



# COURSE OUTLINE

## HET711

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<b>Course Code: Title</b>	HET711: TRADE PRACTICE
<b>Program Number: Name</b>	6085: HDE TECH LEVEL II
<b>Department:</b>	IRONWKR APPR./WELDING RELATED
<b>Semester/Term:</b>	17F
<b>Course Description:</b>	Trade Practices, is designed to provide the theory and practical training to enable the student to be able to perform heating, cutting, fusion welding and brazing activities, be able to describe air conditioning system testing and repair procedures, be able to describe the operation of automatic climate control systems (HVAC), testing and repair procedures following manufacturers recommendations, government regulations, and safe work practices and be able to identify unsafe/faulty operator protection devices following manufacturers recommended practices and government regulations.
<b>Total Credits:</b>	3
<b>Hours/Week:</b>	3
<b>Total Hours:</b>	24
<b>Essential Employability Skills (EES):</b>	<p>#1. Communicate clearly, concisely and correctly in the written, spoken, and visual form that fulfills the purpose and meets the needs of the audience.</p> <p>#2. Respond to written, spoken, or visual messages in a manner that ensures effective communication.</p> <p>#3. Execute mathematical operations accurately.</p> <p>#4. Apply a systematic approach to solve problems.</p> <p>#5. Use a variety of thinking skills to anticipate and solve problems.</p> <p>#6. Locate, select, organize, and document information using appropriate technology and information systems.</p> <p>#7. Analyze, evaluate, and apply relevant information from a variety of sources.</p> <p>#8. Show respect for the diverse opinions, values, belief systems, and contributions of others.</p> <p>#9. Interact with others in groups or teams that contribute to effective working relationships and the achievement of goals.</p> <p>#10. Manage the use of time and other resources to complete projects.</p> <p>#11. Take responsibility for ones own actions, decisions, and consequences.</p>
<b>Course Evaluation:</b>	Passing Grade: 50%, D
<b>Other Course Evaluation &amp;</b>	.

**Assessment Requirements:****Evaluation Process and Grading System:**

Evaluation Type	Evaluation Weight
Assignments/Theory	20%
Shop Assigned Tasks	30%
Tests/Theory	50%

**Books and Required Resources:**

Heavy Duty Truck Systems by Bennett  
Publisher: Cengage Learning Edition: 6th

Service Pack N by Alberta Government  
Publisher: Alberta Government

**Course Outcomes and Learning Objectives:****Course Outcome 1.**

Upon successful completion the apprentice is able to perform heating, cutting, fusion welding and brazing activities following manufacturers` recommendations, government regulations, and safe work practices.

**Learning Objectives 1.**

Explain manufacturers` precautions for using oxy-fuel equipment:

- case hardening effects
- effects of overheating forged and cast components
- protecting seals and gaskets
- fire prevention practices
- personal protective equipment
- Identify oxy-fuel equipment safe operating practices.
- review pressure settings
- plan and prepare the work area

Describe the manufacturers` oxy-fuel equipment diagnostic procedures:

- flash back
- gas leakages
- hoses
- valves
- regulators
- gauges
- fittings

Describe start-up and shutdown of oxy-fuel equipment:

- start-up
- fuel selection and oxygen
- selection of tips
- ignition procedures
- shutdown
- sequential torch shutoff of fuel and oxygen gas valves
- shut off of cylinder valves

Perform oxy-fuel processes following manufacturers` recommendations, government regulations, and safe work practices:

- heat seized fasteners
- fusion welding

- brazing
- surface preparation and finishing

## Course Outcome 2.

Upon successful completion the apprentice is able to describe air conditioning system testing and repair procedures following manufacturers` recommendations, government regulations, and safe work practices.

## Learning Objectives 2.

Explain the purpose and fundamentals of air conditioning systems:

- methods of heat transfer
- temperature and humidity relationship
- solid, liquid and gas states
- properties of refrigerants
- alternative refrigerants
- gas laws, temperature, pressure and volume
- air conditioning thermo-dynamics
- heat absorption
- liquid and gas states
- temperature effects
- thermal expansion and contraction
- Ozone Depletion Program (ODP) certification requirements

Identify the function, construction features, composition, types, and application of refrigerants and air conditioning components:

- refrigerant characteristics
- R12
- dichlorodifluoromethane
- boiling point, toxicity, flammability, etc.
- R134a
- tetrafluoroethane
- boiling point, toxicity, flammability, etc.
- lubricants for refrigerants—R12 and R134a systems
- refrigerant identifying devices
- air conditioning thermo-dynamics

Identify the major components used in mobile air conditioning, identify the location of major components and controls:

- condenser
- receiver dehydration
- accumulator-dryer
- evaporator
- compressor
- hoses, lines and fittings

Describe the function of air conditioning control system components:

- low and high pressure cut-out
- low charge protection
- evaporator temperature control
- cycling clutch control
- orifice tubes
- expansion valves
- fan controls

Describe the principles of operation of air conditioning systems:

- thermostatic expansion valve system
- refrigerant compressors
- system lubrication
- control valves
- low and high pressure cut-out
- low charge protection
- evaporator temperature control, including expansion valves
- cycling clutch control
- orifice tube
- low temperature lockout
- condenser
- receiver dryer (dehydrator)
- accumulator-dryer (dehydrator)
- evaporator
- compressors
- piston
- axial recirculating
- radial
- variable displacement
- scroll
- vane

Demonstrate inspection and testing procedures following manufacturers` recommendations, government regulations, and safe work practices for air conditioning systems.

Outline major differences in testing R12 and R134A systems:

- testing for refrigerant leaks
- testing of system operating pressures and control functions
- system performance tests
- identify leak testing methods
- dyes
- electronic leak detectors (must meet SAEJ1627 and SAEJ1628 standards)
- bubble producing solutions
- nitrogen testing
- trace gas testing
- identify potential location of leaks
- fittings
- lines
- seals
- compressor
- evaporator
- condenser

Recommend reconditioning or repairs following manufacturers` recommendations and government regulations for air conditioning systems.

Describe the recommended procedures to remove and replace lines, hoses and fittings describe the recommended procedures to remove and replace compressors, evaporators, condensers, and control devices perform a demonstration of compressor drive belt adjustment procedures perform a demonstration of the discharging, evacuating, recovery, recycling, and recharging procedures.

### **Course Outcome 3.**

Upon successful completion the apprentice is able to describe the operation of automatic climate control systems (HVAC), testing and repair procedures following manufacturers' recommendations, government regulations, and safe work practices.

### **Learning Objectives 3.**

Explain the purpose and fundamentals of (HVAC) automatic climate control systems.

air flow characteristics:

- inside and outside ventilation
- air quality
- air filtration
- fresh air filter
- recirculating filter
- particulate removal
- chemical removal
- electronics fundamentals enhancement
- body control module (BCM) and electronic control module
- (ECM) input and output
- thermistors

Understand the effects of humidity and sources of heat in the mobile equipment environment.

Identify the construction features, composition, types, and application of (HVAC) automatic climate control systems:

- blower motors and wheels
- plenum chambers and ducts
- air doors
- heater cores
- controls
- body control module assembly
- radiator fan circuit
- compressor clutch circuit
- blower motor circuit
- programmer solenoids
- air mixture doors circuits
- switches and valves
- evaporator pressure control valves
- oil bypass lines
- condensate drain tubes

Describe the principles of operation of (HVAC) automatic climate control systems:

- ventilation systems
- blower motor and wheels
- plenum air flow
- air doors
- heater cores
- controls
- defrost
- body control module assembly
- radiator fan circuit
- compressor clutch circuit
- blower motor circuit
- programmer solenoids and air mixture doors circuit
- switches and valves
- evaporator pressure control valves
- oil bypass lines
- condensate drain tubes

Demonstrate the inspection and testing procedures following manufacturers' recommendations and government regulations for (HVAC) automatic climate control systems:

- heater assemblies for
- leaks (air, coolant)
- loose mountings
- door operation
- blower operation
- contamination
- climatic control system circuits using test equipment
- body control module and electronic control module
- system diagnosis
- fault code interpretation using onboard diagnostics and scan tools
- outline the most common failures in the
- refrigerant systems
- control systems

Outline the recommended test procedures for R12 and R134A refrigerant systems. Recommend reconditioning or repairs following manufacturers' procedures, government regulations, and safe work practices for (HVAC) automatic climate control systems.

Identify the recommended repairs based on test results of the system, outline the replacement procedures for:

- heater cores
- heater hoses
- ventilation controls

## **Course Outcome 4.**

Upon successful completion the apprentice is able to identify unsafe/faulty operator protection devices following manufacturers' recommended practices and government regulations.

## **Learning Objectives 4.**

Explain and identify the purpose and functions of operator protection devices:

- Roll Over Protection Systems (ROPS)
- Falling Object Protection Systems (FOPS)
- Operator Protection Systems (OPS)
- seat belts
- noise control
- operator's compartment shielding
- legal requirements
- fire extinguishers

Demonstrate the inspection and diagnostic procedures following manufacturers' recommendations and government regulations for operator protection devices:

- Roll Over Protection Systems (ROPS)
- fastener torque
- alterations
- additions
- Falling Object Protection Systems (FOPS)
- fastener torque
- alterations
- additions
- Operator Protection Systems (OPS)
- fastener torque

- alterations
- additions
- seat belts
- noise control
- operator's compartment shielding
- fire extinguishers

**Date:**

Monday, January 22, 2018

Please refer to the course outline addendum on the Learning Management System for further information.