** 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 accidentsExplain 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 SheetDescribe the four classifications of fire extinguishersIdentify 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 | 1.51.5 | **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 analysisUnderstand the differences between latent and sensible heat as applied to a cooling system and identify and calculate these values.  | Section 2Units 4-8 | Outline: Project -practicalassignment #1  | FormativeObservation of students in lab | As above |
| 3 | 2,4 | Lab | 3 | Continuation of practical lab assignment #1Lab 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 labSummary report of lab | As above |
| 4 | 1,3 | LectureLab | 21 | **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 systemPractise 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 3Units 9-11Unit 15, 27 |  | Observation of students in labEnd of chapter questions | As above |
| 5 | 3, 7 | Test 1Lab | 21 | ***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) ratioTake amperage readings of a motor load safelyState the reasons why 208V appliances run at lower amperages than 110V appliances Identify wiring alterations that may have been made to equipment. | Test-units 1-11Section 3, 5Units 11-14 | Practical assignment #1 dueTest 1 | Observation of students in labSummativeTheory test 1 | As above |
| 6 | 4 |  | 3 | ***Field trip*** ***Location to be determined*** |  |  | Field trip | As above |
| 7 | 4 | LectureLab | 12 | ***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 systemPerform temperature readings at various locations to identify deficiencies. | Section 2Units 17-22 |  | Observation of students in labEnd of chapter questions | As above |
| 8 | 4, 5 | LectureLab | 12 | ***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 clientDescribe 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, 5Unit23, 27 | Lab assignment | Observation of students in labFormative 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 worksReview 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, 5Unit 18Instructor handouts | Practical Assignment 2given | Observation of students in lab | As above |
| 10 |  |  | 3 | ***Test #2 - 3 hours*** |  | TheoryTest # 2 | Summative | As above |
| 11 | 6 | LectureLab | 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 equipmentUnderstand 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 6Unit 37-40 |  | Formative assessmentEnd of chapter question | As above |
| 1213 | 6 6, 7 | LectureLab lecture lab | 33 | ***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 thermostatBecome familiar with the different kinds of ventilation fansstate 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 operationsIdentify the roll a circulating pump serves in a geo-thermal heat pumpDescribe the main differences between styles of heat pumps.State the importance of a circulating pump Work on completing assignment #2 in the labReview materials for upcoming test | Section 7Unit 66-69Instructor HandoutsSection 6Unit 49-53 |  | Observation of students in labEnd of chapter questionsObservationEnd of chapter questions | As aboveInstructor handouts As above |
| 14 |  | Test #3 | 3 |  .Theory Test #3- 3 hrs |  |  | Summative | Pencils, calculator,eraser |
| 15 | 1-7 | LectureLab | 3 | Review highlights from previous Learning Outcomes  | Instructor Handouts |  |  |  |
| 16 |  | lecture | 3 | Question and answer sessionClass to evaluate my instruction by completing an evaluation Debrief of the semester |  |  | Formative |  |