

Providence Career & Technical Academy

Every child, in school, every day, on time.

Residential HVAC/PLUMBING Senior Syllabus

Instructor Name: Robert Sherwood and Kevin Masse

Time Frame: 2023-2024 Year

Email: robert.sherwood@ppsd.org and kevin.masse@ppsd.org

Course Description

This course involves an orientation of the requirements and other information needed for job entry in the plumbing and HVAC field.

This course will familiarize the students with the terminology and principles of basic residential plumbing, heating, ventilation and air conditioning used in the profession. A variety of topics will be present such as construction safety, construction drawings, employability skills, construction math, fittings, fixtures, and fixtures.

This course will follow the **HBI** curriculum for the following:

Curriculum	Grades Participating
HBI CORE CURRICULUM	Freshmen/ Sophomores
HBI PLUMBING	Sophomores/ Juniors
HBI PLUMBING	Juniors/ Seniors
HBI HEATING, VENTILATION, AIR CONDITIONING	Sophomores/ Juniors/ Seniors

Textbooks Used but not limited to:

HBI Pre-Apprenticeship Certificate Training Student Workbook
Core Units 1-5
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HBI Pre-Apprenticeship Certificate Training Student Workbook
Plumbing Unit 8
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HBI Pre-Apprenticeship Certificate Training Student Workbook
HVAC Unit 14
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Residential Construction Academy: Basic Principles for Construction , 5th Edition
ISBN-13: 978-1-337-91382-9

NCCER Core Curriculum fifth edition
ISBN-13: 978-0-13-424400-6

NCCER Plumbing Level One Training Guide Prentice-Hall fourth edition
ISBN-13: 978-0-13-292143-5

NCCER Plumbing Level Two Training Guide Prentice-Hall fourth edition
ISBN-13: 978-0-13-314850-3

NCCER Heating, Ventilation, Air Conditioning Level One fourth Edition
ISBN-13: 978-0-13-418619-1

NCCER Heating, Ventilation, Air Conditioning Level Two fourth Edition
ISBN-13: 978-0-13-340427-2

NCCER Sheet Metal Level One Training Guide Prentice-Hall third edition
ISBN-13: 978-0-13-604482-6

Standards Addressed and Student Learning Outcomes

Through the HVAC/ Plumbing Training - Students will be able to:

- Work safely around HVAC/ Plumbing equipment
- Assist in designing and building ductwork
- Troubleshoot/repair or replace wiring and conduit in existing HVAC installations
- Conduct preventive maintenance
- Demonstrate proper handling of HVAC-related chemicals and hazardous materials
- Explain the principles and major components of air distribution and treatment systems
- Check thermostat and control circuit operation
- Join pipe with sweating and chemical techniques.
- Rough-in plumbing systems.
- Pressure-test systems.

- Install plumbing fixtures.
- Repair basic plumbing problems.

Through the HVAC/ Plumbing Training Students will gain trade specific Knowledge.

The following knowledge and skills are required for successful completion of this unit:

- Construction, mechanical, and electrical codes
- General and trade-specific terminology
- Familiarity with heat-transfer theory
- Familiarity with HVAC/ Plumbing hand and power tools, and the basic safety and use of them
- Familiarity with EPA refrigerant guidelines
- Industry trade-specific standards and sizes.
- Basic OSHA standards.

Through the HVAC/ Plumbing Training Students will gain the Employability and Effective Communication Skills required to succeed in PostSecondary education, employment, and the military.

- Learn to communicate effectively
- Demonstrate cooperative teamwork skills
- Demonstrate and apply safety in the workplace
- Learn and utilize critical and creative thinking
- Demonstrate responsible work ethics
- Demonstrate safe practices using hand and power tools

Instructional Methods

- Lecture and discussion will be used in the presentation of concepts, information and assignment requirements
- Demonstrations of procedures and techniques
- Lab time will be provided for skill development using tools and equipment
- Audio visuals may be used to supplement instructions
- Google Classroom will be used for Distance Learning and independent learning
- Kahn Academy and other on-line learning Aides will be used to guide students independently to help them understand how academic concepts are applied to construction projects.

Common Core Standards Addressed:

- GMP 1.6: Connect mathematical ideas and representations to one another.
- GMP 2.2: Explain the meanings of the numbers, words, pictures, symbol, gestures, tables, graphs, and concrete objects you and others use.
- GMP 3.1: Explain both what to do and why it works.

- GMP 4.1: Apply mathematical ideas to real-world situations.
- GMP 5.3: Estimate and use what you know to check the answers you find using tools.
- GMP 6.1: Communicate your mathematical thinking clearly and precisely.
- GMP 8.3: Reflect on your thinking before, during, and after you solve a problem.
- W.11-12.2: Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.
- W.11-12.3: Write narratives to develop real or imagined experiences or events using effective technique, well-chosen details, and well-structured event sequences.
- W.11-12.7: Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

HVAC/ Plumbing Standards and Modules Addressed:

Quarter	Expected Level of achievement	HBI Curriculum Heading	Name of Module or Expertise
1	Proficient	HVAC	M1-Alternating Current
1	Proficient	HVAC	M2-Compressors
1	Proficient	HVAC	M4-Leak detection, evacuation, recovery, and charging
2	Advanced	Plumbing	M7-Copper tube and fittings
2	Advanced	HVAC	M7-Basic copper and plastic piping practices
2	Advanced	HVAC	M8-Soldering and brazing
2	Proficient	HVAC	M3-Refrigerants and oils
2	Proficient	HVAC	M5-Metering devices
2	Proficient	HVAC	M6-Heat Pumps
2	Proficient	HVAC	M7-Basic maintenance
2	Proficient	HVAC	M8-Chimneys, vents, and flues
3	Proficient	HVAC	M9-Sheet metal duct systems
3	Proficient	HVAC	M13-Introduction to hydronic systems
3	Exposed	Sheet Metal	M9-Architectural sheet metal
4	Proficient	HVAC	M10-Fiberglass and flexible duct systems
4	Proficient	HVAC	M11- Commercial airside systems
4	Proficient	HVAC	M12- Air quality equipment

1-4	Proficient	Senior Project	
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Guidelines for Success and Grading Policy

Assessment is an integral part of the educational process. Feedback is an important tool in continuously improving the education of the students. Concepts will be evaluated through the use of workbooks, periodic tests, tool identification and practical applications through levels of competency. The grading rationale and grading scale is as follows:

- 20%-- Class work includes participation-daily quizzes and assignments, textbook, theory, behavior and cleanup**
- 20%-- Employability includes attendance, safety protocols, punctuality, drive and determination and coachability, behavior**
- 20%-- Exams and performance assessments**
- 35%-- Lab work includes hands-on performance, tool usage, proper vinaclar and Clean up**

Levels of competency: Students are expected to be at a level of Proficiency in at least 80% of the competencies for HBI Core, Plumbing, and HVAC in order to receive their certification. There are four levels of competency, and each grade has a different expectation for each component. (See the “HVAC/ Plumbing Standards and Modules Addressed” chart above)

Exposed	Competent	Proficient	Advanced
Starting to learn terms, and can perform tasks with help	Knows some terms, and can perform tasks with some help, and can slightly explain how and why some things are done	Knows most terms, and can perform tasks with very little help, and can explain and demonstrate how and why some things are done	Has achieved the level of Proficient, and can teach others to become competent or proficient

Academic Integrity:

Students are expected to submit their own original work. He or she will be expected to finish their modules and associated hands-on lab in a timely manner. PCTA expects every student to

demonstrate ethical behavior with regards to academic pursuits. Academic integrity in the classroom is a specific requirement. Definitions, examples, and possible consequences for violations of academic integrity can be found in the PCTA student handbook. Classroom and virtual attendance is required. Material missed must be made up with the instructor.

PCTA HVAC\Plumbing

1. The HVAC\Plumbing department shall identify on a monthly basis any student who has frequent absences, several missed assignments, and lack of productivity within the classroom.
2. Upon identifying a student with needs, a meeting shall be made with the student, guidance, and the teacher of record to evaluate the student's lack of performance when attending HVAC\Plumbing. This meeting will allow the student and instructor to produce a comprehensive plan with the help of a guidance counselor to get the student to the appropriate performance level. This gives the student the opportunity to be a part of his or her education and redirection of their education.
3. If the student does not comply with the agreement within 2 weeks, a representative from the HVAC\Plumbing department will contact the guidance department to make an appointment for a second conference including the parent to discuss any issues or concerns about their child.
4. If student performance continues to decline the student will be referred to RTI (see below for RTI plan)

PCTA HVAC\Plumbing RTI Plan

1. The HVAC\Plumbing will meet once a month to discuss any potential students who are in the "at risk" category. The "at risk" category is defined as any student missing more than 10 days in one quarter, also any student who fails an assessment from the curriculum.
2. Once any "at risk" students have been identified an EWS form shall be forwarded to guidance and special education. The form will be filed permanently in the HVAC\Plumbing department.
3. The student will be enrolled in weekly after-school tutoring to help provide the student additional support.
4. Check-ins with the students' progress and the teacher of record will be monitored.
5. A meeting shall be scheduled with the RTI team to discuss further actions to create a comprehensive plan for the students to succeed.