San Bernardino Valley College
Curriculum Approved: February 4, 2002

I. CATALOG DESCRIPTION:

A. Department Information:

Division:	Refrigeration and Air Conditioning
Department:	Refrigeration and Air Conditioning
Course ID:	REFRIG 065A-Z
Course Title:	Heat Pump Theory
Units:	3
Lecture:	3 Hours
Prerequisite:	None

B. Course and Schedule Description: This is the single term of a national training course offered in conjunction with the Refrigeration Service Engineers Society and is a comprehensive study of refrigeration heat-pump theory. This course is designed to help certify journeymen-level refrigeration technicians and keep their knowledge current. Department Advisory: HVAC Refrigeration work experience.

II. NUMBER OF TIMES COURSE MAY BE TAKEN FOR CREDIT: One

III. EXPECTED OUTCOMES FOR STUDENTS:

Upon completion of this course, students will be able to:

A. Compare basic heat pump principles.
B. Distinguish between refrigerant flow controls, expansion valves, and reversing valves.
C. Test the heat pump electrical system.
D. Select motor controllers and other starting devices.
E. Evaluate heat pump performance.
F. Install and service heat pumps.
G. Describe troubleshooting techniques of a typical heat pump system.

IV. CONTENT:

A. Heat Pump Fundamentals
   1. Heat pump principles
   2. Understanding heat loss/gain
   3. Heat pump application & installation
   4. Heat pump compressors
   5. Heat pump refrigerant flow controls
   6. Servicing the heat pump electrical system
B. Heat Pump Refrigerant Flow Controls
   1. Thermostatic expansion valves
   2. Accessories
C. Heat pump system auxiliary heaters
   1. Application
   2. Capacity
   3. Selection
   4. Mechanical installation
   5. Electrical installation
D. Heat Pump Defrost Cycle Controls
   1. Solid state defrost cycle controls
   2. Heat pump thermostats
   3. Motor controllers and other starting devices
E. Heat Pump System Indoor Air Distribution
   1. Heat performance criteria
   2. Air flow measurement
   3. Geothermal heat pump systems

F. Installation and Service of Heat Pumps
   1. Add on heat pump systems
G. Troubleshooting Heat Pump Systems
H. Customer Relations

V. METHODS OF INSTRUCTION:

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

A. Lectures and discussions about heat pump principles, expansion valves, reversing valves, electrical circuits, motor controllers, instillation, service and troubleshooting.
B. Lectures and discussions are complemented with handouts and instruction on different methods of analysis and troubleshooting.
C. Dynamics are accented with the use of pictures, charts 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. Describe the operation of a reversing valve.
B. Explain the methods of initiating the defrost cycle on a heat pump.
C. Differentiate between a ground-to-air and a water-to-air pump system.

VII. EVALUATION:

A. Methods of evaluation will vary from instructor to instructor but may include:
   1. Written tests
   2. Final exam
      Typical Questions:
      a. What is a heat pump, and what does it do?
      b. What is the main difference between a heat pump and an air conditioner?
B. Frequency of evaluation will vary from instructor to instructor but may include:
   1. Three (3) written tests
   2. One (1) final exam

VIII. TYPICAL TEXT:

Refrigeration Service Engineers Society, RSES Heat-Pump Training, Refrigeration Service Engineers Society, Des Plaines, IL, 2002

IX. OTHER SUPPLIES REQUIRED OF STUDENTS: None