

# HEATING, VENTILATION & AIR CONDITIONING

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## COURSE OBJECTIVE

Students will obtain education and skills to work as installers, sheet metal fabricators and service technicians in the field of Heating, Ventilation and Air Conditioning.

## COURSE DESCRIPTION

Heating, Ventilation and Air Conditioning is a 3-year program that prepares tenth, eleventh and twelfth grade students for employment to assist the mechanic in the servicing and installation of residential and commercial heating and cooling systems. Students are also prepared for the EPA certification exam for safe refrigerant handling.

## COURSE TOPICS

Introduction to HVAC | Basic Safety | How to Handle Power & Hand Tools Properly  
Blue Print Reading | Piping Practices | Basic Electricity | Introduction to Cooling | Introduction to Heating  
Air Distribution Systems | Introduction to Hydronics | Leak Detection, Evacuation, Recovery & Charging  
Trouble Shooting Heating | Trouble Shooting Cooling | Heat Pumps | Computer Fundamentals

## REQUIRED SUPPLIES

Gloves (Leather, Not Synthetic) | Leather Work Boots (Steel-Toed Preferred) | Safety Glasses  
Shop Shirt (Gray Pocket Tee) | Workwear Pants of Natural Material (100% Cotton, Gray) | Notebook Paper  
(2) 8-Packs of Pencils | (2) 3-Ring Binders | (50) 8-1/2 x 11 Sheet Protectors | USB Drive, 8GB or Larger

## TEXTBOOKS

*Preparing for the Nate Exam-Core Essentials*; Refrigeration Service Engineers Society; 2009  
*Preparing for the Nate Exam-Gas & Oil Heating*; Refrigeration Service Engineers Society; 2010  
*Preparing for the Nate Exam-Air Conditioning & Heat Pumps*; Refrigeration Service Engineers Society; 2009  
*NCCER-Core Curriculum*; Pearson; 2015  
*NCCER-HVAC Level #1; HVAC Level #2; HVAC Level #3*; Pearson; 2013  
*Environmentally Safe Refrigerant Service Tips & Techniques*; Mainstream Engineering Corp.; 2011

## COOPERATING COMPANIES

Associated Builders and Contractors, Inc. (ABC)  
Louis T. Ursitz Heating & Air Conditioning–McDonald, PA  
R. E. Michel Company, Inc.

Shearer Heating & Air Conditioning, Inc.  
Sheet Metal Workers, Local Union 12  
Steam Fitters UA Local #449

## **SPECIALIZED SHOP EQUIPMENT**

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Anemometer | Combustion Analyzers | Digital Manometer | Digital Micron Gauge | Digital Multi-Meter  
Digital Scales | Digital Thermometers | Electronic Leak Detector | Refrigerant Recovery Machine  
Sheet Metal Machines | Ultrasonic Electric Detector | Vacuum Pumps

## **CERTIFICATIONS**

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American Ladder Institute: Articulated Ladder; Mobile Ladder; Single & Extension Ladder; Step Ladder  
CareerSafe OSHA – Construction  
Mainstream Engineering: EPA 608; Green Energy Certification; Refrigerant #410-A Handling  
National Center for Construction Education and Research (NCCER) Credentials  
National Center for Construction Education and Research (NCCER) HVAC Levels 1, 2, 3 Curriculum  
Credentials

## **ARTICULATION AGREEMENTS**

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Community College of Allegheny County  
Penn Commercial, Inc.

Pittsburgh Technical College  
Triangle Tech

## **POST-SECONDARY TRAINING OPTIONS**

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ABC (Associated Builders & Contractors, Inc.) Apprenticeship Opportunity  
Community College of Allegheny County–Heating, Air Conditioning, Ventilation and Refrigeration  
Maintenance Technology  
Local #12 Apprenticeship Opportunity  
Penn Commercial, Inc.–Heating, Ventilation, Air Conditioning & Refrigeration  
Pennsylvania College of Technology–Heating, Air Conditioning and Refrigeration Technology  
Triangle Tech, Inc.–Heating, Air Conditioning, Ventilation and Refrigeration Maintenance Technology  
UA Local #449 Apprenticeship Opportunity

## **POTENTIAL CAREERS**

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Building Maintenance Technician | Building Operations Controller | Consulting and Design Engineer  
Domestic Refrigeration Technician | Electrician, Local #5 | HVAC Installation Mechanic  
HVAC Technician | Inventory Control Technician | Job Estimator | Purchasing Agent | Self-Employment  
Sheet Metal Worker, Local #12 | Steamfitter, Local #449

## **HEATING, VENTILATION AND AIR CONDITIONING SKILLS**

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**Troubleshooting** — Determining causes of operating errors and deciding what to do about it.

**Repairing** — Repairing machines or systems using the needed tools.

**Active Listening** — Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate and not interrupting at inappropriate times.

**Equipment Maintenance** — Performing routine maintenance on equipment and determining when and what kind of maintenance is needed.

**Critical Thinking** — Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems.

**Installation** — Installing equipment, machines, wiring, or programs to meet specifications.

**Social Perceptiveness** — Being aware of others' reactions and understanding why they react as they do.

**Active Learning** — Understanding the implications of new information for both current and future problem-solving and decision-making.

**Coordination** — Adjusting actions in relation to others' actions.

**Reading Comprehension** — Understanding written sentences and paragraphs in work related documents.

## **WAGES AND EMPLOYMENT TRENDS FOR HVAC TECHNICIANS AND INSTALLERS**

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### **Pennsylvania Statistics:**

Median Wages (2020)	\$25.24 Hourly, \$52,490 Annually
Number of Jobs (2018)	367,800 Employees Across the U.S.
Job Outlook (2018–2028)	9% Projected Growth in Pennsylvania
Employment Change (2018–2028)	1,880 Projected Job Openings

Source: *Onetonline.org*

## **WAGES AND EMPLOYMENT TRENDS FOR PLUMBERS, PIPE FITTERS AND STEAM FITTERS**

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### **Pennsylvania Statistics:**

Median Wages (2019)	\$27.08 Hourly, \$56,330 Annually
Number of Jobs (2018)	490,200 Employees
Job Outlook (2018–2028)	10% Projected Growth in Pennsylvania
Employment Change (2018–2028)	49,800

Source: *Onetonline.org*

## **WAGES AND EMPLOYMENT TRENDS FOR SHEET METAL WORKERS**

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### **Pennsylvania Statistics:**

Median Wages (2019)	\$24.70 Hourly, \$51,370 Annually
Number of Jobs (2018)	137,700 Employees
Job Outlook (2018–2028)	6% Projected Growth in Pennsylvania
Employment Change (2018–2028)	12,700

Source: *Onetonline.org*