Course: HVAC Technology

Unit Name: PA100 - INTRODUCTION TO HVAC

Unit Number: PA100

Dates: Fall 2019  Hours: 24

Unit Description/Objectives:
Student will know and be able to complete the required entry class/school forms, identify job opportunities, review course competencies, and demonstrate the safe use of tools safety practices and SDS protocol.

Tasks:
PA101 - Identify HVAC systems.
PA102 - Describe career opportunities in the HVAC profession.
PA103 - Demonstrate awareness of the occupational requirements.
PA104 – Reserved
PA105 Use soft skills when interacting with customers

Standards / Assessment Anchors

Focus Standard

13.1.11.11.B Analyze career options based on personal interests, abilities, aptitudes, achievements and goals

Supporting Standard

CC.3.5.11-12.D. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.
CC.3.5.11-12.G. Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
Connecting Standard

CC.3.5.9-10. I Compare and contrast findings presented in a text to those from other sources, etc.

Instructional Activities:

Knowledge:
- Participate in co-operative group discussions
- Listen and participate in lecture by completing a review sheet
- Participate in co-operative group theory projects
- Review career opportunities using the internet
- Identify components by using drawings and schematics

Skill:
- Follow task sheet instructions to complete practical projects
- Explain the basic principles of heating, ventilating, and air conditioning
- Identify career opportunities available to people in the HVAC trade
- Explain the purpose and objectives of an apprentice training program
- Describe how certified apprentice training can start in high school

Remediation:
- Re-teach major concepts
- Worksheets
- Individual assistance
- Peer Tutoring
- Study Guides

Enrichment:
- Conduct a shop safety audit using a JSA
- Complete a safety review of the program
- Assist another student

Safety:
- Student must:
  - Comply with personal and environmental safety practices associated with shop recommended clothing, eye protection and the handling, storage, and disposal of chemicals/materials in accordance with school, local, state, and federal safety and environmental regulations.
  - Handle material in a safe and work like manner
  - Use protective clothing and equipment
  - Use hand tools in a safe manner
  - Use adequate ventilation when working in enclosed areas
  - Follow manufacturer's directions when using any product, tool, equipment, etc.
  - Use proper safety precautions when using/operating hand tools
  - Use tools and equipment in a professional work like manner according to OSHA standards
  - Know and follow the established safety rules at all times

Assessment:

Rubrics
Quizzes
Worksheets
Projects
Tests
Complete packet questions
Answer questions

Resources/Equipment:

NCCER Core Curriculum: Pearson Education, Inc. 2015
Electricity for HVACR: Cengage Learning, 2015
Various HVAC equipment
Laptops
Steel Center for CTE

**Course:** HVAC

**Unit Name:** PA200 - BASIC SAFETY

**Unit Number:** PA200

**Dates:** fall 2019  **Hours:** 116

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**Unit Description/Objectives:**
Student will know and be able to complete and demonstrate the safe use of tools, safety practices, and SDS protocol.

**Tasks:**
- PA201 - Reserved
- PA202 - Reserved
- PA203 - Identify and demonstrate the use of personal protection equipment.
- PA204 – Apply OSHA regulations to identify hazards and measures to prevent job site accidents from occurring
- PA205 - Set up and use stepladders, extension ladders, and scaffold

**Standards / Assessment Anchors**

*Focus Standard*

CC.3.5.11-12. C. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text

*Supporting Standard*

CC.3.5.11-12.D. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.
CC.3.5.11-12.G. Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
Connecting Standard

CC.3.5.9-10. I Compare and contrast findings presented in a text to those from other sources, etc.

Instructional Activities:

Knowledge:
- Observe demonstrations
- Participate in theory lesson
- Take notes
- Respond to questions
- List safety practice for ladders
- Describe the proper use of the different types of fire extinguishers
- Explain the purpose of OSHA and how it promotes safety on the job
- Explain safety issues concerning lockout/tagout procedures
- Explain personal protection using fall protection systems
- Explain the role that safety plays in the construction crafts
- Describe what job-site safety means
- Explain the appropriate safety precautions around common job-site hazards
- Explain the importance of SDS formerly known as MSDS.

Skill:
- Model projects to be fabricated as per specifications using HVAC/Plumbing material and recommended material
- Follow task sheet instructions to complete practical projects
- Identify the responsibilities and personal characteristics of a professional crafts person
- Explain the role that safety plays in the construction crafts
- Describe what job-site safety means
- Explain the appropriate safety precautions around common job-site hazards
- Demonstrate the use and care of appropriate personal protective equipment
- Follow safe procedures for lifting heavy objects
- Describe safe behavior on and around ladders and scaffolds
- Describe fire prevention and fire-fighting techniques
- Define safe work procedures around electrical hazards
- Demonstrate the use of ladders and scaffolding

Remediation:
- Re-teach major concepts
- Review with teacher assistance
- Provide individual tutoring
- Provide peer tutoring
- Engage student in study groups
- Use review games to provide reinforcement of material

Enrichment:
- Advancement to the next task or set of tasks
- Engage in advanced projects related to tasks
Safety:
Student must:
Comply with personal and environmental safety practices associated with shop recommended clothing, eye protection and the handling, storage, and disposal of chemicals/materials in accordance with school, local, state, and federal safety and environmental regulations.
Handle material in a safe and work like manner
Use protective clothing and equipment
Use hand tools in a safe manner
Use adequate ventilation when working in enclosed areas
Follow manufacturer’s directions when using any product, tool, equipment, etc.
Use proper safety precautions when using /operating hand tools
Use tools and equipment in a professional work like manner according to OSHA standards
Know and follow the established safety rules at all times

Assessment:
Rubrics
Quizzes
Worksheets
Projects
Tests
Complete packet
Answer questions

Resources/Equipment:
NCCER Core Curriculum: Pearson Education, Inc. 2015
Electricity for HVACR: Cengage Learning, 2015
Various HVAC equipment
PPE
Ladders (step and extension)
Scaffold
Steel Center for CTE  
**Course:** HVAC Technology

**Unit Name:** PA300 - TOOLS FOR HVAC/R  
**Unit Number:** PA300  
**Dates:** Fall 2019  
**Hours:** 40

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**Unit Description/Objectives:**
Student will know and be able to safely use all tools in the HVAC/R trade.

**Tasks:**
- PA301 – Use and maintain basic hand tools used in the trade
- PA302 – Use and maintain basic power tools used in the trade

**Standards / Assessment Anchors**

*Focus Standard*

CC.3.5.11-12.C Follow precisely a complex multistep procedure

*Supporting Standard*

CC.3.5.11-12. A Cite specific textual evidence  
CC.3.5.11-12. B Determine the central ideas or conclusions of a text

*Connecting Standard*

CC.3.5.11-12. I Synthesize information from a range of sources into a coherent understanding of a process or concept.
Instructional Activities:

Knowledge:
- Study glossary of terms
- Complete projects
- Participate in theory lesson, take notes, and respond to questions
- Complete individual and group projects
- Memorize essential vocabulary
- Identify common hand tools and their uses in the HVAC trade
- Identify common power tools and their uses in the HVAC trade

Skill:
- Recognize and identify some of the basic hand tools used in the construction trade
- Use tools in a safe manner
- Describe the basic procedures for taking care of these tools
- Identify commonly used power tools of the construction trade
- Use of power tools in a safe manner
- Explain how to maintain power tools properly

Remediation:
- Re-teach major concepts
- Review with teacher assistance
- Provide individual tutoring
- Provide peer tutoring
- Engage student in study groups
- Use review games to provide reinforcement of material

Enrichment:
- Advancement to the next task or set of tasks
- Hone competition skills
- Engage in advanced projects related to tasks

Safety:
- Student must:
  - Comply with personal and environmental safety practices associated with shop recommended clothing, eye protection and the handling, storage, and disposal of chemicals/materials in accordance with school, local, state, and federal safety and environmental regulations
  - Handle material in a safe and work like manner
  - Use protective clothing and equipment
  - Use hand tools in a safe manner
  - Use adequate ventilation when working in enclosed areas
  - Follow manufacturer’s directions when using any product, tool, equipment, etc.
  - Use proper safety precautions when using /operating hand tools
  - Use tools and equipment in a professional work like manner according to OSHA standards
  - Know and follow the established safety rules at all times
Assessment:
- Worksheets
- Quizzes
- Pre/Post Test
- Rubrics
- Group Projects

Resources/Equipment:
- NCCER Core Curriculum: Pearson Education, Inc. 2015
- Electricity for HVACR: Cengage Learning, 2015
- Various HVAC equipment
- Basic hand tools
- Battery tools
- Power tools
- Torches
- HVAC specific hand tools
Course: HVAC

Unit Name: PA400 - BLUEPRINT READING

Unit Number: PA400

Dates: Fall: 2019  Hours: 16

Unit Description/Objectives: Student will know and be able to recognize and identify basic blueprint terms, components, and symbols and related information on blueprints to actual locations on the print; recognize different classifications of drawings; and interpret and use drawing dimensions.

Tasks:
PA401 – Compare types of blueprints
PA402 – Read and interpret blueprint plans

Standards / Assessment Anchors

Focus Standard
CC.3.5.11-12.C Follow precisely a complex multistep procedure

Supporting Standards/Anchors
C.3.5.11-12. D Determine the meaning of symbols, key terms, and other domain specific words
CC.3.5.11-12. E Analyze the structure of the relationships among concepts in a text

Connecting Standard
CC.3.6.11-12. H. Draw evidence from informational texts to support analysis, reflection, and research.
**Instructional Activities:**

**Knowledge:**
- Participate in co-operative group discussions
- Listen and participate in lecture by completing a review sheet
- Participate in co-operative group theory projects
- Review related rubric and procedures for project completion
- Participate in a literacy (RWLS or Math) strategy to familiarize students with material, procedures, and practices
- Identify components by using drawings and schematics

**Skill:**
- Model projects to be fabricated as per specifications using HVAC/Plumbing material and recommended material
- Follow task sheet instructions to complete practical projects
- Recognize and identify basic blueprint terms, components, and symbols
- Relate information on blueprints to actual locations on the print
- Recognize different classifications of drawings
- Interpret and use drawing dimensions

**Remediation:**
- Re-teach major concepts
- Review with teacher assistance
- Provide individual tutoring
- Provide peer tutoring
- Engage student in study groups
- Use review games to provide reinforcement of material
**Enrichment:**
- Advancement to the next task or set of tasks
- Engage in advanced projects related to tasks

**Safety:**
- Student must:
  - Comply with personal and environmental safety practices associated with shop recommended clothing, eye protection and the handling, storage, and disposal of chemicals/materials in accordance with school, local, state, and federal safety and environmental regulations
  - Handle material in a safe and work like manner
  - Use protective clothing and equipment
  - Use hand tools in a safe manner
  - Use adequate ventilation when working in enclosed areas
  - Follow manufacturer’s directions when using any product, tool, equipment, etc.
  - Use proper safety precautions when using /operating hand tools
  - Use tools and equipment in a professional work like manner according to OSHA standards
  - Know and follow the established safety rules at all times

**Assessment:**
- Worksheets
- Quizzes
- Pre/Post Test
- Rubrics
- Group Projects

**Resources/Equipment:**
- **NCCER Core Curriculum**: Pearson Education, Inc. 2015
- **Electricity for HVACR**: Cengage Learning, 2015
- Various HVAC equipment
- Blue prints
- Tape measure
- Calculator
Unit Description/Objectives:
Student will know and be able to identify, assemble and install copper, plastic, and steel piping.

Tasks:
PA501 - Identify piping materials.
PA502 - Select, measure, cut, and ream piping and tubing.
PA503 – Cut, ream, thread and assemble steel piping projects and pressure test
PA504 – Assemble non-metallic pipe and fittings and pressure test
PA505 - Assemble copper tubing projects and pressure test according to trade standards.
PA506 - Solder copper tubing.
PA507 - Braze ACR tubing.
PA508 - Identify and use fittings and tools for steel (black) pipe. PA509 - Cut, ream, thread and assemble steel (black) pipe.
PA509- Reserved
PA510 - Assemble corrugated stainless steel gas tubing (CSST) projects.
PA511 - Reserved

Standards / Assessment Anchors

Focus Standard
CC.3.5.11-12.C Follow precisely a complex multistep procedure

Supporting Standard
CC.3.5.11-12 A Cite specific textual evidence
CC.3.5.11-12. B Determine the central ideas or conclusions of a text
Connecting Standard

CC.3.5.11-12. I Synthesize information from a range of sources into a coherent understanding of a process or concept.

Instructional Activities:

Knowledge:
- Participate in co-operative group discussions
- Listen and participate in lecture by completing a review sheet
- Participate in co-operative group theory projects
- Review related rubric and procedures for project completion
- Participate in a literacy (RWLS or Math) strategy to familiarize students with material, procedures, and practices
- Perform research work by reading, reviewing, and deciphering content material from trade journals
- Perform research work by reading, reviewing, and deciphering content material from the Internet
- Identify components by using drawings and schematics
Skill:

Model projects to be fabricated as per specifications using HVAC/Plumbing material and recommended material
Follow task sheet instructions to complete practical projects
Assemble and operate the tools used for connection of piping material
Prepare tubing and fittings for assembly
Use appropriate method for assembly
Identify the purposes and uses of piping material
Identify inert gases needed to purge tubing for proper assembly

Remediation:

Re-teach major concepts
Review with teacher assistance
Provide individual tutoring
Provide peer tutoring
Engage student in study groups
Use review games to provide reinforcement of material

Enrichment:

Advancement to the next task or set of tasks
Engage in advanced projects related to tasks

Safety:

Student must:
Comply with personal and environmental safety practices associated with shop recommended clothing, eye protection and the handling, storage, and disposal of chemicals/materials in accordance with school, local, state, and federal safety and environmental regulations
Handle material in a safe and work like manner
Use protective clothing and equipment
Use hand tools in a safe manner
Use adequate ventilation when working in enclosed areas
Follow manufacturer’s directions when using any product, tool, equipment, etc.
Use proper safety precautions when using /operating hand tools
Use tools and equipment in a professional work like manner according to OSHA standards
Know and follow the established safety rules at all times

Assessment:

Student practical tasks will be graded based on rubrics if applicable.
Tasks will be inspected, tested and graded to meet HVAC-R standards (Reference National Mechanical, Plumbing, and Electrical Code Book)
Practical tasks include related theory testing applicable to the task and will be graded
Practical tasks include related assignments applicable to the task and will be graded

Resources/Equipment:

NCCER Core Curriculum: Pearson Education, Inc. 2015
Electricity for HVACR: Cengage Learning, 2015
Various HVAC equipment
Copper pipe and fittings
Steel pipe and fittings
CSST pipe
Acetylene tank
Torch assembly
Solder
Flux
Brazing rods
Nitrogen
Gauges
Pipe dope
Threader
Oil bucket
Vise
Pipewrenches
cutters
Unit Name: PA600 - BASIC ELECTRICITY

Unit Number: PA600

Dates: Fall 2019  Hours: 160

Unit Description/Objectives:
Student will know and be able to state how electrical power is generated and distributed and describe how voltage, current, resistance, and power are related. Student will also know and be able to use Ohm's law to calculate the current, voltage, and resistance in a circuit and use the power formula to calculate how much power is consumed by a circuit. Finally, the student will know and be able to describe the differences between series and parallel circuits.

Tasks:
PA601 – Compare and analyze methods of producing electricity using appropriate terms
PA602 - Calculate basic electrical quantities using Ohm's law.
PA603 - Explain how magnetism is used in different HVAC components.
PA604 - Implement safe electrical practices.
PA605 - Interpret and draw various types of electrical schematics and symbols.
PA606 - Apply proper wiring techniques.
PA607 - Perform electrical testing to include mechanical/electronic relays.
PA608 - Wire series circuit, parallel circuit, and series / parallel circuit.
PA609 - Install and size electric disconnects, circuit breakers and fuses.
PA610 – classify and test various types of capacitors
PA611 - Identify electrical motors and their applications.
PA612 – Differentiate motor control protection and start devices
PA613 – Apply electrical codes.

PA614 – Determine transformers and their applications

PA615– Size, apply and ground electrical circuits and raceways

**Standards / Assessment Anchors**

*Focus Standard*

CC.3.5.11-12.C Follow precisely a complex multistep procedure

*Supporting Standard*

CC.3.5.11-12 A Cite specific textual evidence
CC.3.5.11-12.B Determine the central ideas or conclusions of a text

*Connecting Standard*

CC.3.5.11-12. I Synthesize information from a range of sources into a coherent understanding of a process or concept.
Instructional Activities:

Knowledge:
- Participate in co-operative group discussions
- Listen and participate in lecture by completing a review sheet
- Participate in co-operative group theory projects
- Review related rubric and procedures for project completion
- Participate in a literacy (RWLS or Math) strategy to familiarize students with material, procedures, and practices
- Perform research work by reading, reviewing, and deciphering content material from trade journals
- Perform research work by reading, reviewing, and deciphering content material from the Internet
- Identify components by using drawings and schematics

Skill:
- Complete time cards describing daily work completed
- Model projects to be fabricated as per specifications using HVAC/Plumbing material and recommended material
- Follow task sheet instructions to complete practical projects
- State how electrical power is generated and distributed
- Describe how voltage, current, resistance, and power are related
- Use Ohm’s law to calculate the current, voltage, and resistance in a circuit
- Use the power formula to calculate how much power is consumed by a circuit
- Describe the differences between series and parallel circuits
- Recognize and describe the purpose and operation of the various electrical components used in HVAC equipment
- State and demonstrate the safety precautions that must be followed when working on electrical equipment
- Make voltage, current, and resistance measurements using electrical test equipment

Remediation:
- Re-teach major concepts
- Review with teacher assistance
- Provide individual tutoring
- Provide peer tutoring
- Engage student in study groups
- Use review games to provide reinforcement of material

Enrichment:
- Advancement to the next task or set of tasks
- Engage in advanced projects related to tasks

Safety:
Student must:
- Comply with personal and environmental safety practices associated with shop recommended clothing, eye protection and the handling, storage, and disposal of chemicals/materials in accordance with school, local, state, and federal safety and environmental regulations
- Handle material in a safe and work like manner
- Use protective clothing and equipment
- Use hand tools in a safe manner
- Use adequate ventilation when working in enclosed areas
- Follow manufacturer’s directions when using any product, tool, equipment, etc.
- Use proper safety precautions when using /operating hand tools
- Use tools and equipment in a professional work like manner according to OSHA standards
- Know and follow the established safety rules at all times
Assessment:
Student practical tasks will be graded based on rubrics if applicable.
Tasks will be inspected, tested and graded to meet HVAC-R standards (Reference National Mechanical, Plumbing, and Electrical Code Book)
Practical tasks include related theory testing applicable to the task and will be graded
Practical tasks include related assignments applicable to the task and will be graded

Resources/Equipment:
NCCER Core Curriculum: Pearson Education, Inc. 2015
Electricity for HVACR: Cengage Learning, 2015

Various HVAC equipment
Basic hand tools
Romex wire
Motors
Transformers
Relays
Capacitors
Volt meter
Calculator
Steel Center for CTE
Course: HVAC

Unit Name: PA700 - INTRODUCTION TO COOLING
Unit Number: PA700
Dates: Fall 2019  Hours: 160

Unit Description/Objectives:
Student will know and be able to explain how heat transfer occurs in a cooling system and demonstrate an understanding of the terms and concepts used in the refrigeration cycle.

Tasks:
- PA701 - Measure temperature and pressure of a cooling system.
- PA702 - Calculate superheat and sub cooling.
- PA703 - Locate and describe components of the basic refrigeration cycle.
- PA704 – Evaluate refrigerants using temperature and pressure charts for various refrigerants
- PA705 – Analyze and test the operations various compressors.
- PA706 – Analyze and test the operations of various condensers.
- PA707 – Analyze and test the operations of various evaporators.
- PA708 – Analyze, test and adjust the operations of various metering devices.
- PA709 - Identify secondary components used in the air conditioning and refrigeration industry.
- PA710 - Evaluate effects of airflow on cooling system performance.
- PA711 - Categorize and manipulate service valves

Standards / Assessment Anchors
Focus Standard

CC.3.5.11-12.C Follow precisely a complex multistep procedure

Supporting Standard

CC.3.5.11-12 A Cite specific textual evidence
CC.3.5.11-12. B Determine the central ideas or conclusions of a text

Connecting Standard

2.1.HS.F.5 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

Instructional Activities:

Knowledge:
- Participate in co-operative group discussions
- Listen and participate in lecture by completing a review sheet
- Review related rubric and procedures for project completion
- Perform research work by reading, reviewing, and deciphering content material from trade journals
- Perform research work by reading, reviewing, and deciphering content material from the Internet
- Identify components by using drawings and schematics
Skill:
Complete time cards describing daily work completed
Model projects to be fabricated as per specifications using HVAC/Plumbing material and recommended material
Follow task sheet instructions to complete practical projects
Explain how heat transfer occurs in a cooling system, demonstrating an understanding of the terms and concepts used in the refrigeration cycle
Calculate the temperature and pressure relationships at key points in the refrigeration cycle
Under supervision, use temperature- and pressure-measuring instruments to make readings at key points in the refrigeration cycle
Identify commonly used refrigerants and demonstrate the procedures for handling these refrigerants.
Identify the major components of a cooling system and explain how each type works
Identify the major accessories available for cooling systems and explain how each works
Identify the control devices used in cooling systems and explain how each works
State the correct methods to be used when piping a refrigeration system

Remediation:
Re-teach major concepts
Review with teacher assistance
Provide individual tutoring
Provide peer tutoring
Engage student in study groups
Use review games to provide reinforcement of material

Enrichment:
Advancement to the next task or set of tasks
Engage in advanced projects related to tasks

Safety:
Student must:
Comply with personal and environmental safety practices associated with shop recommended clothing, eye protection and the handling, storage, and disposal of chemicals/materials in accordance with school, local, state, and federal safety and environmental regulations
Handle material in a safe and work like manner
Use protective clothing and equipment
Use hand tools in a safe manner
Use adequate ventilation when working in enclosed areas
Follow manufacturer's directions when using any product, tool, equipment, etc.
Use proper safety precautions when using /operating hand tools
Use tools and equipment in a professional work like manner according to OSHA standards
Know and follow the established safety rules at all times

Assessment:
Student practical tasks will be graded based on rubrics if applicable.
Tasks will be inspected, tested and graded to meet HVAC-R standards (Reference National Mechanical, Plumbing, and Electrical Code Book)
Practical tasks include related theory testing applicable to the task and will be graded
Practical tasks include related assignments applicable to the task and will be graded
Resources/Equipment:


NCCER Core Curriculum: Pearson Education, Inc. 2015

Electricity for HVACR: Cengage Learning, 2015

Various HVAC equipment
Basic handtools
Refrigerant
Gauges
Nitrogen
410a
Service wrench
Metering devices
Service valves
Temp/pressure charts
Course: HVAC

Unit Name: PA800 - INTRODUCTION TO HEATING

Unit Number: PA800

Dates: Fall 2019  Hours: 199

Unit Description/Objectives:
Student will know and be able to explain the three methods by which heat is transferred and give an example of each, describe how combustion occurs and identify the by-products of combustion, and identify the various types of fuels used in heating.

Tasks:
- PA801 - Describe the principles of combustion.
- PA802 - Evaluate temperatures and pressures of various heating systems
- PA803 - Identify components and fuel properties of various heating systems
- PA804 - Perform maintenance on a gas furnace.
- PA805 – Reserved
- PA806 - Identify oil heating equipment.
- PA807 - Install and adjust oil, gas (condensing & non-condensing), and electric heating equipment
- PA808 - Perform annual preventive maintenance on oil fired equipment.
- PA809 - Reserved
- PA810 - Identify and size electric heating equipment.
- PA811 - Install heating/air conditioning thermostats
- PA812 - RESERVED
- PA813 - Perform combustion analysis on oil and gas fired equipment
- PA814 - Identify the sequence of operations of various warm air furnaces

Standards / Assessment Anchors
Focus Standard

CC.3.5.11-12.C Follow precisely a complex multistep procedure

Supporting Standard

CC.3.5.11-12. A Cite specific textual evidence
CC.3.5.11-12. B Determine the central ideas or conclusions of a text

Connecting Standard

Standard CC.3.5.11-12. H Evaluate the hypotheses, data, analysis, and conclusions in a technical text, verifying the data when possible.

Instructional Activities:

Knowledge:
- Participate in co-operative group discussions
- Participate in co-operative group theory projects
- Review related rubric and procedures for project completion
- Perform research work by reading, reviewing, and deciphering content material from trade journals
- Perform research work by reading, reviewing, and deciphering content material from the Internet
- Identify components by using drawings and schematics
Skill:

Model projects to be fabricated as per specifications using HVAC/Plumbing material and recommended material
Follow task sheet instructions to complete practical projects
Explain the three methods by which heat is transferred and give an example of each
Describe how combustion occurs and identify the byproducts of combustion
Identify the various types of fuels used in heating
Identify the major components and accessories of an induced draft and condensing gas furnace and explain the function of each component
State the factors that must be considered when installing a furnace
Identify the major components of a gas furnace and describe how each works
With supervision, use a manometer to measure and adjust manifold pressure on a gas furnace
Identify the major components of an oil furnace and describe how each works.
Describe how an electric furnace works
With supervision, perform basic furnace preventive maintenance procedures such as cleaning and filter replacement

Remediation:

- Re-teach major concepts
- Review with teacher assistance
- Provide individual tutoring
- Provide peer tutoring
- Engage student in study groups
- Use review games to provide reinforcement of material

Enrichment:

- Advancement to the next task or set of tasks
- Engage in advanced projects related to tasks

Safety:

Student must:
- Comply with personal and environmental safety practices associated with shop recommended clothing, eye protection and the handling, storage, and disposal of chemicals/materials in accordance with school, local, state, and federal safety and environmental regulations.
- Handle material in a safe and work like manner
- Use protective clothing and equipment
- Use hand tools in a safe manner
- Use adequate ventilation when working in enclosed areas
- Follow manufacturer's directions when using any product, tool, equipment, etc.
- Use proper safety precautions when using /operating hand tools
- Use tools and equipment in a professional work like manner according to OSHA standards
- Know and follow the established safety rules at all times

Assessment:

Student practical tasks will be graded based on rubrics if applicable.
Tasks will be inspected, tested and graded to meet HVAC-R standards (Reference National Mechanical, Plumbing, and Electrical Code Book).
Practical tasks include related theory testing applicable to the task and will be graded
Practical tasks include related assignments applicable to the task and will be graded

Resources/Equipment:

- NCCER Core Curriculum: Pearson Education, Inc. 2015
- Electricity for HVACR: Cengage Learning, 2015
- Various HVAC equipment
- Various hand tools
Manometer
Volt meter
Manometer
Thermostats
Oil nozzles
Oil filters
Ductwork
A coil
Pvc pipe
Steel pipe
Threading machine
Brazing equipment
Unit Description/Objectives:

Student will know and be able to describe the airflow and pressures in a basic forced air distribution system, explain the differences between propeller and centrifugal fans and blowers, and identify the various types of duct systems and explain why and where each type is used. Student will also know and be able to demonstrate and explain the installation of metal, fiberboard, and flexible duct and demonstrate and explain the installation of fittings and transitions used in duct systems.

Tasks:

PA901 - Identify and design different types of duct systems.
PA902 - Identify and describe the different types of duct system components.
PA903 - Test velocity, static pressure, temperature, humidity, and volume
PA904 - RESERVED
PA905 - RESERVED
PA906 - compare, identify and fabricate using various duct materials
PA907 - Perform basic installation practices including duct sealing and leak testing
PA908 - Identify and compare the application air distribution secondary accessories to increase air quality and comfort

Standards / Assessment Anchors

Focus Standard

CC.3.5.11-12.C Follow precisely a complex multistep procedure

Supporting Standard

CC.3.5.11-12 A Cite specific textual evidence
CC.3.5.11-12. B Determine the central ideas or conclusions of a text

Connecting Standard
CC.3.5.11-12. H Evaluate the hypotheses, data, analysis, and conclusions in a technical text, verifying the data when possible.

**Instructional Activities:**

**Knowledge:**
- Participate in co-operative group discussions
- Listen and participate in lecture by completing a review sheet
- Participate in co-operative group theory projects
- Review related rubric and procedures for project completion
- Participate in a literacy (RWLS or Math) strategy to familiarize students with material, procedures, and practices
- Perform research work by reading, reviewing, and deciphering content material from trade journals
- Perform research work by reading, reviewing, and deciphering content material from the Internet
- Identify components by using drawings and schematics
Skill:
- Model projects to be fabricated as per specifications using HVAC/Plumbing material and recommended material
- Follow task sheet instructions to complete practical projects
- Describe the airflow and pressures in a basic forced-air distribution system
- Explain the differences between propeller and centrifugal fans and blowers
- Identify the various types of duct systems and explain why and where each type is used

Demonstrate or explain the installation of:
- metal
- flexible duct
- Demonstrate or explain the installation of fittings and transitions used in duct systems

Demonstrate or explain the use and installation of:
- Diffusers used in duct systems
- Registers used in duct systems
- Grilles used in duct systems
- Demonstrate or explain the use and installation of dampers used in duct systems

Remediation:
- Re-teach major concepts
- Review with teacher assistance
- Provide individual tutoring
- Provide peer tutoring
- Engage student in study groups
- Use review games to provide reinforcement of material

Enrichment:
- Advancement to the next task or set of tasks
- Engage in advanced projects related to tasks

Safety:
- Student must:
  - Comply with personal and environmental safety practices associated with shop recommended clothing, eye protection and the handling, storage, and disposal of chemicals/materials in accordance with school, local, state, and federal safety and environmental regulations
  - Handle material in a safe and work like manner
  - Use protective clothing and equipment
  - Use hand tools in a safe manner
  - Use adequate ventilation when working in enclosed areas
  - Follow manufacturer's directions when using any product, tool, equipment, etc.
  - Use proper safety precautions when using /operating hand tools
  - Use tools and equipment in a professional work like manner according to OSHA standards
  - Know and follow the established safety rules at all times

Assessment:
- Student practical tasks will be graded based on rubrics if applicable.
- Tasks will be inspected, tested and graded to meet HVAC-R standards (Reference National Mechanical, Plumbing, and Electrical Code Book)
- Practical tasks include related theory testing applicable to the task and will be graded
- Practical tasks include related assignments applicable to the task and will be graded

Resources/Equipment:
- NCCER Core Curriculum: Pearson Education, Inc. 2015
- Electricity for HVACR: Cengage Learning, 2015
- Various HVAC equipment
- Basic sheet metal tools
Sheetmetal
Lockformer
Rollers
Foot sheer
Brake
Various ductwork fittings
Steel Center for CTE
Course: HVAC

Unit Name: PA1000 - INTRODUCTION TO HYDRONIC SYSTEMS

Unit Number: PA1000

Dates: Fall 2019 Hours: 60

Unit Description/Objectives:
Student will know and be able to describe hot-water heating system components.

Tasks:
- PA1001 – identify and compare various hot water heating system components, piping schemes, and their application
- PA1002 – service and maintain hydronic systems

Standards / Assessment Anchors

Focus Standard

CC.3.5.11-12.C Follow precisely a complex multistep procedure

Supporting Standard

CC.3.5.11-12.A Cite specific textual evidence
CC.3.5.11-12.B Determine the central ideas or conclusions of a text

Connecting Standard

Standard CC.3.5.11-12.H Evaluate the hypotheses, data, analysis, and conclusions in a technical text, verifying the data when possible.

Instructional Activities:

Knowledge:
- Participate in co-operative group discussions
- Listen and participate in lecture by completing a review sheet
- Participate in co-operative group theory projects
- Review related rubric and procedures for project completion
- Participate in a literacy (RWLS or Math) strategy to familiarize students with material, procedures,
and practices
Perform research work by reading, reviewing, and deciphering content material from trade journals
Perform research work by reading, reviewing, and deciphering content material from the Internet
Review career opportunities using the internet
Identify components by using drawings and schematics

Skill:
Model projects to be fabricated as per specifications using HVAC/Plumbing material and recommended material
Follow task sheet instructions to complete practical projects

Remediation:
Re-teach major concepts
Review with teacher assistance
Provide individual tutoring
Provide peer tutoring
Engage student in study groups
Use review games to provide reinforcement of material
**Enrichment:**
- Advancement to the next task or set of tasks
- Engage in advanced projects related to tasks

**Safety:**
- Student must:
  - Comply with personal and environmental safety practices associated with shop recommended clothing, eye protection and the handling, storage, and disposal of chemicals/materials in accordance with school, local, state, and federal safety and environmental regulations
  - Handle material in a safe and work like manner
  - Use protective clothing and equipment
  - Use hand tools in a safe manner
  - Use adequate ventilation when working in enclosed areas
  - Follow manufacturer’s directions when using any product, tool, equipment, etc.
  - Use proper safety precautions when using /operating hand tools
  - Use tools and equipment in a professional work like manner according to OSHA standards
  - Know and follow the established safety rules at all times

**Assessment:**
- Student practical tasks will be graded based on rubrics if applicable.
- Tasks will be inspected, tested and graded to meet HVAC-R standards (Reference National Mechanical, Plumbing, and Electrical Code Book)
- Practical tasks include related theory testing applicable to the task and will be graded
- Practical tasks include related assignments applicable to the task and will be graded

**Resources/Equipment:**

- NCCER Core Curriculum: Pearson Education, Inc. 2015
- Electricity for HVACR: Cengage Learning, 2015

- Various HVAC equipment
- Expansion tank
- Pumps
- Copper pipe
- Water fill valve
- Relief valve
- Low water cutoff switch
Steel Center for CTE

Course: HVAC Technology

Unit Name: PA1100 - LEAK DETECTION, EVACUATION, RECOVERY AND CHARGING

Unit Number: PA1100

Dates: Fall 2019 Hours: 78

Unit Description/Objectives:
Student will know and be able to identify the common types of leak detectors and explain how each is used. Students will also be able to recover refrigerant and charge units with refrigerants while adhering to EPA 608 standards.

Tasks:
PA1101 - Locate refrigerant leaks using common types of leak detectors.
PA1102 - Perform refrigerant recovery.
PA1103 - Perform system evacuation and dehydration.
PA1104 - Determine when to charge with liquid versus vapor.
PA1105 - Weigh in correct system charge (when appropriate).
PA1106 - Charge systems using superheat method when appropriate (e.g., fixed restriction).
PA1107 - Charge systems using sub cooling method when appropriate (e.g., TXV, AXV).
PA1108 - Apply knowledge of EPA Section 608.
PA1109 – Identify pump down applications and perform system pump down operations

Standards / Assessment Anchors

Focus Standard

CC.3.5.11-12.C Follow precisely a complex multistep procedure

Supporting Standard
CC.3.5.11-12 A Cite specific textual evidence
CC.3.5.11-12. B Determine the central ideas or conclusions of a text

Connecting Standard

CC.3.5.11-12. I Synthesize information from a range of sources into a coherent understanding of a process or concept.

Instructional Activities:

Knowledge:
- Participate in co-operative group discussions
- Listen and participate in lecture by completing a review sheet
- Participate in co-operative group theory projects
- Review related rubric and procedures for project completion
- Perform research work by reading, reviewing, and deciphering content material from trade journals
- Perform research work by reading, reviewing, and deciphering content material from the Internet
- Identify components by using drawings and schematics
Skill:
   Model projects to be fabricated as per specifications using HVAC/Plumbing material and recommended material
   Follow task sheet instructions to complete practical projects
   Identify the common types of leak detectors and explain how each is used
   Demonstrate skill in performing leak detection tests
   Identify the service equipment used for evacuating a system and explain why each item of equipment is used
   Demonstrate skill in performing system evacuation and dehydration
   Identify the service equipment used for recovering refrigerant from a system and for recycling the recovered refrigerant, and explain why each item of equipment is used
   Demonstrate skill in charging refrigerant into a system

Remediation:
   Re-teach major concepts
   Review with teacher assistance
   Provide individual tutoring
   Provide peer tutoring
   Engage student in study groups
   Use review games to provide reinforcement of material

Enrichment:
   Advancement to the next task or set of tasks
   Engage in advanced projects related to tasks

Safety:
   Student must:
   Comply with personal and environmental safety practices associated with shop recommended clothing, eye protection and the handling, storage, and disposal of chemicals/materials in accordance with school, local, state, and federal safety and environmental regulations
   Handle material in a safe and work like manner
   Use protective clothing and equipment
   Use hand tools in a safe manner
   Use adequate ventilation when working in enclosed areas
   Follow manufacturer’s directions when using any product, tool, equipment, etc.
   Use proper safety precautions when using /operating hand tools
   Use tools and equipment in a professional work like manner according to OSHA standards
   Know and follow the established safety rules at all times

Assessment:
   Student practical tasks will be graded based on rubrics if applicable.
   Tasks will be inspected, tested and graded to meet HVAC-R standards (Reference National Mechanical, Plumbing, and Electrical Code Book)
   Practical tasks include related theory testing applicable to the task and will be graded
   Practical tasks include related assignments applicable to the task and will be graded
Resources/Equipment:

- NCCER Core Curriculum: Pearson Education, Inc. 2015
- Electricity for HVACR: Cengage Learning, 2015

Various HVAC equipment
- Basic handtools
- Recovery machine
- Gauges
- Recovery cylinder
- Refrigeration wrench
- Scale
- Temp/pressure charts
- Refrigerant
- Vacuum pump
- Thermistor
- Leak detector
Unit Description/Objectives: Student will know and be able to identify the major components of fuel systems and describe the function of each component including natural gas, LP gas, and fuel oil.

Tasks:
- PA1201 - Perform gas burner flame proving tests according to trade standards.
- PA1202 – troubleshoot and service gas heating equipment.
- PA1203 – Troubleshoot oil fired equipment

Standards / Assessment Anchors

Focus Standard
CC.3.5.11-12.C Follow precisely a complex multistep procedure

Supporting Standard
CC.3.5.11-12 A Cite specific textual evidence
CC.3.5.11-12 B Determine the central ideas or conclusions of a text

Connecting Standard
CC.3.5.11-12. I Synthesize information from a range of sources into a coherent understanding of a process or concept.

Instructional Activities:
Knowledge:
Participate in co-operative group discussions
Listen and participate in lecture by completing a review sheet
Participate in co-operative group theory projects
Review related rubric and procedures for project completion
Perform research work by reading, reviewing, and deciphering content material from trade journals
Perform research work by reading, reviewing, and deciphering content material from the Internet
Review career opportunities using the internet
Identify components by using drawings and schematics

**Skill:**
- Complete time cards describing daily work completed
- Model projects to be fabricated as per specifications using HVAC/Plumbing material and recommended material
- Follow task sheet instructions to complete practical projects
- Identify the major components of the following fuel systems and describe the function of each component:
  - Natural gas
  - LP gas
  - Fuel oil
- Identify the physical properties of each type of fuel
- Identify the safety precautions and potential hazards associated with each type of fuel and system

**Remediation:**
- Re-teach major concepts
- Review with teacher assistance
- Provide individual tutoring
- Provide peer tutoring
- Engage student in study groups
- Use review games to provide reinforcement of material
Enrichment:
- Advancement to the next task or set of tasks
- Engage in advanced projects related to tasks

Safety:
- Student must:
  - Comply with personal and environmental safety practices associated with shop recommended clothing, eye protection and the handling, storage, and disposal of chemicals/materials in accordance with school, local, state, and federal safety and environmental regulations
  - Handle material in a safe and work like manner
  - Use protective clothing and equipment
  - Use hand tools in a safe manner
  - Use adequate ventilation when working in enclosed areas
  - Follow manufacturer’s directions when using any product, tool, equipment, etc.
  - Use proper safety precautions when using /operating hand tools
  - Use tools and equipment in a professional work like manner according to OSHA standards
  - Know and follow the established safety rules at all times

Assessment:
- Student practical tasks will be graded based on rubrics if applicable.
- Tasks will be inspected, tested and graded to meet HVAC-R standards (Reference National Mechanical, Plumbing, and Electrical Code Book)
- Practical tasks include related theory testing applicable to the task and will be graded
- Practical tasks include related assignments applicable to the task and will be graded

Resources/Equipment:
- NCCER Core Curriculum: Pearson Education, Inc. 2015
- Electricity for HVACR: Cengage Learning, 2015
- Various HVAC equipment
- Basic handtools
- Combustion analyzer
- Manometer
- Amp meter
- Shop vac
- Oil nozzle
- Oil filter
- Oil nozzle wrench
- nitrogen
Steel Center for CTE

Course: HVAC

Unit Name: PA1300 - TROUBLESHOOTING COOLING

Unit Number: PA1300

Dates: Fall 2019 Hours: 48

Unit Description/Objectives:
Student will know and be able to explain the basic principles applicable to all control systems.

Tasks:
- PA1301 - Identify control system components.
- PA1302 - Install, troubleshoot, and service cooling equipment.
- PA1303 - Install electrical components.

Standards / Assessment Anchors

Focus Standard
- CC.3.5.11-12.C Follow precisely a complex multistep procedure

Supporting Standard
- CC.3.5.11-12 A Cite specific textual evidence
- CC.3.5.11-12. B Determine the central ideas or conclusions of a text

Connecting Standard
- CC.3.5.11-12. I Synthesize information from a range of sources into a coherent understanding of a process or concept.

Instructional Activities:
Knowledge:
- Participate in co-operative group discussions
- Listen and participate in lecture by completing a review sheet
- Participate in co-operative group theory projects
Review related rubric and procedures for project completion
Perform research work by reading, reviewing, and deciphering content material from trade journals
Perform research work by reading, reviewing, and deciphering content material from the Internet
Review career opportunities using the internet
Identify components by using drawings and schematics
Take notes regarding safety procedures explained in safety DVD’s

**Skill:**
- Complete time cards describing daily work completed
- Model projects to be fabricated as per specifications using HVAC/Plumbing material and recommended material
- Follow task sheet instructions to complete practical projects
- Explain the basic principles applicable to all control systems
- Identify the various types of electromechanical, electronic, and pneumatic HVAC controls
- Explain the function of the various types of electromechanical, electronic, and pneumatic HVAC controls
- Explain the operation of the various types of electromechanical, electronic, and pneumatic HVAC controls
- Identify the service instruments needed to troubleshoot HVAC components

**Remediation:**
- Re-teach major concepts
- Review with teacher assistance
- Provide individual tutoring
- Provide peer tutoring
- Engage student in study groups
- Use review games to provide reinforcement of material
Enrichment:
- Advancement to the next task or set of tasks
- Engage in advanced projects related to tasks

Safety:
- Student must:
  - Comply with personal and environmental safety practices associated with shop recommended clothing, eye protection and the handling, storage, and disposal of chemicals/materials in accordance with school, local, state, and federal safety and environmental regulations
  - Handle material in a safe and work like manner
  - Use protective clothing and equipment
  - Use hand tools in a safe manner
  - Use adequate ventilation when working in enclosed areas
  - Follow manufacturer’s directions when using any product, tool, equipment, etc.
  - Use proper safety precautions when using operating hand tools
  - Use tools and equipment in a professional work like manner according to OSHA standards
  - Know and follow the established safety rules at all times

Assessment:
- Student practical tasks will be graded based on rubrics if applicable.
- Tasks will be inspected, tested and graded to meet HVAC-R standards (Reference National Mechanical, Plumbing, and Electrical Code Book)
- Practical tasks include related theory testing applicable to the task and will be graded
- Practical tasks include related assignments applicable to the task and will be graded

Resources/Equipment:
- NCCER Core Curriculum: Pearson Education, Inc. 2015
- Electricity for HVACR: Cengage Learning, 2015
- Various HVAC equipment
- Basic hand tools
- Vacuum pump
- Thermistor
- Gauges
- Refrigeration wrench
- Nitrogen
- Amp meter
- Temp/pressure charts
- Various electrical components related to HVAC
Course: HVAC

Unit Name: PA1400 - HEAT PUMPS

Unit Number: PA1400

Dates: Fall 2019  Hours: 41

Unit Description/Objectives:
Student will know and be able to describe the principles of reverse-cycle heating.

Tasks:
PA1401 - Explain heat pump modes of operation.
PA1402 - Identify and describe heat pump components.
PA1403 – Install comfort cooling systems

Standards / Assessment Anchors

Focus Standard
CC.3.5.11-12.C Follow precisely a complex multistep procedure

Supporting Standard
CC.3.5.11-12 A Cite specific textual evidence
CC.3.5.11-12. B Determine the central ideas or conclusions of a text

Connecting Standard
CC.3.5.11-12. I Synthesize information from a range of sources into a coherent understanding of a process or concept.

Instructional Activities:
Knowledge:
Participate in co-operative group discussions
Listen and participate in lecture by completing a review sheet
Participate in co-operative group theory projects
Review related rubric and procedures for project completion
Perform research work by reading, reviewing, and deciphering content material from trade journals
Perform research work by reading, reviewing, and deciphering content material from the Internet
Identify components by using drawings and schematics

Skill:
- Model projects to be fabricated as per specifications using HVAC/Plumbing material and recommended material
- Follow task sheet instructions to complete practical projects
- Describe the principles of reverse-cycle heating
- Identify heat pumps by type and general classification
- List the components of heat pump systems

Remediation:
- Re-teach major concepts
- Review with teacher assistance
- Provide individual tutoring
- Provide peer tutoring
- Engage student in study groups
- Use review games to provide reinforcement of material

Enrichment:
- Advancement to the next task or set of tasks
- Engage in advanced projects related to tasks
**Safety:**
Student must:
- Comply with personal and environmental safety practices associated with shop recommended clothing, eye protection and the handling, storage, and disposal of chemicals/materials in accordance with school, local, state, and federal safety and environmental regulations
- Handle material in a safe and work like manner
- Use protective clothing and equipment
- Use hand tools in a safe manner
- Use adequate ventilation when working in enclosed areas
- Follow manufacturer’s directions when using any product, tool, equipment, etc.
- Use proper safety precautions when using /operating hand tools
- Use tools and equipment in a professional work like manner according to OSHA standards
- Know and follow the established safety rules at all times

**Assessment:**
Student practical tasks will be graded based on rubrics if applicable.
Tasks will be inspected, tested and graded to meet HVAC-R standards (Reference National Mechanical, Plumbing, and Electrical Code Book)
Practical tasks include related theory testing applicable to the task and will be graded
Practical tasks include related assignments applicable to the task and will be graded

**Resources/Equipment:**
- NCCER Core Curriculum: Pearson Education, Inc. 2015
- Electricity for HVACR: Cengage Learning, 2015
- Various HVAC equipment
- Basic hand tools
- Vacuum pump
- Thermistor
- Refrigeration wrench
- Nitrogen
- Gauges
- Temp/pressure charts
Unit Name: PA1500 - COMPUTER FUNDAMENTALS

Unit Number: PA1500

Dates: Fall 2019  Hours: 24

Unit Description/Objectives: Student will know and be able to complete PDP Internet research requirements set by Monroe Career & Technical Institute and demonstrate skills with computer software relating to HVAC.

Tasks:
- PA1501 - RESERVED
- PA1502 - Utilize the Internet for research.
- PA1503 – Use HVAC computer software.

Standards / Assessment Anchors

Focus Standard

CC.3.6.11-12. G Gather relevant information from multiple authoritative print and digital sources, following a standard format for citation.

Supporting Standard

CC.3.5.11-12. B Determine the central ideas or conclusions of a text
CC.3.6.11-12. F Conduct short and more sustained research to answer a question or solve a problem.

Connecting Standard

CC.3.5.11-12. I Synthesize information from a range of sources into a coherent understanding of a process or concept.
**Instructional Activities:**

**Knowledge:**
- Participate in co-operative group discussions
- Listen and participate in lecture by completing a review sheet
- Participate in co-operative group theory projects
- Review related rubric and procedures for project completion
- Perform research work by reading, reviewing, and deciphering content material from trade journals
- Perform research work by reading, reviewing, and deciphering content material from the Internet
- Review career opportunities using the internet
- Identify components by using drawings and schematics

**Skill:**
- Model projects to be fabricated as per specifications using HVAC/Plumbing material and recommended material
- Follow task sheet instructions to complete practical projects

**Remediation:**
- Re-teach major concepts
- Review with teacher assistance
- Provide individual tutoring
- Provide peer tutoring
- Engage student in study groups
- Use review games to provide reinforcement of material

**Enrichment:**
- Advancement to the next task or set of tasks
- Engage in advanced projects related to tasks

**Safety:**
- Student must:
  - Comply with personal and environmental safety practices associated with shop recommended clothing, eye protection and the handling, storage, and disposal of chemicals/materials in accordance with school, local, state, and federal safety and environmental regulations
  - Handle material in a safe and work like manner
  - Use protective clothing and equipment
  - Use hand tools in a safe manner
  - Use adequate ventilation when working in enclosed areas
  - Follow manufacturer's directions when using any product, tool, equipment, etc.
  - Use proper safety precautions when using /operating hand tools
  - Use tools and equipment in a professional work like manner according to OSHA standards
  - Know and follow the established safety rules at all times

**Assessment:**
- Student practical tasks will be graded based on rubrics if applicable. Tasks will be inspected, tested and graded to meet HVAC-R standards (Reference National Mechanical, Plumbing, and Electrical Code Book) Practical tasks include related theory testing applicable to the task and will be graded Practical tasks include related assignments applicable to the task and will be graded

**Resources/Equipment:**
- NCCER Core Curriculum: Pearson Education, Inc. 2015
- Electricity for HVACR: Cengage Learning, 2015
- Laptop