Program Description

Air Conditioning and Refrigeration, a constantly changing program designed to satisfy the mechanically oriented person. Introducing entry level skills in this rapidly growing service industry. A Student may specialize in air conditioning, refrigeration, or both (recommended.) The program is built on the block principle with refrigeration divided into domestic and commercial, and air conditioning divided into residential and commercial systems. Students test and repair actual equipment and built-up trainers. Field trips are taken, familiarizing students with actual application. Students must receive a minimum grade "C" or better in all required core in order to qualify for the degree or certificate.

Staff

Please dial (661) 722-6300, then the 4 digit extension.

Division:	
Greg Bormann, Dean	x.6327
Mari-Ali Baiza, Administrative Assistant	x.6327
Leyla Recinos, Clerical Assistant III	x.6327
Kimberly Sennett, Department Chair	x.6742
Faculty:	
Vacant	
Instructional Assistant:	
Jim Landreth	x.6199
Adjunct Faculty:	V.M.
Robert Nemila	2521
Lawrence Oribio	2387
Val Rael	2150

Career Options

AC&R Contractor	Sales Engineer
Dispatcher	Service Engineer
Manufacturers Service Representative	Service Manager
	Service Technician

(Careers may require education beyond the two-year college level.)

Program Learning Outcomes

Refrigeration Specialist

1. Install, analyze, diagnose and repair refrigeration equipment using proper hand-tools, meters, gauges and test instruments.
2. Demonstrate proper refrigerant handling techniques in recovery, recycling and reclamation when installing, repairing and removing refrigeration equipment.
3. Analyze systems and components for proper installation, operation and efficiency.
4. Analyze prints and drawings including mechanical and electrical schematics and pictorials for job specifications, equipment location and diagnostics.
5. Diagnose and facilitate repair to the smallest repairable unit on a refrigeration unit.

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Certificate Programs

The air conditioning and refrigeration curriculum is designed to provide pre-employment instruction in the manipulative skills, technical knowledge, and related trade information which will prepare the student for employment in the air conditioning and refrigeration industry.

Refrigeration Specialist

The program is built on the block principle with refrigeration divided into domestic and commercial courses. Alternate energy concepts are included in the commercial refrigeration courses. Proper handling practices for the new HO and HC (Hydro-olefin and Hydo-Carbon) refrigerants. and applicable EPA mandated regulations in regards to are covered. Students perform tests and repairs on actual equipment as well as built-up trainers. Field trips to various course-related installations are taken, familiarizing students with actual applications. This certificate requires a minimum of 20 units. This program provides the basic skills necessary to enter the refrigeration industry as an entry-level technician. This certificate can be used as a major toward an associate degree.

Required Courses (20 units):	**units**
ACRV 112, Basic Refrigeration Systems	5
ACRV 113, Basic Refrigeration Controls	5
ACRV 212, Commercial Refrigeration Systems	5
ACRV 213, Commercial Refrigeration Controls	5
	Total 20

Air Conditioning Specialist

The certificate requirements for an Air Conditioning Specialist may be satisfied by completing 20 units of required courses and can be used as a major toward an associate degree. The Air Conditioning certificate requires a minimum of 20 units and can be used as a major toward an associate degree. This Certificate and/AS degree provide the basic skills necessary to enter the refrigeration industry with enhanced employability and opportunity through increased options in the Air Conditioning Industry.

Required Courses (20 units):	**units**
ACRV 122, Residential Air Conditioning Systems	***5***
ACRV 123, Residential Air Conditioning Controls	5
ACRV 222, Commercial Air Conditioning Controls	5
ACRV 223, Commercial Air Conditioning Systems	5
	Total 20

Air Conditioning–Refrigeration Specialist

A certificate in Air Conditioning- Refrigeration Specialist may be earned by completing the requirements for the Air Conditioning Specialist and the Refrigeration Specialist. Duplicate courses need only be taken once. The requirements for an associate degree may be satisfied by completing the certificate requirements in addition to the associate degree requirements.

Required Courses (40 units):	units
ACRV 112, Basic Refrigeration Systems	*5*
ACRV 113, Basic Refrigeration Controls	5
ACRV 212, Commercial Refrigeration Systems	5
ACRV 213, Commercial Refrigeration Controls	5
ACRV 122 Residential Air Conditioning Systems	5
ACRV 123, Residential Air Conditioning Controls	5
ACRV 222 Commercial Airconditioing Controls	5
ACRV 223, Commercial Air Conditioning Systems	5
Total	**40**

Associate Degrees

Refrigeration Specialist

The requirements for an associate degree in Refrigeration may be satisfied by completing 20 units of required courses, 21 units of general education requirements, and sufficient elective credits to total 60 units. (See Graduation/ Associate Degree Requirements.) Students who complete the associate degree in Refrigeration have enhanced employability in the field of Refrigeration. They are well prepared for entry level service positions with eventual leadership roles. Additionally, they have shown that they are capable of advanced training, and able to comprehend and apply complex theory. The associate degree will also provide students with a broad range of knowledge with which to evaluate and appreciate the diverse field of opportunity in the Refrigeration Industry.

Except in cases of a prerequisite requirement, it is not required to take courses in exactly this sequence; they are recommended in this order to facilitate success.

Required Courses (20 units):	Units
ACRV112 - Basic Refrigeration Systems	5
ACRV113 - Basic Refrigeration Controls	5
ACRV212 - Commercial Refrigeration Systems	5
ACRV213 - Commercial Refrigeration Controls	5

Recommended Pathway

Fall, First Semester	units
ACRV 112, Basic Refrigeration Systems	5
GE requirement Area D1 (ENGL 101)	3
GE requirement Area E	3
Elective (recommended ENGL115)	3
Total	**14**
Spring, Second Semester	
ACRV 113, Basic Refrigeration Controls	5
GE requirement Area A	3
GE requirement Area D2	3
Electives	5
Total	**16**
Fall, Third Semester	
ACRV 212, Commercial Refrigeration Systems	5
GE requirement Area C	3
Electives	7
Total	**15**
Spring, Fourth Semester	
ACRV 213, Commercial Refrigeration Controls	5
GE requirement Area B	3
GE requirement Area F	3
Electives	4
Total	**15**
Degree Total	**60**

Semester class order completion time may vary for night students.

Air Conditioning Specialist

The requirements for an associate degree in Air Conditioning may be satisfied by completing 20 units of required Associate Degree Requirements.) Students who complete the associate degree in Air Conditioning have enhanced employability in the field of Air Conditioning. They are well prepared for entry level service positions with eventual leadership roles. Additionally, they have shown that they are capable of advanced training, and able to comprehend and apply complex theory. The associate degree will also provide students with a broad range of knowledge with which to evaluate and appreciate the diverse field of opportunity in the HVAC Industry.

Except in cases of a prerequisite requirement, it is not required to take courses in exactly this sequence; they are recommended in this order to facilitate success.

Required Courses (20 units):	Units
ACRV 122, Residential Air Conditioning Systems	5
ACRV 123, Residential Air Conditioning Controls	5
ACRV 222, Commercial Air Conditioning Controls	5
ACRV 223, Commercial Air Conditioning Systems	5

Recommended Pathway

Fall, First Semester	units
ACRV 122, Residential Air Conditioning Systems	5
GE requirement Area D1 (ENGL 101)	3
GE requirement Area E	3
Electives	4
Total	**15**
Spring, Second Semester	
ACRV 123 Residential Air Cond Controls	5
Elective, (recommended ENGL115)	3
GE requirement Area D2	3
Electives	7
Total	**15**
Fall, Third Semester	
ACRV 222, Commercial Air Conditioning Controls	5
GE requirement Area B	3
GE requirement Area C	3
Electives	4
Total	**15**
Spring, Fourth Semester	
ACRV 223, Commercial Air Conditioning Systems	5
GE requirement Area A	3
GE requirement Area F	3
Electives	4
Total	**15**
Degree Total	**60**

Semester class order completion time may vary for night students.

Air Conditioning and Refrigeration Specialist

The requirements for an associate degree in Air Conditioning and Refrigeration may be satisfied by completing 40 units of required courses and 21 units of general education requirements to total 61 units. (See Graduation/Associate Degree Requirements.) Students who complete the associate degree in Air Conditioning and Refrigeration have increased employability with firms that work in both Air Conditioning and Refrigeration Industries. They are well prepared for entry level service positions with eventual leadership roles. Additionally, they have shown that they are capable of advanced training, and able to comprehend and apply complex theory. The associate degree will also provide students with a broad range of knowledge with which to evaluate and appreciate the diverse field of opportunity in the HVAC/R Industry.

Required Courses (40 units):	**Units**
ACRV 112, Basic Refrigeration Systems	***5***
ACRV 113, Basic Refrigeration Controls	5
ACRV 212, Commercial Refrigeration Systems	5
ACRV 213, Commercial Refrigeration Controls	5
ACRV 122, Residential Air Conditioning Systems	5
ACRV 123, Residential Ait Conditioning Controls	5
ACRV 222, Commercial Airconditioing Controls ***and***	5
ACRV 223, Commercial Systems Systems	5

Recommended Pathway	
Fall, First Semester	**units**
ACRV 112 Basic Refrigeration Systems	5
ACRV 122 Residential Air Conditioning Systems	5
GE requirement Area D1 (ENGL 101)	3
	Total 13
Spring, Second Semester	
ACRV 113 Basic Refrigeration Controls	5
ACRV 123 Residential Air Cond Controls	5
GE requirement Area A	3
GE requirement Area D2	3
	Total 16
Fall, Third Semester	
ACRV 212, Commercial Refrigeration Systems	5
ACRV 222, Commercial Air Conditioning Controls	5
GE requirement Area C	3
GE requirement Area E	3
	Total 16
Spring, Fourth Semester	
ACRV 213, Commercial Refrigeration Controls	5
ACRV 223, Commercial Air Conditioning Systems	5
GE requirement Area B	3
GE requirement Area F	3
	Total 16
	Degree Total 61

Prerequisite Completion

All prerequisite courses must be completed with a satisfactory grade in order to enroll in the next course. According to Title 5, Section 55200(d), a satisfactory grade is a grade of "A," "B," "C" or "P". Classes in which the Pass/No Pass option is available are indicated with an asterisk **(*)** before the course title. See "Pass/No Pass Option" in the catalog for full explanation.

Air Conditioning and Refrigeration Courses

ACRV 112 BASIC REFRIGERATION SYSTEMS

5 units

10 hours weekly [2.5 lecture, 7.5 lab]

Study of refrigeration fundamentals including heat transfer, energy, and the basic refrigeration system. Basic tools with some specialty tools and basic refrigerant handling skills will also be covered. Topics include: brazing of copper tubing; repair and replacement of components, along with maintenance on domestic refrigeration equipment. Recommended for students desiring to enter the air conditioning and refrigeration industry. (AVC)

ACRV 113 BASIC REFRIGERATION CONTROLS

5 units

10 hours weekly [2.5 lecture, 7.5 lab]

Study of electrical diagrams and circuits in domestic refrigerators and freezers. Includes terminology, legends, ATL and pictorial electrical diagrams used in domestic refrigeration equipment. The testing and repair or replacement of specialized circuitry on refrigeration equipment including types of motors and start components, temperature controls and defrost timers used on domestic refrigeration equipment will also be covered. Recommended for students desiring to enter the air conditioning and refrigeration industry. (AVC)

ACRV 122 RESIDENTIAL AIR CONDITIONING SYSTEMS

5 units

10 hours weekly [2.5 lecture, 7.5 lab]

Study of air conditioning fundamentals including methods of heating, cooling and humidification. Topics include: repair and replacement of components along with maintenance on residential air conditioning equipment. Environmental controls are introduced with basic electrical schematics using temperature and humidity controls. (AVC)

ACRV 123 RESIDENTIAL AIR CONDITIONING CONTROLS

5 units
10 hours weekly [2.5 lecture, 7.5 lab]
Study of air conditioning fundamentals including methods of heating, cooling and humidification. Load calculations along with air flow, duct design, air quality and air handling are covered. The characteristics of air and psychrometrics are introduced. A residential system is designed from calculating load to laying out the air handling system (blower and ducts). Also includes system evaluation and diagnostics of the air side of the system. Recommended for students entering the air conditioning industry. (AVC)

ACRV 199 *OCCUPATIONAL WORK EXPERIENCE

1–8 units
hours vary
Prerequisite: *To participate in work experience, students must have a job or internship which is either paid or voluntary and have the approval of the supervisor and instructor supervising work experience in the specific subject area. PRIOR TO ENROLLING, students must attend a scheduled orientation or meet individually with the supervising instructor for an individual orientation.*
Occupational Work Experience Education is supervised employment designed to provide students a realistic learning experience through work. The ultimate goal is to teach students those skills and attitudes that will equip them to function and adapt as an employee in a variety of situations and jobs. Occupational Work Experience Education is supervised employment extending classroom-based occupational learning at an on-the-job learning station related to the student's educational major or occupational goal. Credit may be accrued at the rate of one to eight units per semester. For the satisfactory completion of all types of Cooperative Work Experience Education (WE 197 and WE 199), students may earn up to a total of sixteen semester credit hours. (AVC) **(R3)**

ACRV 212 COMMERCIAL REFRIGERATION SYSTEMS

5 units
10 hours weekly [2.5 lecture, 7.5 lab]
Prerequisite: *Completion of ACRV 112 and 113*
Study of commercial refrigeration applications and design concerns including calculating of heat loads and equipment sizing. Installation and service procedures including maintenance practices are covered in the "hands-on" lab portion of class. Emphasis on the refrigerant handling and recovery practices used in the repair and replacement of components. Recommended for students desiring to enter the refrigeration industry. (AVC)

ACRV 213 COMMERCIAL REFRIGERATION CONTROLS

5 units
10 hours weekly
Prerequisite: *Completion of ACRV 112 and 113*
Equipment specific refrigeration principles and applications are studied. Commercial refrigeration applications and design concerns including analyzing efficiency and optimizing performance. Diagnostics, service and repair are covered in the "hands-on" lab portion of class. Emphasis on the refrigerant handling and recovery practices used in the repair and replacement of components. Recommended for students desiring to enter the refrigeration industry. (AVC)

ACRV 222 COMMERCIAL AIR CONDITIONING CONTROLS

5 units
10 hours weekly [2.5 lecture, 7.5 lab]
Prerequisite: *Completion of ACRV 122 and ACRV 123.*
Study of commercial air conditioning covering electricity and controls. Reviews basic electrical theory and takes the student through electrical schematics and controls as they apply to the light commercial air conditioning industry. Topics include: motors, magnetic line starters, transformers, solid-state devices and programmable logic controllers. ATL and pictorial schematic wiring diagrams for commercial single and three-phase systems are also covered. Recommended for students desiring to enter the air conditioning industry. (AVC)

ACRV 223 COMMERCIAL AIR CONDITIONING SYSTEMS

2.5 units
10 hours weekly [2.5 lecture, 7.5 lab]
Prerequisite: *Completion of ACRV 122 and 123*
Study of commercial air conditioning covering building environments. Course covers the commercial facility and its systems management and control. Energy conservation using economizers. Occupant comfort and productivity are issues considered in system design and control. Equipment types to include boilers, heat recovery and economizer packages, cooling towers and hydronic systems along with air handling and filtration are introduced. Control strategies for occupant comfort, and facility control management are discussed. (AVC)