** HMI 214 HVAC**

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| Week | **Outcomes** | Format | Hrs | Topic/Content | Readings | Assignment | Assessment | Resources |
| 1 | 1,3 | Lecture | 3 | ***Protect self and others:***  Follow shop safety rules and understand how practicing good housekeeping at all times prevents accidents  Explain hazards associated with the different types of cooling systems.  Comprehend the safety procedures and Personal Protective Equipment associated with the HVAC industry.  Identify information on a Material Safety Data Sheet  Describe the four classifications of fire extinguishers  Identify unsafe situations and conditions.  Understand the fundamentals of the heating and cooling systems, as well as, recognize the environmental protection process of refrigerant recovery systems | Units 3, 23, 26 | End of chapter questions |  | Calculators, green tag safety boots, safety glasses  Text book ***Fundamentals of HVAC/R***  Instructor handouts / training materials |
| 2 | 1, 2 | Lecture    Lab | 1.5  1.5 | **Principles of Heat transfer and the effects these have on a heating or cooling system:**  Understand the principles of conduction, radiation, convection, and evaporation.  Explain these principles and relate them to the condition of heating and cooling equipment.  Identify, through observation and temperature readings, when equipment is functioning properly.  Take readings at strategic locations in the functioning cooling system and document findings for analysis  Understand the differences between latent and sensible heat as applied to a cooling system and identify and calculate these values. | Section 2  Units 4-8 | Outline:  Project -practical  assignment #1 | Formative  Observation of students in lab | As above |
| 3 | 2,4 | Lab | 3 | Continuation of practical lab assignment #1  Lab project consists of taking temperature readings to understand that latent heat is removed from the house air and that the amount of condensation (drain) an air conditioner produces will be excessive.  Lab reports to be completed compiling the findings. Complete Practical Assignment #1. | Unit 23 | Practical assignment #1 | Observation of students in lab  Summary report of lab | As above |
| 4 | 1,3 | Lecture  Lab | 2  1 | **Demonstrate the ability to identify the heating/cooling trade tools and meters**  Describe and explain the purpose of various specialty tools such as: refrigeration gauges, flaring tools, vacuum pump, micron vacuum gauge, and electrical meters.  Understand how voltage, current, and resistance are part of a heating or cooling system  Practise using these tools while performing work related tasks on the equipment in the lab: e.g. checking refrigeration pressures, superheat, and sub-cooling.  Summarize their experiences in a report. | Section 3  Units 9-11  Unit 15, 27 |  | Observation of students in lab  End of chapter questions | As above |
| 5 | 3, 7 | Test 1  Lab | 2  1 | ***Theory test #1 – 2 hrs***  ***Lab time 1 hr***  ***Continuation of Trade tools and meters: Demonstrate an understanding of electrical fundamentals as it relates to the heating and cooling systems.***  Identify the condition of brittle and damaged wiring on various heating and cooling equipment and comprehend the amperage to wire size (gauge) ratio  Take amperage readings of a motor load safely  State the reasons why 208V appliances run at lower amperages than 110V appliances  Identify wiring alterations that may have been made to equipment. | Test  Units 1-11  Section 3, 5  Units 11-14 | Practical assignment #1 due  Test 1 | Observation of students in lab  Summative  Theory test 1 | As above |
| 6 | 4 |  | 3 | ***Field trip***  ***Location to be determined*** |  |  | Field trip | As above |
| 7 | 4 | Lecture  Lab | 1  2 | ***Review and discuss the field trip.***  **Understand the operation of an evaporator, condenser, compressor, and metering device.**  Take temperatures at various points along the piping of the air conditioner and explain what is happening to the physical state of the refrigerant.  Explain thermodynamic terminology such as: British Thermal Unit, Joule and Watt. Become familiar with terminology related to the First and Second Laws of Thermodynamics.  Describe what occurs during the latent heat of fusion and latent heat of vaporization.  Lab - study the role that airflow and filter maintenance have on heating or cooling operations.  Locate the high and low sides of an air conditioning system  Perform temperature readings at various locations to identify deficiencies. | Section 2  Units 17-22 |  | Observation of students in lab  End of chapter questions | As above |
| 8 | 4, 5 | Lecture  Lab | 1  2 | ***Explain the basic heat transfer principles of operation for the various heating and cooling sources.***  Identify various energy sources and explain their operations with confidence.  Understand the refrigeration principles and heat transfer concepts and use those ideas to describe one particular system to their client  Describe and determine if unacceptable alterations have been made between the size of the duct system and the BTU capacity of the piece of equipment, including supply plenum of furnaces, return air drops and branch runs.  **Lab** assignment: Outline the pros and cons for each application explained in week 10, explaining answers. | Section 4, 5  Unit 23, 27 | Lab assignment | Observation of students in lab  Formative assessment | As above |
| 9 | 4, 5, 6 | Lab | 3 | ***Explain the basic principles of operation for air conditioning system components.***  Understand how a ductless split air conditioning system works  Review the differences between recovered, recycled, and reclaimed refrigerant  Explain the concept called entropy, enthalpy and practice using a psychometric chart.  ***Lab -work continued:*** perform a variety of procedures to the equipment and understand what the results of the tests indicate. | Section 4, 5  Unit 18  Instructor handouts | Practical Assignment 2  given | Observation of students in lab | As above |
| 10 |  |  | 3 | ***Test #2 - 3 hours*** |  | Theory  Test # 2 | Summative | As above |
| 11 | 6 | Lecture  Lab | 3 | ***Review previous HMI 202 course materials referring to the safe and successful ignition of gas fired equipment.***  Examine the in-depth operation of a fuel burning appliance and its components.  Explain how the size of the furnace plenum, duct system and return air duct affects the operating efficiency of the equipment  Understand that temperature differences are critical to the efficient operation of the unit.  Explain where to take temperature readings and transfer resultant values into an efficiency rating for how the system is functioning.  Describe the important role that a properly installed humidifier has on a heating system and the importance of dehumidification in the summer time | Section 6  Unit 37-40 |  | Formative assessment  End of chapter question | As above |
| 12  13 | 6  6, 7 | Lecture  Lab  Lecture  Lab | 3  3 | ***Describe the duties of a ventilation system and explain the primary function.***  Realize the variables that determine the size of a duct run and difference between static and velocity pressure of air  Understand the purpose of a condensate trap on an evaporator.  Know where to properly locate a thermostat  Become familiar with the different kinds of ventilation fans  state the concepts of how an HRV operates  ***Identify the differences between Ground Source, air to air, and geo-thermal heat pumps***  Understand what the main components of heat pump systems are and be able to explain the operations  Identify the roll a circulating pump serves in a geo-thermal heat pump  Describe the main differences between styles of heat pumps.  State the importance of a circulating pump  Work on completing assignment #2 in the lab  Review materials for upcoming test | Section 7  Unit 66-69  Instructor Handouts  Section 6  Unit 49-53 |  | Observation of students in lab  End of chapter questions  Observation  End of chapter questions | As above  Instructor handouts  As above |
| 14 |  | Test #3 | 3 | Theory Test #3 - 3 hrs |  |  | Summative | Pencils, calculator,  eraser |
| 15 | 1-7 | Lecture  Lab | 3 | Review highlights from previous Learning Outcomes | Instructor Handouts |  |  |  |
| 16 |  | Lecture | 3 | Question and answer session  Class to evaluate my instruction by completing an evaluation  Debrief of the semester |  |  | Formative |  |