LOAD CALCULATIONS
Course Syllabus

Course Number: ARCO-A0924
OCAS Code: None
Course Length: 45 Hours
Career Cluster: Architecture & Construction
Career Pathway: Maintenance/Operations
Career Major(s): HVAC Technician

Pre-requisite(s):
This course introduces students to psychrometrics, heating and cooling load calculations, and refrigeration load calculations.

Textbooks:


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


Course Objectives:
A. Complete an Introduction to Blueprints.
   1. Recognize and identify basic blueprint terms, components, and symbols.
   2. Relate information on blueprints to actual locations on the print.
   3. Recognize different classifications of drawings.
   4. Interpret and use drawing dimensions.

B. Utilize Psychrometrics.
   1. Identify the following on a psychrometric chart:
      a. Dry bulb line (DB)
      b. Wet bulb line (WB)
      c. Relative humidity (RH)
      d. Dew point (DP)
      e. Enthalpy (h)
      f. Specific humidity (grains of moisture) or (lbw/lbda)
      g. Apparatus dew point
   2. Explain:
      a. Specific humidity
      b. Apparatus dew point
      c. Contact factor
      d. Relative humidity
      e. Dry bulb
      f. Wet bulb
      g. Dew point
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3. Calculate:
   a. Refrigeration sensible heat ratio
   b. Latent heat ratio
   c. Contact factor
   d. Latent heat
   e. Sensible heat
   f. Total heat
   g. Water removal
   h. Mixed air condition

4. On a psychrometric chart, plot the following:
   a. sensible heating
   b. sensible cooling
   c. heating and humidifying
   d. heating and dehumidifying
   e. cooling and humidifying
   f. cooling and dehumidifying
   g. humidifying
   h. dehumidifying
   i. cooling cycle
   j. mixed air process
   k. cooling and reheat

C. Use Sling Psychrometer.
   1. Obtain wet-bulb temperature.
   2. Obtain dry-bulb temperature.
   3. Plot relative humidity, specific humidity, dew point enthalpy and specific volume.
   4. Plot a load triangle.

D. Understand Refrigeration Loads.
   1. Define "U" value: (Btu/hr • ft² • °F).
   2. Define "K" value: (Btu/hr • ft² • °F).
   3. Define "C" value: (Btu/hr • ft² • °F).
   4. Define "R" value: (hr • ft² • °F/Btu).
   5. Interpret heat transfer tables ("U", "K", "C", "R").
   6. Explain the heat load sources:
      a. Conduction
      b. Infiltration (sensible and latent)
      c. Product
      d. Miscellaneous loads (people, motors, equipment, sensible and latent)
      e. Radiation
   7. Explain the purpose of vapor barriers.
   8. Interpret tables of specific heat values, latent heat, and heat of respiration.
   9. Calculate total heating transfer value of any surface (R) - (U).

E. Calculate Heating Loads.
   1. Interpret structure design data.
   2. Interpret building prints - size of rooms, etc.
   3. Determine total resistance to heat flow ("R"), ("U").
   4. Calculate conduction loss:
      a. Walls
      b. Roofs
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c. Floors¹

d. Windows¹

e. Basement (walls, floor)¹

f. Unconditioned space¹

5. Calculate infiltration:¹
   a. Doors¹
   b. Windows¹

6. Calculate ventilation load.¹

7. Calculate duct loss.¹

8. Calculate effects of bath and kitchen exhaust.¹

9. Calculate effects of power roof ventilators.¹

10. Calculate total heating load.¹

F. Calculate Cooling Loads.

1. Interpret structure design data.¹

2. Calculate "U" values for building material.¹

3. Calculate Cooling Load Temperature Difference (CLTD).¹

4. Make corrections for CLTD.¹

5. Calculate conduction loads:¹
   a. Walls¹
   b. Roofs¹
   c. Windows¹
   d. Doors¹
   e. Unconditioned space¹
   f. Floors¹

6. Calculate lighting load.¹

7. Calculate equipment load.¹

8. Calculate infiltration and ventilation load:¹
   a. Heat load¹
   b. Moisture loads¹

9. Calculate duct gain.¹

10. Calculate refrigeration sensible heat ratio.¹

11. Calculate storage factor.¹

12. Calculate effects of bath and kitchen exhaust.¹

13. Calculate effects of power roof ventilators.¹

14. Calculate total cooling load:¹
   a. Sensible loads¹
   b. Latent loads¹

G. Calculate the Heat Loss and Gain for a Residence From a Basic Floor Plan.

1. Discuss load calculation terms and definitions.

2. Use calculator to find area and volume of a residence.

3. Calculate heat transfer multipliers.

4. Calculate heat loss and gain using ACCAJ-1form.

H. Select the Proper Capacity Heating and Cooling Units Based on Calculations.

¹ ODCTE objective
² NCCER objective
All unmarked objectives are TTC instructor developed.
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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.