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# AIR CONDITIONING, REFRIGERATION & FACILITIES TECHNOLOGY

*Associate in Applied Science Degree 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*

**MORE INFORMATION:**

**[GATEWAYCC.EDU/INDUSTRIAL-TECHNOLOGY](http://GATEWAYCC.EDU/INDUSTRIAL-TECHNOLOGY)**



**GATEWAY  
COMMUNITY COLLEGE**

A MARICOPA COMMUNITY COLLEGE

108 N. 40<sup>th</sup> Street – Phoenix, AZ 85034



**MARICOPA  
COMMUNITY COLLEGES**

*Disclaimer: This document is for informational purposes only. The official programs description can be found here: <http://www.maricopa.edu/academic/ccta/>*

Program: 3587, 5380, 5542 Effective 2018 - 2019

## 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:

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*Maricopa County Community College District (MCCCD) is an EEO/AA institution and an equal opportunity employer of protected veterans and individuals with disabilities. A lack of English language skills will not be a barrier to admission and participation in the career and technical education programs of the college.*

*The Maricopa Community Colleges do not discriminate on the basis of race, color, national origin, sex, disability or age in its programs or activities. For Title IX/504 concerns, call the following number to reach the appointed coordinator: (480) 731-8499. For additional information, as well as a listing of all coordinators within the Maricopa College system, <http://www.maricopa.edu/non-discrimination>.*

1	<b>Submit 'Student Information Form'</b> <a href="https://admissions.maricopa.edu/">https://admissions.maricopa.edu/</a>	Enrollment Services IE 1214	(602) 286-8200
2	<b>Verify in-state residency</b> <a href="https://my.maricopa.edu/services/admissions-records-registration/proof-identity-id-authentication">https://my.maricopa.edu/services/admissions-records-registration/proof-identity-id-authentication</a>	Enrollment Services IE 1214	(602) 286-8200
3	<b>Send Official Transcript and/or High School Transcripts to Enrollment Services</b> GateWay Community College Attn: Admissions and Records 108 North 40th Street Phoenix, AZ 85034	Enrollment Services IE 1214	(602) 286-8200
4	<b>Take Course Placement Test (if applicable)</b> Some courses and programs require test scores prior to enrollment. No fee required. BRING PICTURE ID. Call for times.	Testing Center IE 1252	(602) 286-8160
5	<b>Apply for Financial Aid and Scholarships, if interested</b> <a href="http://www.gatewaycc.edu/Pay/FinancialAid/Apply.aspx">http://www.gatewaycc.edu/Pay/FinancialAid/Apply.aspx</a> <a href="http://www.fafsa.ed.gov/index.htm">http://www.fafsa.ed.gov/index.htm</a>	Enrollment Services IE 1214	(855) 622-2332
6	<b>Meet with an Industrial Technology Program Advisor</b> Explore your program options, obtain registration advisement and setup a program of study plan.	Enrollment Services IE 1214	(602) 286-8174
7	<b>Register for Courses</b> Schedule Available at <a href="http://classes.sis.maricopa.edu/">http://classes.sis.maricopa.edu/</a> Enroll online at <a href="https://my.maricopa.edu">https://my.maricopa.edu</a>	Enrollment Services IE 1214	(602) 286-8200
8	<b>Pay Tuition and Fees</b> Payment Plans and Payment Extensions Available. Ask for details.	Enrollment Services IE 1214	(602) 286-8200
9	<b>Obtain Student ID, Optional</b> Enrollment Services — BRING PICTURE ID	Enrollment Services IE 1214	(602) 286-8141
10	<b>Obtain Parking Decal, Required</b> Required if parking a vehicle on campus.	Enrollment Services IE 1214	(602) 286-8200
11	<b>Purchase Books</b> Bookstore or online at <a href="https://www.bkstr.com/gatewayccstore/home">https://www.bkstr.com/gatewayccstore/home</a>	Main Building, Bookstore MA 1200	(602) 286-8400
12	<b>Attend a Program Orientation Session</b> A week before the start of the semester.	Room location varies each semester.	(602) 286-8613



## 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 choose 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

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



## Employment Outlook

In Arizona, Air Conditioning, Refrigeration and Facility Technician positions are expected to increase by 2018. Air Conditioning/Refrigeration Facilities Technicians earn an average hourly rate of \$19.40 for an average annual salary of \$40,342.

## Program Costs

Tuition and fees are set by the Maricopa Community College District Governing Board. Tuition is based on the 2018 -2019 tuition rate of \$85 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.

## Certificate of Completion in Residential and Light Commercial Air Conditioning

Program Prerequisite: Completion of MAT090 or equivalent is recommended.

Course Pre-Fix	Course Name	Credits	Advisor Notes
<b>Certificate of Completion in Residential HVAC Required Courses</b>			
HVA101/HVA101LL	Refrigeration Applications & Components I/Lab	4	
HVA103/HVA103LL	Refrigeration Applications & Components II/Lab	4	
HVA104	EPA Section 608 Technician Preparation and Certification OR Proof of EPA Certification	0-0.5	
FAC105/FAC105LL	Electricity for Industry/Lab	4	
HVA112/HVA112LL	Heating & Air Conditioning/Lab	4	
HVA143	Load Calculation & Duct Design	3	
OSH106 AA OR OSH105AA OR	Industrial Safety Construction Safety, OR Proof of OSHA 30 Hour Card	0-3	
BPC110 or CIS105	Computer Usage & Applications	3	
<b>Total Required Credits for Certificate of Completion in Residential HVAC</b>		<b>22-25.5</b>	

## Certificate of Completion in Air Conditioning, Refrigeration & Facilities Technology

Program Prerequisite: Completion of MAT090 or equivalent is recommended.

Course Pre-Fix	Course Name	Credits	Advisor Notes
<b>Certificate of Completion in ACRF Required Courses</b>			
<b>Certificate of Completion in Residential and Light Commercial AC</b>		<b>22-25.5</b>	
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	
<b>Total Required Credits for Certificate of Completion in ACRF</b>		<b>44-47.5</b>	

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 MAT090 or equivalent is recommended.

Course Pre-Fix	Course Name	Credits	Advisor Notes
<b>Associate of Applied Science Required Core Courses</b>			
HVA101/HVA101LL	Refrigeration Applications & Components I/Lab	4	
HVA103/HVA103LL	Refrigeration Applications & Components II/Lab	4	
HVA104	EPA Section 608 Technician Preparation and Certification OR Proof of EPA Certification	0-0.5	
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	
OSH105AA OR OSH106AA	Construction Safety OR Industrial Safety		
BPC110 or CIS105	Microsoft Office	3	
<b>Associate in Applied Science Required General Education Courses</b>			
ENG101+ ENG 107+	First-Year Composition, OR First-Year Composition for ESL	3	
ENG102+ OR (ENG 108+, OR ENG111+)	First-Year Composition	3	
COM100 OR (COM110, COM225, COM230)	Introduction to Communications	3	
CRE101 OR (CRE111)	Critical Reading or Equivalent by Assessment	3	
MAT120+, MAT121+, MAT122+, OR MAT140+	Mathematical Concepts and Applications	3-5	
CHM130+/CHM130LL+ OR PHY101+ OR PHY111+	Fundamental Chemistry, Introduction to Physics, 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	
<b>Total Required Credits for Associate in Applied Science</b>		<b>72-74</b>	

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

## Program of Study/Suggested Course Sequence For ACRF Degree and Certificate Programs

### FALL/SPRING START: Day/Night Classes

1st Semester				
Course	Credit	Tuition	Course Fees	Book
HVA101 and HVA101LL	4	\$340	\$75	Yes
FAC105 and FAC105LL	4	\$340	\$60	Yes
HVA143	3	\$255	-	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>			
HVA104	<i>Course HVA104 is required for the following programs: 3587, 5380, 5542)</i>			
2nd Semester				
Course	Credit	Tuition	Course Fees	Book
HVA103 and HVA103LL	4	\$340	\$75	Yes
HVA112 and HVA112LL	4	\$340	\$75	Yes
OSH105AA OR	3	\$255	\$40	Yes
OSH106AA	3	\$255	\$40	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				
Course	Credit	Tuition	Course Fees	Book
FAC115 and FAC115LL	4	\$340	\$60	Yes
FAC210 and FAC210LL	4	\$340	\$25	Yes
FAC186	3	\$255	\$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				
Course	Credit	Tuition	Course Fees	Book
FAC220 and FAC220LL	4	\$340	\$25	Yes
FAC235 and FAC235LL	4	\$340	\$25	Yes
FAC231	3	\$255	-	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>			

## 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: ¼"\* , 5/16"\* , 11/32" , 3/8" , 7/16" , ½"  
 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: ¼" - 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: ¼" - 7/8"  
 Socket Set: 3/8" or ½"  
 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



## Air Conditioning, Refrigeration and Facilities Degree and Certificate Cost Estimates

Program	Tuition	Course Fees	Total
Associate of Applied Science in ACRF 3587	\$6,120	\$524	\$6,644
Certificate of Completion in Residential HVAC 5542	\$2,125	\$325	\$2,450
Certificate of Completion in ACRF 5380	\$3,995	\$485	\$4,480

*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 2018-2019 tuition rates for in-county students. Additional fees may apply.*

### COLLEGE CONTACT INFORMATION

Admissions, Registration and Records .....	(602) 286-8200
Apprenticeship Programs .....	(602) 286-8681
Assessment/Testing .....	(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) 286-8200
Children's Learning Center .....	(602) 286-8130
College Information .....	(602) 286-8000
Computer Commons.....	(602) 286-8411
Counseling .....	(602) 286-8900
Disability Services .....	(602) 286-8191
Financial Aid .....	(855) 622-2332
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 PAH- RA, 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 HVACR industry Associations.

Placement Test		
Math:	Reading:	English:

Semester:	Year:	
Course	Credit	Grade

Semester:	Year:	
Course	Credit	Grade

Semester:	Year:	
Course	Credit	Grade

Semester:	Year:	
Course	Credit	Grade

Semester:	Year:	
Course	Credit	Grade

Semester:	Year:	
Course	Credit	Grade