San Bernardino Valley College
Curriculum Approved: March 4, 2002

I. CATALOG DESCRIPTION:

A. Department Information:

Division:	Technology
Department:	Refrigeration and Air Conditioning
Course ID:	REFRIG 103x3
Course Title:	Refrigeration III
Units:	4
Lecture:	3 Hours
Lab:	3 Hours
Prerequisite:	REFRIG 101x3

B. Course & Schedule Description: Theory of compressor construction and operation. Principles of all types of refrigerant controls and multi-stage control devices pertaining to commercial and industrial refrigeration. Includes practical lab work.

II. NUMBER OF TIMES COURSE MAY BE TAKEN FOR CREDIT: Three (3)

III. EXPECTED OUTCOMES FOR STUDENTS:

Upon completion of the first repetition of the course, students will be able to:

A. Evaluate and compare differences between commercial and domestic refrigeration systems.
B. Compare the types of compressors and explain how they work.
C. Examine different types of refrigerant controls and explain how they work.
D. Measure temperatures and pressures of four different commercial systems.
E. Wire a single-phase compressor.
F. Evaluate superheat.
G. Design and build a commercial refrigeration system, refrigerator, freezer or water cooler, applying refrigeration principles.

Upon completion of the second repetition of the course, students will be able to:

A. Illustrate their skill and knowledge by categorizing commercial refrigeration units into compressor types and control types.
B. Demonstrate the servicing of commercial refrigeration units and how to determine super-heat.
C. Organize and evaluate the construction of commercial lab project.
D. Develop their skill and confidence while helping first-time student.

Upon completion of the third repetition of the course, students will be able to:

A. Explain the operation of the different commercial compressor types and the different commercial controls.
B. Access, evaluate, and critique student's laboratory projects.
C. Use improved knowledge and skill while assisting the instructor with first-time students.

IV. CONTENT:

A. Safety
B. Commercial Systems
    1. Commercial cooling systems
    2. Industrial compressors
    3. Cooling towers
C. Refrigerated Cabinet Construction
    1. Reach in
    2. Walk in
    3. Display cabinets
    4. Ice cream cabinets

D. Environmental Protection Agency 604 Industrial Regulations
E. Industrial Cooling Systems
   1. Cryogenics
   2. Food storing equipment
   3. Specialty cooling systems
F. South Coast Air Quality Management District 1415 Requirements
G. Industrial Valving
   1. Manual valves
   2. Valves, pressure regulating
H. National Electrical Code for Industrial Applications

V. METHODS OF INSTRUCTION:

Methods of instruction will vary from instructor to instructor but may include:

A. Lectures and discussions about commercial refrigeration, their compression systems, cabinet types, refrigerant controls, superheat and troubleshooting.
B. Lectures and discussions are complemented with practical laboratory projects emphasizing system properties, methods of analysis and troubleshooting.
C. Dynamics are accented with the use of show and tell demonstrations and videos.
D. Homework is assigned to promote expertise, vocabulary, and writing skills.

VI. TYPICAL ASSIGNMENTS:

Typical assignments will vary from instructor to instructor but may include:

A. Explain how a condenser operates.
B. Draw a pictorial configuration for a cascade refrigeration system.
C. Construct a bread board version of a commercial refrigeration system.
D. Assemble a project portfolio including: pictorial diagrams, assembly procedures, pictures, and a project term paper (graded on content and spelling).

VII. EVALUATION:

A. Methods of evaluation will vary from instructor to instructor but shall include:
   1. Written tests
   2. Final exam
      Typical Questions:
      a. What is the maximum number of openings a three-way valve can close at one time?
      b. What leaves the system when it is purged?
   3. Project assembly, to include one student project portfolio per student consisting of:
      a. A typed paper discussing theory and design.
      b. Proof of project assembly. (picture)
      c. A presentation to the instructor including: temperature objective, problems confronted, and any deviation from the original design.
B. Frequency of evaluation will vary from instructor to instructor but may include:
   1. Three written tests
   2. One final exam
C. Levels of evaluation upon repetition:
   1. First enrollment:
      Students are expected to have a good understanding of commercial refrigeration systems.
   2. Second enrollment:
      Students are expected to have a thorough understanding of commercial refrigeration and show growth in knowledge, work skills and confidence.
   3. Third enrollment:
      Students are expected to show increasing skills while working as group leaders and assisting the instructor in lecture demonstrations and organizing and evaluating lab projects.

VIII. TYPICAL TEXT:

Althouse, Modern Refrigeration and Air Conditioning, Goodheart/Willcox, Tinley Park, IL, 2000
Althouse, Modern Refrigeration and Air Conditioning Study Guide, Goodheart/Willcox, Tinley Park, IL, 2000
Dossat, R., Principles of Refrigeration, Prentice Hall, NJ, 2002

IX. **OTHER SUPPLIES REQUIRED OF STUDENTS:** None

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Step 3, Form A

Content Review Form
PREREQUISITE COURSE

Target Course: REFRIG 103x3: Refrigeration III

Prerequisite Course: REFRIG 101x3: Refrigeration I

Instructions:

1. List exit competencies (skills) from Prerequisite Course. These skills are listed in the "Student Outcomes" section of the Course Outline ("upon completion of the course, the student should be able to…")
2. Indicate which of the listed exit competencies (skills) are necessary entry skills needed for success in the target course. Mark with an "X" each needed skill.
3. Indicate the degree of importance of each needed entry skill for course success, using the following rating scale:

   1=Critical 2=Very Helpful 3=Desirable

Skills Analysis

Exit Skills in Prerequisite Course	Entry Skills Needed for Success in Target Course (Mark with an X if needed.)	Degree of Importance (Rate 1 - 3)
1. Examine the fundamentals of refrigeration, such as interactions of temperatures and pressures and their relationship in a closed system.	X	
2. Distinguish between different trade tools, soldering, and brazing methods.		1
3. Experiment with refrigerant tubing; cutting, bending, brazing, etc.	X	
4. Compare the purpose and operation of three different metering devices.	X	1
5. Categorize refrigerants by numbers, colors, and pressures.	X	1
6. Identify the different sections of a refrigeration system.	X	1
7. Practice safety procedures.	X	1
	X	

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