Chapter 2 in the HVACR 201 textbook.

Chapter 2 Review PowerPoint

Read Chapter 3 in the HVACR 201 textbook.

Video – Effective Refrigerant Recovery Techniques Part 1

Video – Effective Refrigerant Recovery Techniques Part 2

Chapter 3 Review PowerPoint

Unit 1 Exam

Unit 2 – Condensers and Metering Devices

Read Chapter 4 in the HVACR 201 textbook.

Video – How It's Made: Evaporative Cooling Towers

Chapter 4 Review PowerPoint

Read Chapter 5 in the HVACR 201 textbook.

Video – TXV Manufacture
Video – EEV Operation
Chapter 5 Review PowerPoint
Unit 2 Exam

Unit 3 – Refrigeration Accessories and Evaporators

Read Chapter 6 in the HVACR 201 textbook.
Video – Heat Pump Reversing Valve Operation
Chapter 6 Review PowerPoint
Read Chapter 7 in the HVACR 201 textbook.
Chapter 7 Review PowerPoint
Unit 3 Review Game
Unit 3 Exam

Unit 4 – Evacuation and Charging Procedures

Read Chapter 8 in the HVACR 201 textbook.
Video – Evacuation Part 1
Video – Evacuation Part 2
Chapter 8 Review PowerPoint
Unit 4 Exam

Unit 5 – Heating

Read Chapter 9 in the HVACR 201 textbook.
Video – Sequence of Operation for a Gas Furnace
Video – Carbon Monoxide Safety Tips
Chapter 9 Review PowerPoint
Unit 5 Exam

Unit 6 – Electrical and Electrical Troubleshooting

Read Chapter 10 in the HVACR 201 textbook.
Chapter 10 Review PowerPoint
Read Chapter 11 in the HVACR 201 textbook.
Video – Troubleshooting Electric Circuits
Chapter 11 Review PowerPoint
Unit 6 Exam

Unit 7 – Introduction to Motors

Read Chapter 12 in the HVACR 201 textbook.
Video – How it Works: Electric Motors
Video – Common HVAC Motors
Chapter 12 Review PowerPoint
Unit 7 Exam

Unit 8 – Cooling Equipment and Mechanical Troubleshooting

Read Chapter 13 in the HVACR 201 textbook.
Video – Installing a Ductless Mini Split System
Video – How a Chiller and Cooling Tower Work Together
Video – Heating, Chillers, and the Economizer Cycle

Chapter 13 Review PowerPoint
Read Chapter 14 in the HVACR 201 textbook.
Chapter 14 Review PowerPoint
Unit 8 Exam

Unit 9 – Advanced Installation Techniques and Control Systems

Read Chapter 15 in the HVACR 201 textbook.
Video – Duct Sealing
Chapter 15 Review PowerPoint
Read Chapter 16 in the HVACR 201 textbook.
Chapter 16 Review PowerPoint
Unit 9 Exam

Unit 10 – Psychrometrics and Basic Sizing
Read Chapter 17 in the HVACR 201 textbook.
Video – Reading a Psychrometric Chart
Chapter 17 Review PowerPoint
Read Chapter 18 in the HVACR 201 textbook.
Chapter 18 Review PowerPoint
Psychrometric Chart Reading Review Game
Unit 10 Exam

Final Exam

Course Evaluation



PHCC Academy® HVAC 301 Syllabus



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HVAC 101 and 201 or equivalent

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Course Goals

- To provide a more in-depth understanding of servicing and troubleshooting HVACR systems
- To familiarize students with testing, adjusting and balancing techniques
- To introduce students to cooling towers and evaporative condensers
- To provide familiarize students with commercial air conditioning and refrigeration systems
- To introduce students to concepts of indoor air quality

Student Responsibilities

- Complete work in a timely manner.
- Read all information and assignments within the learning management system before starting the course.
- Complete all tests in this course as closed-book. Students are on the honor system.
- Complete all assignments with a passing grade of 70 percent or higher.
- Complete the course in 1 year (12 months) or request a 6-month extension before the course expiration date.
- Maintain records of on-the-job training completed.

Employer Responsibilities

- Ensure that all students enrolled are proficient in reading and writing in English at a high school level and possess the self-motivation to complete internet-based coursework.
- Register apprentices with the U.S. Department of Labor, either through your own apprenticeship program or through your PHCC State Chapter Partner's registered apprenticeship program.

- Track the apprentice's on-the-job training hours and document such hours. Documentation records must be maintained by the employer for the duration of the apprentice's employment and must be retained as required by the U.S. Department of Labor.
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Required Textbook (Purchased Separately)

Hohman, John (2010). HVACR 301, 1st ed. Clifton Park, NY: Delmar, Cengage Learning.

Assignments

Unit 1 – Servicing and Troubleshooting Systems and TAB

Read Chapter 1 in the HVACR 301 textbook.

Video – Radiant Floor Heating Systems

Video – Heat Recovery Devices

Chapter 1 Review PowerPoint

Read Chapter 2 in the HVACR 301 textbook.

Video – How to Read a Pump Curve

Video – Performing a Duct Traverse

Chapter 2 Review PowerPoint

Unit 1 Exam

Unit 2 – Energy-Efficient Mechanical Systems and Fluid Handling Systems

Read Chapter 3 in the HVACR 301 textbook.

Video – Using a Combustion Analyzer on a High-Efficiency Furnace

Chapter 3 Review PowerPoint

Read Chapter 4 in the HVACR 301 textbook.

Video – Anatomy of a Circulator

Chapter 4 Review PowerPoint
Energy-Efficient Mechanical Systems and Fluid Handling Systems Review Game
Unit 2 Exam

Unit 3 – Applied Electrical Problem Solving
Read Chapter 5 in the HVACR 301 textbook.
Video – Arc Flash Safety
Video – Hard Start Kit
Video – Variable Frequency Drive Basics
Chapter 5 Review PowerPoint
Unit 3 Exam

Unit 4 – Applied Refrigeration System Problem Solving
Read Chapter 6 in the HVACR 301 textbook.
Video – Nitrogen Purging
Video – Why You Should Replace Filter-Driers
Video – Evacuation Part 1
Video – Evacuation Part 2
Chapter 6 Review PowerPoint
Unit 4 Exam

Unit 5 – Troubleshooting with the Psychrometric Chart
Read Chapter 7 in the HVACR 301 textbook.
Video – Reading a Psychrometric Chart
Drawing Assignment Assessment
Chapter 7 Review PowerPoint
Unit 5 Exam

Unit 6 – Cooling Towers and Evaporative Condensers
Read Chapter 8 in the HVACR 301 textbook.
Video – How It's Made: Evaporative Cooling Tower
Chapter 8 Review PowerPoint
Unit 6 Exam

Unit 7 – Commercial Air Conditioning and Refrigeration Systems
Read Chapter 9 in the HVACR 301 textbook.
Video – Chiller Basics
Chapter 9 Review PowerPoint
Unit 7 Exam

Unit 8 – Water Treatment and Indoor Air Quality
Read Chapter 10 in the HVACR 301 textbook.
Video – Legionella
Chapter 10 Review PowerPoint
Read Chapter 11 in the HVACR 301 textbook.
Video – Sick Building Syndrome
Chapter 11 Review PowerPoint
Water Treatment and IAQ Review Game

Unit 8 Exam

Final Exam

Course Evaluation



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Course Goals

- To familiarize students with heat pump systems and components
- To provide students with in-depth knowledge about air-source heat pumps
- To provide students with in-depth knowledge about geothermal heat pumps
- To introduce students to energy and efficiency calculations and applications

Student Responsibilities

- Complete work in a timely manner.
- Read all information and assignments within the learning management system before starting the course.
- Complete all tests in this course as closed-book. Students are on the honor system.
- Complete all assignments with a passing grade of 70 percent or higher.
- Complete the course in 1 year (12 months) or request a 6-month extension before the course expiration date.
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Required Textbook (Purchased Separately)

Hohman, John (2012). HVACR 401, 1st ed. Clifton Park, NY: Delmar, Cengage Learning.

Assignments

Unit 1 – Review of Basic Refrigeration Related to Heat Pumps

Read Chapter 1 in the HVACR 401 textbook.

Video – What is Superheat?

Video – What is Subcooling?

Chapter 1 Review PowerPoint

Read Chapter 2 in the HVACR 401 textbook.

Chapter 2 Review PowerPoint

Read Chapter 3 in the HVACR 401 textbook.

Chapter 3 Review PowerPoint

Read Chapter 4 in the HVACR 401 textbook.

Chapter 4 Review PowerPoint

Unit 1 Exam

Unit 2 – Heat Pump Components and Fundamentals

Read Chapter 5 in the HVACR 401 textbook.

Video – Wiring a Heat Pump Thermostat

Chapter 5 Review PowerPoint

Read Chapter 6 in the HVACR 401 textbook.

Video – Heat Pump Components

Chapter 6 Review PowerPoint

Read Chapter 7 in the HVACR 401 textbook.
Video – Common HVAC Motors
Chapter 7 Review PowerPoint
Read Chapter 8 in the HVACR 401 textbook.
Chapter 8 Review PowerPoint
Read Chapter 9 in the HVACR 401 textbook.
Video – Defrost Sequence of Operation
Chapter 9 Review PowerPoint
Unit 2 Exam

Unit 3 – Electrical Schematics and Heat Pump Installation and Maintenance

Read Chapter 10 in the HVACR 401 textbook.
Chapter 10 Review PowerPoint
Read Chapter 11 in the HVACR 401 textbook.
Chapter 11 Review PowerPoint
Read Chapter 12 in the HVACR 401 textbook.
Chapter 12 Review PowerPoint
Electricity and Heat Pumps Review Game
Unit 3 Exam

Unit 4 – Troubleshooting and Systems

Read Chapter 13 in the HVACR 401 textbook.
Video – Troubleshooting Outdoor Fan Motor
Video – Troubleshooting a Variable Speed Blower Motor
Chapter 13 Review PowerPoint
Read Chapter 14 in the HVACR 401 textbook.
Chapter 14 Review PowerPoint
Read Chapter 15 in the HVACR 401 textbook.
Chapter 15 Review PowerPoint
Unit 4 Exam

Unit 5 – Geothermal Systems

Read Chapter 16 in the HVACR 401 textbook.
Video – How Geothermal Heat Pumps Work
Chapter 16 Review PowerPoint
Read Chapter 17 in the HVACR 401 textbook.
Chapter 17 Review PowerPoint
Read Chapter 18 in the HVACR 401 textbook.
Chapter 18 Review PowerPoint
Unit 5 Exam

Unit 6 – Pumps and System Checks

Read Chapter 19 in the HVACR 401 textbook.
Chapter 19 Review PowerPoint
Read Chapter 20 in the HVACR 401 textbook.
Chapter 20 Review PowerPoint
Pumps and System Checks Review Game
Unit 6 Exam

Unit 7 – Geothermal Installation and Maintenance

Read Chapter 21 in the HVACR 401 textbook.

Video – Geothermal Vertical Loop Installation

Video – Flushing, Purging, and Filtering the Geothermal Loop

Chapter 21 Review PowerPoint

Read Chapter 22 in the HVACR 401 textbook.

Chapter 22 Review PowerPoint

Unit 7 Exam

Unit 8 – Water Treatment and Indoor Air Quality

Read Chapter 23 in the HVACR 401 textbook.

Video – Testing a Water/Refrigerant Coax

Video – Measuring Superheat and Subcooling

Video – Troubleshooting a TXV

Video – Leak Testing an Air Coil

Chapter 23 Review PowerPoint

Read Chapter 24 in the HVACR 401 textbook.

Chapter 24 Review PowerPoint

Unit 8 Exam

Final Exam

Course Evaluation