

Air Conditioning, Refrigeration & Facilities Technology

Associate of Applied Science in Air Conditioning, Refrigeration & Facilities Technology

Certificate of Completion in Air Conditioning, Refrigeration & Facilities Technology

Certificate of Completion in Residential and Light Commercial Air Conditioning



For More Information, Contact:
**The Industrial Technology Division at
GateWay Community College**
Phone (602) 286-8613
<http://industry.gatewaycc.edu/>



Welcome to the Air Conditioning, Refrigeration & Facilities Technology Program at GateWay Community College

If you have any questions about the enclosed program material, please feel free to contact any of the following program contacts:

Dr. Clyde Perry, Industrial Technology Division, Division Chair, ACRF Program Director, and ACRF Faculty

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Registration Checklist

1	Submit 'Student Information Form' www.my.maricopa.edu	South Building, A&R Office Room SO1146	602.286.8200
2	Request Official Transcripts from all other educational agencies to be forwarded to Admissions & Records	South Building, A&R Office Room SO1146	602.286.8200
3	Take Course Placement Test (if applicable) Some courses and programs require test scores prior to enrollment. No fee required_BRING PICTURE ID_Call for times	South Building, Testing Center Room SO1136	602.286.8160
4	Apply for Financial Aid and Scholarships, if interested http://enroll.gatewaycc.edu/FinancialAid/ApplyForFinancialAid/ http://enroll.gatewaycc.edu/FinancialAid/Scholarships/	South Building, Financial Aid Room SO118	602.286.8300
5	Meet with an Industrial Technology Program Advisor Explore your program options, obtain registration advisement and setup a program of study plan.	South Building, Industrial Tech Room SO1300	602.286.8613
6	Register for Courses	South Building, A&R Office Room SO1146	602.286.8200
7	Pay Tuition and Fees Payment Plans and Payment Extensions Available. Ask for Details.	South Building, Cashiers Office Room SO1107	602.286.8277
8	Obtain Student ID, Optional Student Life_BRING PICTURE ID	Main Building, Student Life Room MA1132	602.286.8141
9	Obtain Parking Decal, Required Required if parking a vehicle on campus	South Building, A&R Office Room SO1146	602.286.8200
10	Purchase Books Bookstore or online at www.efollet.com	Main Building, Bookstore Room MA1200	602.286.8400



Career Description

As an Air-Conditioning/Refrigeration & Facilities (ACRF) Technician, you will operate and maintain the mechanical and electrical systems in residential to large commercial, high technology and multi-building complexes. ACRF Technicians assist employees in maintaining an environmentally safe and accessible place of business. Technicians are called upon to provide short and long term planning schedules to maintain compliance, a safe work environment and cost beneficial production schedules and with knowledge of health, safety, environmental and ADA regulations, technicians provide education, training, and guidance to the employer. You will work closely with safety and health officers, management and administration. You must have considerable knowledge in the areas of heating, ventilating, air conditioning, refrigeration, electrical and mechanical systems, and be able to solve problems quickly and in emergency situations. Employment opportunities can be found in all industries where a company has more than 10 employees and comes under regulatory guidelines, such as electrical plants, hospitals, and grocery stores as well as residential systems.

How To Get Started

GateWay Community College offers a Certificate of Completion and Associate in Applied Science Degree in Air Conditioning/Refrigeration Facilities Technology (ACRF). Your class work along with hands-on training, using the latest in technology, are integrated in a seamless program that resembles an actual workplace environment. In this program, you will learn the required competencies by working individually or in a team to solve actual field problems. After completion you may chose to specialize in the areas of Air and Water Balance, Electrical Technology, and Building Commissioning.

Accreditation

GateWay Community College is a Maricopa Community College, accredited by the Commission on Institutions of Higher Education of the North Central Association of Colleges and Schools (30 North LaSalle Street, Suite 2400, Chicago, IL. 60602-2504. Tele# (800)621-7440)

Career Opportunities

- φ **Application Engineer/Technician**
- φ **Outside/Inside Sales Representative**
- φ **Facilities Engineer**
- φ **Production Technician**
- φ **Field Service/Installation Technician**
- φ **Project Manager**
- φ **Inspector**
- φ **Sales Manager**
- φ **Job Foreman/Supervisor**
- φ **Service Repair Technician**
- φ **Journeyman**
- φ **Supermarket Refrigeration**



Employment Outlook

In Arizona, Air Conditioning, Refrigeration and Facility Technician positions are expected to increase 20% or more in the next 10 years. ACRF Technicians earn an average of \$10.47 to \$26.02 an hour for an average annual salary of \$21,778 to \$54,122.

Program Costs

Tuition and fees are set by the Maricopa Community College District Governing Board. Tuition is based on the 2008-2009 tuition rate of \$71 per credit hour (for in-county students). Tuition and fees are subject to change. Additional fees may apply. Financial Aid and Child Care are available to those who qualify.

CERTIFICATES OF COMPLETION

Certificate of Completion in Residential and Light Commercial Air Conditioning

Program Prerequisite: Completion of MAT082 or equivalent is recommended.

Course Pre-Fix	Course Name	Credits	Advisor Notes
Certificate of Completion in Residential HVAC Required Courses			
HVA101/HVA101LL	Refrigeration Applications & Components I/Lab	3	
HVA103/HVA103LL	Refrigeration Applications & Components II/Lab	3	
FAC105/FAC105LL	Electricity for Industry/Lab	4	
HVA112/HVA112LL	Heating & Air Conditioning/Lab	4	
HVA143	Load Calculation & Duct Design	3	
OSH106	Industrial Safety	2	
BPC110	Microsoft Office	3	
Total Required Credits for Certificate of Completion in Residential HVAC		22	

Certificate of Completion in Air Conditioning, Refrigeration & Facilities Technology

Program Prerequisite: Completion of MAT082 or equivalent is recommended.

Course Pre-Fix	Course Name	Credits	Advisor Notes
Certificate of Completion in ACRF Required Courses			
Certificate of Completion in Residential and Light Commercial AC		22	
FAC115/FAC115LL	Motors, Controls & Wiring Diagrams/Lab	4	
FAC186	Electro-Mechanical Devices	3	
FAC210/FAC210LL	Facilities Air Conditioning Systems/Lab	4	
FAC220/FAC220LL	Controls & Instrumentation/Lab	4	
FAC231	Codes	3	
FAC235/FAC235LL	Air & Water Balance/Lab	4	
MAT103AA	Math for Industrial Applications I or Equivalent by Permission	2	MAT122 is an approved equivalent to meet MAT103AA and MAT103AB
MAT103AB	Math for Industrial Applications II or Equivalent by Permission	2	
BPC110	Microsoft Office or Equivalent	3	
Total Required Credits for Certificate of Completion in ACRF		48	

To receive these certificates, students must earn a grade 'C' or better in all courses within the program.

Note: (+) Indicates a prerequisite and/or co requisite is required

Associate in Applied Science (AAS) in Air Conditioning, Refrigeration & Facilities

Program Prerequisite: Completion of MAT082 or equivalent is recommended.

Course Pre-Fix	Course Name	Credits	Advisor Notes
Associate of Applied Science Required Core Courses			
HVA101/HVA101LL	Refrigeration Applications & Components I/Lab	3	
HVA103/HVA103LL	Refrigeration Applications & Components II/Lab	3	
FAC105/FAC105LL	Electricity for Industry/Lab	4	
HVA112/HVA112LL	Heating & Air Conditioning/Lab	4	
FAC115/FAC115LL	Motors, Controls & Wiring Diagrams/Lab	4	
HVA143	Load Calculation & Duct Design	3	
FAC186	Electro-Mechanical Devices	3	
FAC210/FAC210LL	Facilities Air Conditioning Systems/Lab	4	
FAC220/FAC220LL	Controls & Instrumentation/Lab	4	
FAC231	Codes	3	
FAC235/FAC235LL	Air & Water Balance/Lab	4	
OSH106	Industrial Safety	2	
MAT103AA	Math for Industrial Applications I or Equivalent by Permission	2	MAT122 is an approved equivalent to meet MAT103AA and MAT103AB
MAT103AB	Math for Industrial Applications II or Equivalent by Permission	2	
BPC110	Microsoft Office or Equivalent	3	
Associate in Applied Science Required General Education Courses			
ENG101+	First-Year Composition	3	
ENG102+	First-Year Composition	3	
COM100	Introduction to Communications	3	
CRE101	Critical Reading or Equivalent by Assessment	3	
CHM130+/CHM130LL+	Fundamental Chemistry, OR		
PHY101+	Introduction to Physics, OR		
PHY111+	General Physics I	4	
Humanities/Fine Arts <i>(course must be on the approved list of courses to meet the AAS degree in General Education Requirements)</i>		3	
Social/Behavioral Sciences <i>(course must be on the approved list of courses to meet the AAS degree in General Education Requirements)</i>		3	
Total Required Credits for Associate in Applied Science		70	

To receive this certification and/or degree, students must earn a grade 'C' or better in all courses within the program.

Note: (+) Indicates a prerequisite and/or co requisite is required

**Program of Study/Suggested Course Sequence
for
ACRF Degree and Certificate Programs**

FALL START: Day Classes

1st Semester, Fall				
Course	Credit	Tuition	Course Fees	Book
HVA101 and HVA101LL	3	\$213	\$25	Yes
FAC105 and FAC105LL	4	\$284	\$25	Yes
OSH106	2	\$142	\$25	Yes
General Studies/ Required Core Classes	<i>Required general education core classes can be taken at any other MCCD Colleges at your convenience (summer, online and Saturday classes are available)</i>			

2nd Semester, Spring				
Course	Credit	Tuition	Course Fees	Book
HVA103 and HVA103LL	3	\$213	\$25	Yes
HVA112 and HVA112LL	4	\$284	\$25	Yes
HVA143	3	\$213	-	Yes
General Studies/ Required Core Classes	<i>Required general education core classes can be taken at any other MCCD Colleges at your convenience (summer, online and Saturday classes are available)</i>			

3rd Semester, Fall				
Course	Credit	Tuition	Course Fees	Book
FAC115 and FAC115LL	4	\$284	\$25	Yes
FAC210 and FAC210LL	4	\$284	\$25	Yes
FAC186	3	\$213	\$25	Yes
General Studies/ Required Core Classes	<i>Required general education core classes can be taken at any other MCCD Colleges at your convenience (summer, online and Saturday classes are available)</i>			

4th Semester, Spring				
Course	Credit	Tuition	Course Fees	Book
FAC220 and FAC220LL	4	\$284	\$25	Yes
FAC235 and FAC235LL	4	\$284	\$25	Yes
HVA231	3	\$213	-	Yes
General Studies/ Required Core Classes	<i>Required general education core classes can be taken at any other MCCD Colleges at your convenience (summer, online and Saturday classes are available)</i>			

**Program of Study/Suggested Course Sequence
for
ACRF Degree and Certificate Programs**

FALL START: Night Classes

1st Semester, Fall				
Course	Credit	Tuition	Course Fees	Book
HVA101 and HVA101LL	3	\$213	\$25	Yes
FAC105 and FAC105LL	4	\$284	\$25	Yes
HVA143	3	\$213	-	Yes
General Studies/ Required Core Classes	<i>Required general education core classes can be taken at any other MCCD Colleges at your convenience (summer, online and Saturday classes are available)</i>			

2nd Semester, Spring				
Course	Credit	Tuition	Course Fees	Book
HVA103 and HVA103LL	3	\$213	\$25	Yes
HVA112 and HVA112LL	4	\$284	\$25	Yes
OSH106	2	\$142	\$25	Yes
General Studies/ Required Core Classes	<i>Required general education core classes can be taken at any other MCCD Colleges at your convenience (summer, online and Saturday classes are available)</i>			

3rd Semester, Fall				
Course	Credit	Tuition	Course Fees	Book
FAC115 and FAC115LL	4	\$284	\$25	Yes
FAC210 and FAC210LL	4	\$284	\$25	Yes
FAC186	3	\$213	-	Yes
General Studies/ Required Core Classes	<i>Required general education core classes can be taken at any other MCCD Colleges at your convenience (summer, online and Saturday classes are available)</i>			

4th Semester, Spring				
Course	Credit	Tuition	Course Fees	Book
FAC220 and FAC220LL	4	\$284	\$25	Yes
FAC235 and FAC235LL	4	\$284	\$25	Yes
HVA231	3	\$213	-	Yes
General Studies/ Required Core Classes	<i>Required general education core classes can be taken at any other MCCD Colleges at your convenience (summer, online and Saturday classes are available)</i>			

**Program of Study/Suggested Course Sequence
for
ACRF Degree and Certificate Programs**

SPRING START: Night Classes

1st Semester, Spring				
Course	Credit	Tuition	Course Fees	Book
HVA101 and HVA101LL	3	\$213	\$25	Yes
FAC105 and FAC105LL	4	\$284	\$25	Yes
OSH106	2	\$142	\$25	Yes
General Studies/ Required Core Classes	<i>Required general education core classes can be taken at any other MCCD Colleges at your convenience (summer, online and Saturday classes are available)</i>			

2nd Semester, Fall				
Course	Credit	Tuition	Course Fees	Book
HVA103 and HVA103LL	4	\$284	\$25	Yes
HVA112 and HVA112LL	4	\$284	\$25	Yes
HVA143	3	\$213	-	Yes
General Studies/ Required Core Classes	<i>Required general education core classes can be taken at any other MCCD Colleges at your convenience (summer, online and Saturday classes are available)</i>			

3rd Semester, Spring				
Course	Credit	Tuition	Course Fees	Book
FAC115 and FAC115LL	4	\$284	\$25	Yes
FAC210 and FAC210LL	4	\$284	\$25	Yes
HVA231	3	\$213	-	Yes
General Studies/ Required Core Classes	<i>Required general education core classes can be taken at any other MCCD Colleges at your convenience (summer, online and Saturday classes are available)</i>			

4th Semester, Fall				
Course	Credit	Tuition	Course Fees	Book
FAC220 and FAC220LL	4	\$284	\$25	Yes
FAC235 and FAC235LL	4	\$284	\$25	Yes
FAC186	3	\$213	-	Yes
General Studies/ Required Core Classes	<i>Required general education core classes can be taken at any other MCCD Colleges at your convenience (summer, online and Saturday classes are available)</i>			

Individual Education Plan

Placement Test		
Math:	Reading:	English:

Semester _____		Year _____	
Course	Credit	Complete/ Grade	

Semester _____		Year _____	
Course	Credit	Complete/ Grade	

Semester _____		Year _____	
Course	Credit	Complete/ Grade	

Semester _____		Year _____	
Course	Credit	Complete/ Grade	

Semester _____		Year _____	
Course	Credit	Complete/ Grade	

Semester _____		Year _____	
Course	Credit	Complete/ Grade	

TOOL REQUIREMENTS

Minimum Basic Tool List

Please note, you do not need to have all tools before starting classes. As you progress in the program, you will be required to obtain these tools. The instructors will also provide recommended brands and vendors.

Common Blade Screw Drivers: 6"x5/16"* , 4"x1/4"* , 2"x1/8" (pocket)
Phillips Screw Drivers: #1* , #2*
Adjustable (Crescent) Wrench: 6" , 12"
Nut Drivers: 1/4"* , 5/16"* , 11/32" , 3/8" , 7/16" , 1/2"
6-in-1 Screwdriver (alternative to * items)
Tapered (Needle-nose) Pliers
Side Cutter Pliers (Dikes)
Wire Stripper – Terminal Crimper
Fuse Puller
Refrigeration Service Valve Wrench
Tubing Cutter
Flaring Tool
Clamp-on Ammeter (UL-Listed, Minimum Rating 600 V, Category III)
Volt/Ohm Meter (UL-Listed, Minimum Rating 1000V Category II, 600 V, Category III)
Work Gloves
Safety Glasses

Optional General Tool List

Open-end Wrenches: 1/4" – 13/16"
Common Blade Screw Drivers: 6"x3/16" , 1-1/4"x1/4" (stubby)
Utility Knife
Linesman's Pliers
Slip-joint Pliers (Channel-locks): 6" , 12"
Awl
Hex Key Set
Tape Measure
Hammer
Box End Ratchet Wrenches: 1/4"-7/8?
Socket Set: 3/8" or 1/2"
Spirit Level
Mill-tooth Flat File
Flashlight (sealed)
Punch Set
Circuit Tester
Jumper Wires
Miscellaneous Items: Spare batteries, spare utility knife blades, duct tape, WD40

HVAC-R

Pipe Wrenches: 8" , 12" , 16-18"
Wire Brush
Manometer
Pipe Dope/Teflon Tape
Pilot Light Igniter
Inspection Mirror
Refrigeration Gauges Set

Facilities Systems Technology

Pipe Wrenches: 12" , 18"
V-Belt Pulley Gage
Specialty Drivers: Torx, Roberson, Tri-oval, etc.
Insertion Thermometer

PROGRAM COSTS

Air Conditioning, Refrigeration and Facilities Degree and Certificate Cost Estimates

Program	Tuition	Course Fees	Total
Associate of Applied Science in ACRF	\$4,970	\$225	\$5,195
Certificate of Completion in Residential HVAC	\$1,562	\$125	\$1,687
Certificate of Completion in ACRF	\$3,408	\$225	\$3,633

Please note that these are only estimates and do not include books. These estimates may change based on increases to tuition, course fees and book costs. Estimates are based on the 2008-2009 tuition rates for in-county students. Additional fees may apply.

COLLEGE CONTACT INFORMATION

Admissions, Registration and Records.....	(602) 286-8200
Adult Re-Entry.....	(602) 286-8900
Apprenticeship Programs.....	(602) 286-8681
Assessment/Testing Center.....	(602) 286-8160
Bookstore.....	(602) 286-8400
Cafeteria.....	(602) 286-8308
Career and Employment Services Center.....	(602) 286-8500
College Safety.....	(602) 286-8911
Cashier's Office.....	(602) 286-8277
Cashier's TIP Hotline.....	(602) 286-8286
Children's Learning Center.....	(602) 286-8130
College Information.....	(602) 286-8000
Counseling.....	(602) 286-8900
Disability Services.....	(602) 286-8888
Financial Aid.....	(602) 286-8300
Institute for Computer Training (ICT) Lab.....	(602) 286-8568
Learning Center.....	(602) 286-8800
Library.....	(602) 286-8454
Phone Registration.....	(602) 286-8100
Student Activities/Clubs.....	(602) 286-8700
Veterans Services.....	(602) 286-8076

Partnership for Heating Ventilation Air-Conditioning Refrigeration Accreditation (PAHRA)



GateWay Community College's Air Conditioning, Refrigeration, and Facilities Technology training program has met the instruction, curriculum, student, faculty, and facility standards set forth by the Partnership for Air-Conditioning, Heating, Refrigeration Accreditation (PAHRA). PAHRA's programmatic accreditation certifies that the following training areas have been evaluated:

- ⇒ Residential Heating and Air Conditioning
- ⇒ Light Commercial Heating and Air Conditioning
- ⇒ Commercial Refrigeration

The many individuals and organizations supporting PAHRA, such as the Air-Conditioning and Refrigeration Institute (ARI), Air Conditioning Contractors of America, American Society of Heating, Refrigeration, Air Conditioning Engineers (ASHRAE), Council of Air-Conditioning

and Refrigeration Educators (CARE), Gas Appliance Manufacturers Association (GAMA), Heating, Air Conditioning & Refrigeration Distributors International (HARDI), and Plumbing, Heating, Cooling Contractors (PHCC) commend your training program for meeting and/or exceeding standards established and validated by the HVAC/R industry Associations.