PRINCIPLES OF THERMODYNAMICS & HEAT TRANSFER
Course Syllabus

Course Number: ARCO-0222
OHLAP Credit: No
OCAS Code: None
Course Length: 60 Hours
Career Cluster: Architecture & Construction
Career Pathway: Maintenance/Operations
Career Major(s): HVAC Technician

Pre-requisite(s): This course is an introduction to matter and heat behavior, fluids and pressures, refrigeration cycle/diagrams and measurement systems.

Textbooks:


Refrigeration & Air Conditioning Technology, 7th Ed, (2013), Whitman /Johnson/ Tomczyk Silberstein / Publisher Delmar Cengage


Course Objectives:

A. Explain Matter and Heat Behavior.
   1. Define matter and heat.¹
   2. Explain the direction and rate of heat flow.¹
   3. Describe the three methods of heat transfer.¹
   4. Identify the reference points of temperature.¹
       a. Boiling point¹
       b. Freezing point¹
       c. Critical temperature¹
       d. Absolute zero¹
   5. Explain the difference between heat and temperature.¹
   6. Explain the difference between latent and sensible heat.¹
   7. Explain the change of state of matter.¹
   8. Explain heat/cool storage.¹
   9. Define specific heat.¹
   10. Define sensible heat.¹
   11. Define latent heat of fusion.¹
   12. Define latent heat of vaporization.¹
   13. Define enthalpy.¹
   14. Define saturation temperature (dew point temperature).¹
   15. Define water vapor pressure.¹
   16. Explain the direction and rate of moisture transfer.¹
   17. Calculate total heat (in BTU's) a pound of any substance contains.¹
B. Understand Fluids and Pressures.
1. Explain the relationship of pressures and fluids at saturation temperatures.¹
2. Identify the relationship between temperature and pressure using the P/T Chart.¹
3. Define pressure.¹
4. Explain atmospheric pressure.¹
5. Explain compound gauges.¹
6. Explain bourdon tubes.¹
7. Explain barometric pressure.¹
8. Explain absolute pressure.¹
9. Explain gauge pressure.¹
10. Explain inches of mercury absolute.¹
11. Explain micron.¹

C. Explain Refrigeration Cycle/Diagrams.
1. Identify the four major components of the vapor compression refrigeration system.¹
2. Describe the state and conditions of the refrigerant during a cycle.¹
3. Explain the effects of:¹
   a. Superheating the suction gases¹
   b. Increasing the condensing pressure¹
   c. Subcooling the liquid¹
4. Explain the importance of superheat and subcooling.¹
5. Define refrigeration.¹
6. Explain the functions of the four major components of a refrigeration system.¹
   a. Compressor¹
   b. Condenser¹
   c. Metering device¹
   d. Evaporator¹
7. List the components which separate the high side from the low side of the system.¹
8. Describe the Temperature/Enthalpy (T-H) Diagram.¹
9. Calculate problems using Pressure/Enthalpy (P-H) Diagram.¹
10. Label the line which represents each of the four basic components on a Pressure/Enthalpy (P-H) Diagram.¹

D. Use Measurement Systems.
1. Explain units of heat, power, velocity, mass and length.¹
2. Identify U.S. and S.I. units.¹
3. Convert from U.S. to metric units.¹
   a. Length¹
   b. Area¹
   c. Volume¹
   d. Mass¹
   e. Force¹
   f. Velocity¹
   g. Density¹
   h. Pressure¹
   i. Temperature¹
   j. Energy¹
   k. Power¹
   l. Specific Heat¹
   m. Volume Flow Rate¹
   n. Capacity¹
4. Convert pounds to ounces.¹
5. Convert cooling capacity from tons of refrigeration to kW and Btu/h to kW.¹

¹ODCTE objective

Teaching Methods: The class will primarily be taught by the lecture and demonstration method and supported by various media materials to address various learning styles. There will be question and answer sessions over material covered in lecture and media presentations. Supervised lab time is provided for students to complete required projects.

Grading Procedures: 1. Students are graded on theory and shop practice and performance.
2. Each course must be passed with seventy (70%) percent or better.
3. Grading scale: A=90-100%, B=80-89%, C=70-79%, D=60-69%, F=50-59%.

Description of Classroom, Laboratories, and Equipment: Tulsa Technology Center campuses are owned and operated by Tulsa Technology Center School District No. 18. All programs provide students the opportunity to work with professionally certified instructors in modern, well-equipped facilities.

Available Certifications/College Credit: The student may be eligible to take state, national or industry exam after completion of the program. College credit may be issued from Oklahoma State University-Okmulgee or Tulsa Community College. See program counselor for additional information.

College Credit Eligibility: The student must maintain a grade point average of 2.0 or better.