Modesto Junior College  
Course Outline of Record  
INTEC 362

I. **OVERVIEW**
The following information will appear in the 2010 - 2011 catalog

INTEC 362  *Industrial Refrigeration Systems*  2 Units

*Principles underlying heat transference as used in refrigeration systems. Explanation of devices and equipment used in industrial refrigeration systems. Formerly listed as INDED 363.*

Field trips might be required.  *(A-F Only) Lecture*

II. **LEARNING CONTEXT**
*Given the following learning context, the student who satisfactorily completes this course should be able to achieve the goals specified in Section III, Desired Learning:*

**A. COURSE CONTENT**

1. **Required Content:**

   a. Heat transfer principles
      1. Rules relating to heat
      2. Pressure temperature relations
      3. Saturation temperature
      4. Laws of gases

   b. Refrigerants
      1. Types
      2. Basic characteristics
      3. Relative advantages

   c. Compression Systems
      1. Vapor - compression cycles
      2. Capillary control
      3. Direct expansion systems
      4. Condensing units

   d. Evaporators
      1. Capacities
      2. Humidification
      3. Capacity extenders
      4. Expansion coils
      5. Float coils

   e. Compressors
      1. Reciprocating
      2. Rotary
      3. Centrifugal
      4. Compound

   f. Condensers
      1. Types
      2. Characteristics

   g. Control Valves
      1. Gas
      2. Liquid
h. Electrical
   1. Motors
   2. Switches
   3. Controls

i. Load Calculations
   1. Cooling loads
   2. System balance
   3. Unit selection

j. Service Analysis and Operations
   1. Error indications
   2. Dehydration
   3. Service charts

B. HOURS AND UNITS

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C. METHODS OF INSTRUCTION (TYPICAL)

Instructors of the course might conduct the course using the following method:

1. Classroom instruction.
2. Equipment and technology demonstrations.
3. Video presentations.
4. Plant visits.
5. Guest speakers.

D. ASSIGNMENTS (TYPICAL)

1. **EVIDENCE OF APPROPRIATE WORKLOAD FOR COURSE UNITS**
   Time spent on coursework in addition to hours of instruction (lecture hours)
   - Weekly reading assignments
   - Weekly homework assignments
   - Semester based projects

2. **EVIDENCE OF CRITICAL THINKING**
   Assignments require the appropriate level of critical thinking
   
   Examples of Typical Quiz/Exam Questions:

   a. Graph the saturation curve for Ammonia.
   b. An increase in sensible heat causes:
      i. A rise in temperature
      ii. A fall in temperature
      iii. No change in temperature
iv. Ice to melt

c. Which of the following is used to calculate heat energy?
   i. British Thermal Units (BTU's)
   ii. Calories
   iii. Joules
   iv. Degrees C or F

d. Latent heat of vaporization is:
   i. calculated using temperature
   ii. calculated using pressure
   iii. the heat required to cause a change in state
   iv. the same for all liquids

e. How much pressure is required to create a 1,500 lb force over 2 square inches?
   i. 30 psi
   ii. 750 psi
   iii. 155 psi
   iv. none of the above

f. Name two types of vacuum procedures used by technicians.

g. An ammonia compressor is operating with -25 degree F suction temperature and a suction pressure of 5.4 in. Hg Vacuum. What is the condition of the suction vapor? (you may refer to your tables)
   i. 10 degrees F superheated
   ii. -10 degrees F subcooled
   iii. Saturated
   iv. 12 degrees F superheated

h. Identify 5 different types of industrial refrigeration compressors.

i. Explain the principle of liquid recirculation using a schematic diagram.

j. Describe safety hazards and appropriate PPE related to industrial refrigeration systems.

k. List and describe the necessary first-aid and evacuation procedures necessary in the event of a refrigeration spill.

l. How are industrial refrigerant leaks detected?

m. What is the purpose of hot gas bypass pressure regulating valves?
n. Explain volumetric efficiency as it relates to industrial refrigeration compressors.

o. Identify various types of metering devices used in industrial refrigeration systems.

p. Identify practical considerations that need to be met when designing pipe and component locations within a plant.

E. TEXTS AND OTHER READINGS (TYPICAL)

   R.E.T.A..

III. DESIRED LEARNING

A. COURSE GOAL
   As a result of satisfactory completion of this course, the student should be prepared to:

   explain the physical principles of heat transfer within refrigeration systems. Demonstrate knowledge of
   principles of operation and safe application of industrial refrigeration equipment and devices.

B. STUDENT LEARNING GOALS
   Mastery of the following learning goals will enable the student to achieve the overall course goal.

   1. Required Learning Goals
      Upon satisfactory completion of this course, the student will be able to:

      a. Explain the process of how refrigeration is achieved.

      b. Design/describe a system that incorporates the various devices and equipment used in a typical
         refrigeration system.

      c. Apply one of several analysis techniques to the various service problems encountered in
         refrigeration systems.

      d. Describe the function and operation of industrial refrigeration compressors.

      e. Describe the different types of systems used in industrial refrigeration.

      f. List and explain safe installation, operation and maintenance practices of industrial refrigeration
         systems.

IV. METHODS OF ASSESSMENT (TYPICAL)

A. FORMATIVE ASSESSMENT
   1. Homework assignments.

   2. Classroom discussion.

B. SUMMATIVE ASSESSMENT
   1. Mid Term

   2. Final Exam