

Heating, Ventilation & Air Conditioning (HVAC)

Level III Unit Outline

Unit 1: Agenda Book Review/Classroom Rules

- Class discussion of student agenda book
- Review of classroom rules
- School safety protocols, district drills and emergency evacuations, behavior and meeting locations
- Review expectations and school policies for electronic devices

Unit 2: Safety, First Aid, Personal Protective Equipment and Shop Attire

- Identify, discuss, locate first aid and blood borne kits
- Identify, locate and demonstrate function and purpose of the Emergency Eye Station
- Identify, discuss, locate fire extinguisher
- Identify, distribute and discuss function and uses of protective eyewear, appropriate personal protective equipment (PPE) required in shop, and acceptable shop attire
- Identify, show location and discuss function and uses of the SDS (Safety Data Sheets) and how to interpret the information about paints and aerosols, content precautions, material labeling
- Equipment safety protocols
- Identify, demonstrate shop ventilation systems where applicable
- Identify locate and discuss function of shop flammable cabinet where applicable
- Discuss and demonstrate shop housekeeping of supplies, work stations and room maintenance
- Discuss and identify electrical safety considerations in the shop area
- Compile a safety section in the student shop notebook
- Identify, demonstrate air gauge function and operation where applicable
- Completion of online safety course and successful passing of safety test(s)

Unit 3 – Heating Materials and Tools

- Students will list and identify all relevant heating specific tools
- Students will note and learn to identify types of radiant tubing
- Students will differentiate between nominal (plumbing) tubing and fittings
- Conduct proper assessment of student understanding of items listed above

Unit 4 – Combustion Related Theory

- Discuss oil heat combustion
- List the components of fuel oil heating

- Discuss Propane heat combustion
- List the components of propane gas heating
- Discuss Natural gas heat combustion
- List the components of natural gas heating

Unit 5 – Basic Heating Controls and Safeties

- List all relevant heating controls
- Identify forced hot air specific controls
- Recognize hydronic hot water controls
- Identify Oil combustion specific controls
- Identify gas specific controls
- Draw and discuss connection type electrical schematics for various control systems

Unit 6 – Introduction to Air Systems

- Students will catalog types of heat exchangers
- Students will identify types of blower drives
- Examine and report on various ducting options
- Students will identify various blower types
- Students will identify various Furnace configurations

Unit 7 – Introduction to Boilers

- Introduction to boiler mechanical theory
- Provide a list of the different components of hot water heating
- Provide a list of the different components of steam heat
- Draw instructional illustrations of steam heat systems
- Catalog standards and procedures for hydronic pipe systems

Unit 8 – Design and Layout I (Load Calculations)

- Introduction to design and layout
- Review psychrometrics
- Introduction to Manual J load calculations
- Perform Manual J load calculations
- Perform Manual D duct design

Unit 9 – Alternative and Green Technology (Heating)

- Research the various alternative heating systems and produce a PowerPoint presentation discussing their findings
- Acquire an understanding of alternative heating systems

Unit 10 – Soft Skills/Customer Service

- Discuss customer service procedures
- Discuss employer expectations
- Presentation from industry professionals
- Introduction to cultural competency

Unit 11 – Heating Service Procedures

- Discuss and outline service procedures
- Perform preventative maintenance on boilers and furnaces
- Students will simulate service paperwork
- Students will identify necessary and possible service for various types of heating systems
- Students will research equipment specific technical facts

Unit 12 – Introduction to Heating Installations

- Discuss possible locations for equipment
- Applying load calculations to new equipment installation
- Discuss accessory and mounting materials
- Discuss special fasteners for hydronic piping and duct work
- Explore special equipment features
- List standard procedures for hydronic piping installations

Unit 13 – Introduction to Alternative and Green HVAC Systems

- Students will list some alternative cooling methods and systems
- Students will explore innovations within the HVAC field
- Students will research the impact of waste, pollution and environmental effects of HVAC products and equipment

Unit 14 – EPA Section 608 Certification

- Provide study materials for the exam
- Discuss topics and material relevant to the exam
- Students will receive written assignments relevant to the exam

HVAC

New Jersey Student Learning Standards

NJ Learning Standards 9.3

CONTENT AREA:	9.3 CAREER AND TECHNICAL EDUCATION
MANUFACTURING CAREER CLUSTER®	
Number	Standard Statement
<i>By the end of Grade 12, Career and Technical Education Program completers will be able to:</i>	
CAREER CLUSTER®:	MANUFACTURING (MN)
PATHWAY:	MAINTENANCE, INSTALLATION, & REPAIR (MN-MIR)
9.3.MN-MIR.1	Demonstrate maintenance skills and proficient operation of equipment to maximize manufacturing performance.
9.3.MN-MIR.2	Demonstrate the safe use of manufacturing equipment to ensure a safe and healthy environment.
9.3.MN-MIR.3	Diagnose equipment problems and effectively repair manufacturing equipment.
9.3.MN-MIR.4	Investigate and employ techniques to maximize manufacturing equipment performance.
9.3.MN-MIR.5	Implement a preventative maintenance schedule to maintain manufacturing equipment, tools and workstations.
9.3.MN-MIR.6	Implement an effective, predictive and preventive manufacturing equipment maintenance program.