

HVAC

PROGRAM DESCRIPTION

The HVAC Program is a basic HVAC education program encompassing heating, ventilation, air conditioning and refrigeration. The content in each course focuses on learning objective that have been identified by HVAC industry groups (such as AHRI, NATE) as key knowledge for an HVAC technician. It is specially structured to prepare technicians to be eligible for the EPA 608 Universal Certification prior to graduation and the initial NATE Core Certification after graduation. Upon successful completion of this program, students will understand the operations, maintenance and repair of residential and commercial heating and air conditioning systems and prepare for entry level positions in the HVAC industry.

TYPE OF AWARD GIVEN

Students will receive a Diploma once all requirements of completion have been satisfied.

*REQUIREMENTS FOR COMPLETION:

All courses within this program must be complete in order for the student to be eligible for a Diploma. The Universal EPA exam for Certification must be passed before a student will receive a Diploma.

LICENSURE

The U.S Environmental Protection Agency, or EPA, requires HVAC certification, (EPA Section 608), to anyone who performs maintenance, service, repair and disposal of refrigerants that releases the chemicals inside the appliance to the atmosphere.

CAREER OUTCOMES

This program prepares students for an industry related entry-level heating, air conditioning and refrigeration positions. Student must sit for the required testing of EPA 608 Universal Certification prior to graduation. Please see Licensure Eligibility Requirements – Trades Department in this catalog.

PROGRAM CIP CODE: 15.0501& 47.0201

O*NET Codes –49-9021.0

Positions: Heating, Air Conditioning and Refrigeration Technology/Technician

O*Net Occupation Titles	SocCode
www.O*Netcodeconnector.org	
Heating, Air Conditioning and Refrigeration Technology/Technician	15.0501

INSTRUCTIONAL MATERIAL/EQUIPMENT

The HVAC program provides students will exposure to various AC and Refrigeration units. This equipment gives the students an opportunity to think critically and trouble shoot machines.

- ✓ 3 Ton Residential AC Unit
- ✓ 3 Ton Commercial AC Unit
- ✓ 3 Ton Condenser Complete (various)
- ✓ 5 Ton Condenser Complete (various)
- ✓ Ice Maker
- ✓ Refrigerator (various kinds)
- ✓ Freezer
- ✓ 90% Efficiency Comfort
- ✓ 3 Ton Heat Pump

DESCRIPTION OF INSTRUCTION:

The courses within this program are taught by lecture. Lecture hours include faculty instruction, classroom activities, assessments, etc. The lab hours are comprised of hours specific to gaining industry related skills included, but not limited to, exercises and activities that strengthen and broaden a student's understanding of the job duties required of them in their chosen field.

As a requirement of the US Environmental Protection Agency, HVAC/R technicians practicing in refrigerants must pass the EPA 608 Certifications within the type of equipment being worked on. Our program prepares the students to be eligible to test for the EPA 608 Universal Certification which encompasses (EPA 608 Certification Type I, II, and III).

UNIFORM AND SUPPLIES INFORMATION

See Catalog Addendum for further information. In addition, students may be required to furnish some items at their own expense: Work Boots approximate cost \$60.00

PROGRAM INFORMATION

Total Quarter Credit Hours: 54

of Weeks: 36

Class Time: 20 Hours per Week

Minimum Work Outside of Classroom: 108 Hours

Length of Program: 720 clock Hours

Teacher/Student Ratio:1:35 Class / 1:20 Lab

PROGRAM MODULES

		LECTURE HOURS		LABORATORY HOURS		Home work	TOTAL INSTRUCTIONAL HOURS	
Course Number & Title		Clock	credit	Clock	credit	Home Work Hours	Clock	Credit
Pre-requisites								
HV510	Principles of Heat, Energy & Pressure	40	4	40	2	12	80	6
HV520	Electrical Systems & Components	40	4	40	2	12	80	6
HV525	HVAC Brazing Techniques	40	4	40	2	12	80	6
HV575	Green Job Training	40	4	40	2	12	80	6
HV530	Commercial Environmental Systems	40	4	40	2	12	80	6
HV540	Commercial Refrigeration	40	4	40	2	12	80	6
HV550	HVAC System Design	40	4	40	2	12	80	6
HV560	Residential & Commercial	40	4	40	2	12	80	6
HV570	Refrigerants & Refrigeration Systems	40	4	40	2	12	80	6
	Totals	360	36	360	18	108	720	54

As defined the minimum clock hour/quarter credit hour conversion rates are as follows:

Lecture: 10 clock hours equal 1 quarter credit hour

Lab: 20 clock hours equal 1 quarter credit hour

In the application of this section, for the purpose of official records of the amount of Credit hours Summit College shall round education credit hours down to the nearest half hour of credits actually completed i.e. .50 or .00 –Financial Aid Title IV Clock Hour to Credit hour Conversion may be different please see financial aid for conversions based on Quarter credits and work outside of class.

GRADING SCALE

Grading Scale					
Grade	Range	Points	Grade	Range	Points
A	96-100	4.0	C	70-75	2.0
A-	90-95	3.7	C-	67-69	1.7
B+	87-89	3.3	D+	63-66	1.3
B	83-86	3.0	D	60-62	1.0
B-	80-82	2.7	F	0-59	0
C+	76-79	2.3			

Breakdown	
Test	25%
Quiz	15%
Homework	10%
Attendance	10%
Lab	30%
Participation	10%

MODULE DESCRIPTION

Course Name: **Principles of Heat, Energy, and Pressure**

Prerequisites: None

Course Number: HV510

Course Length: 80 hours / 4 Weeks Course Breakdown Hours: 40 Lecture/40 Lab / 12 Homework

Credit Units: 6

This course provides the student with knowledge on the theory of refrigeration by learning the underlying principles of heat, energy, temperatures and pressures and the common tools, materials and supplies used in working with HVAC/R systems. The student will gain hands-on experience in calculating and measuring pressures, trouble shooting and simulated service calls on refrigeration systems with emphasis placed on industry safety standards.

Course Name: **Electrical Systems and Components**

Prerequisites: None

Course Number: HV520

Course Length: 80 hours / 4 Weeks Course Breakdown Hours: 20 Lecture / 60 Lab/ 12 Homework

Credit Units: 6

This course provides the student with knowledge of basic electrical theory such as Ohms Law, circuit schematics symbols, circuit characteristics used in the HVAC/R industry. The student will earn the most common types of motor, starting components, protection devices, as well as troubleshooting strategies. The student will demonstrate a working knowledge of basic electrical safety including "Lock Out" and "Tag Out" procedures and practices.

Course Name: **HVAC Brazing Techniques**

Prerequisites: None

Course Number: HV525

Course Length: 80 hours / 4 Weeks Course Breakdown Hours: 40 Lecture / 40 Lab / 12 Homework

Credit Units: 6

This course provides the student a thorough understanding of HVAC/R pipe and tubing materials including service valves, gauges and joints. The student will learn Oxyacetylene welding, flame cutting, brazing and soldering techniques with emphasis placed on industry safety standards. The student will gain hands-on experience fitting HVAC/R pipe and tubing utilizing welding, soldering and brazing techniques while monitoring and maintaining line pressure and joints seals.

Course Name: **Commercial Environmental Systems**
 Prerequisite: HV-510/520/525/575
 Course Number: HV530
 Course Length: 80 hours / 4 Weeks Course Breakdown Hours: 40 Lecture / 40 Lab / 12 Homework
 Credit Units: 6

This course provides the student with understanding of systems that control heating, ventilation and air conditioning equipment in commercial and industrial buildings. Types of equipment include cooling towers, water chiller systems, hydronic heating systems and boilers. The student will learn the various processes used to preserve and store perishable food. The student will have hands-on experience adjusting belt drives, performing routine maintenance on cooling towers, water circulating pumps and system blowers.

Course Name: **Commercial Refrigeration**
 Prerequisite: HV-510/520/525/575
 Course Number: HV540
 Course Length: 80 hours / 4 Weeks Course Breakdown Hours: 40 Lecture/ 40 Lab/ 12 Homework
 Credit Units: 6

This course will provide the student with the understanding of refrigeration systems such as refrigerators, ice machines, coolers and freezers in residential and commercial environments. Students will learn to locate, troubleshoot, service, and install all components of the HVAC/R system.

Course Name: **HVAC System Design**
 Prerequisite: HV-510/520/525/575
 Course Number: HV550
 Course Length: 80 hours / 4 Weeks Course Breakdown Hours: 40 Lecture / 40 Lab / 12 Homework
 Credit Units: 6

This course provides the student with the knowledge necessary to identify techniques and procedures used in the residential construction industry to determine proper sizing of HVAC equipment and ducts to meet the requirements for a high-quality, comfortable climate in terms of heating, cooling, humidifying, dehumidifying, ventilation and air cleaning or filtering.

Course Name: **Residential and Commercial Systems**
 Prerequisite: HV-510/520/525/575
 Course Number: HV560
 Course Length: 80 hours / 4 Weeks Course Breakdown Hours: 40 Lecture/ 40 Lab / 12 Homework
 Credit Units: 6

This course provides specific knowledge and hands-on training experience in the installation, service, and maintenance of furnaces, heat pumps, and air conditioning systems. Students will study the electrical and mechanical components of cooling and heating systems, proper use of tools and service equipment, as well as various methods and techniques of troubleshooting.

Course Name: **Refrigerants and Refrigeration Systems**
 Prerequisite: HV-510/520/525/575
 Course Number: HV570
 Course Length: 80 hours / 4 Weeks Course Breakdown Hours: 40 Lecture/ 40 Lab / 12 Homework
 Credit Units: 6

This course covers refrigeration system components, performance checks and refrigerant cycle diagnosis. Emphasis is placed on the use of refrigerant recovery/recycle units, industry codes, refrigerant coils and correct methods of charging and recovering refrigerants. Upon completion, students should be able to identify system components and understand their functions, properly recover/recycle refrigerants, and demonstrate service procedures which comply with the no-venting laws.

Course Name: **Green Job Training**

Prerequisites: None

Course Number: HV575

Course Length: 80 hours / 4 Weeks Course Breakdown Hours: 40 Lecture / 40 Lab/ 12 Homework

Credit Units: 6

This course will provide the student with the basic understanding of the latest information on green mechanical technology. Emphasis is placed on the use of green concepts, comfort cooling combination systems, HVAC/R electrical and plumbing. Upon completion, students should be able to identify system components and understand their functions, properly demonstrate knowledge in energy efficiency and energy management.

Welding Basic

PROGRAM DESCRIPTION

The Welding program is designed to provide the student with the skills and knowledge necessary to successfully perform the functions of an entry level Welder in various welding processes. Basic Welding includes training in metal cutting and brazing utilizing the Oxyacetylene torch and welding employing four welding processes, (Shielded Metal Arc Welding, Gas Metal Arc Welding, Gas Tungsten Arc Welding and Flux Cored Arc Welding). The program includes knowledge in welding safety; symbols and blue print reading for Welders. The Welding program is also designed to introduce students to the skills and knowledge necessary to successfully perform the functions of an entry level Welder in various shops. This includes Shielded Metal Arc Welding. The program is offered in both lectures and “hands-on” practical lab formats. As an approved Test Agent site for the Los Angeles Department of Building and Safety (LADBS), students are eligible to participate in the didactic portion of certification testing administered under the guidelines of the American Welding Society (AWS) testing protocol.

TYPE OF AWARD GIVEN:

Students will receive a Diploma once all requirements of completion have been satisfied.

CAREER OUTCOMES

This program prepares students for an industry related welding technician position.

PROGRAM CIP CODE: 48.0508

O*NET Codes – 51.9198 --- 51.4121.00/.06/.07

Positions: Production Workers Welders, Cutters, Solderers, and Brazers Welders, Cutters, and Welder Fitters

O*Net Occupation Titles www.O*Netcodeconnector.org	SocCode
Welding, Soldering, and Brazing Machine Setters, Operators, and Tenders	51-4122.00
Welders, Cutters, and Welder	51-4121.06

INSTRUCTIONAL MATERIAL/EQUIPMENT

The welding program offers equipment that assists the students to learn various and important welding process such as shielded metal arc welding, gas tungsten, gas metal arc welding, flux cored arc welding and Oxyacetylene. The equipment providing in the shops allows for each student to have time to practice the process specified in that module.

- ✓ SMAW, TIG and Flux Core machines
- ✓ Oxyacetylene Table
- ✓ Plasma and Carbon Arc Cutter
- ✓ Electrode Oven
- ✓ Iron Worker
- ✓ Benders (various)
- ✓ Grinders (various)
- ✓ Chopsaw
- ✓ Wellsaw

UNIFORM AND SUPPLIES INFORMATION

See your enrollment package for uniforms included in the total program cost. In addition students may be required to furnish the some items at their own expense: Due to sanitary and health considerations of returning and reuse of the uniform and supplies included in the program cost, these items are NOT RETURNABLE and the cost of the uniform and supplies package is NON-REFUNDABLE once the student has been issued the uniform and supplies.

PROGRAM INFORMATION

Total Quarter Credit Hours: 42

Class Time: 20 Hours per Week

Length of Program: 720 Clock Hours:

Number of Weeks: 36

Minimum Work Outside of Classroom: 84 Hours

Teacher/Student Ratio: 1:30 Class / 1:20 Lab

PROGRAM MODULES

Course Number & Title		LECTURE HOURS		LABORATORY HOURS		Home work	TOTAL INSTRUCTIONAL HOURS	
		Clock	credit	Clock	credit		clock	credit
WB110	Gas Metal Arc Welding Basic	20	2	100	5	14	120	7
WB120	Oxyacetylene, Welding and Cutting	20	2	100	5	14	120	7
WB130	Shielded Metal Arc Welding	20	2	100	5	14	120	7
WB140	Flux Cored Arc Welding/Symbols for Welding	20	2	100	5	14	120	7
WB150	Gas Tungsten Arc Welding/Blueprint Reading	20	2	100	5	14	120	7
WB160	SMAW Structural	20	2	100	5	14	120	7
		120	12	600	30	84	720	42

As defined the minimum clock hour/quarter credit hour conversion rates are as follows:

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Lab: 20 clock hours equal 1 quarter credit hour

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A-	90-95	3.7	C-	67-69	1.7
B+	87-89	3.3	D+	63-66	1.3
B	83-86	3.0	D	60-62	1.0
B-	80-82	2.7	F	0-59	0
C+	76-79	2.3			

Breakdown	
Test	20%
Safety	10%
Homework	10%
Attendance	10%
Skills	40%
Participation	10%

MODULE DESCRIPTION

Course Name: **Gas Metal Arc Welding Basic**

Prerequisite: None

Course Number: WB110

Course Length: 120 Hours / 6 Weeks Course Breakdown Hours: 20 Lecture / 100 Lab / 14 Homework

Credit Units: 7

This course provides the student with hands on and a technical understanding of the Gas Metal Arc Welding Process through the usage of the 5 basic weld joints. Students will end the module with the practice on ½" beveled plates.

Course Name: **Oxyacetylene, Welding and Cutting**

Prerequisite: None

Course Number: WB120

Course Length: 120 Hours / 6 Weeks Course Breakdown Hours: 20 Lecture / 100 Lab / 14 Homework

Credit Units: 7

This course provides the student with hands-on and a technical understanding of Oxyacetylene Welding and Cutting Process. The student will learn to weld on 11g mild steel in all positions Flat, Horizontal, Vertical and Overhead with the inclusion of tube welding in the 2g, 5g, and 6g positions. Plasma and Oxyfuel cutting will also be used in the cutting and beveling of steel plate.

Course Name: **Shielded Metal Arc Welding**

Prerequisite: None

Course Number: WB130

Course Length: 120 Hours / 6 Weeks Course Breakdown Hours: 20 Lecture / 100 Lab / 14 Homework

Credit Units: 7

This course provides the student with hands-on and a technical understanding of Shielded Metal Arc Welding Process and will be using a variety of different electrodes such as E7024, E6010, E6011, and E7018. Welding will be done in the Flat, Horizontal, Vertical and Overhead positions. This will also include all 5 Basic Weld Joints.

Course Name: **Flux Cored Arc Welding /Symbols for Welding**

Prerequisite: WB110, 120, 130

Course Number: WB140

Course Length: 120 Hours / 6 Weeks Course Breakdown Hours: 20 Lecture /100 Lab / 14 Homework

Credit Units: 7

This course provides the student with hands on and a technical understanding of Flux Cored Arc Welding. The student will be introduced to the two types of fluxcore. Fluxcore with gas and flux core without, while performing the welds on 3/8" T-joints and ½" single v-groove beveled plates in all positions. The student will acquire an understanding of the principles, systems of views, lines and symbols and dimensional data for fit-up and welding, as provided on engineering drawings or blueprints.

Course Name: **Gas Tungsten Arc Welding /Blueprint Reading**

Prerequisite: WB110, 120, 130

Course Number: WB150

Course Length: 120 Hours / 6 Weeks Course Breakdown Hours: 20 Lecture /100 Lab /14 Homework

Credit Units: 7

This course provides the student with hands on and a technical understanding of Gas Tungsten Arc Welding. The

student will be able to produce quality weldments on mild steel and aluminum in the flat, horizontal, vertical and overhead positions using ER70S-2 and 4043 Filler metals. The second topic covered in this course is Blue Print Reading for welders and fitters.

Course Name: **SMAW Structural**

Prerequisite: WB110, 120, 130

Course Number: WB160

Course Length: 120 Hours / 6 Weeks Course Breakdown Hours: 20 Lecture / 100 Lab /14 Homework

Credit Units: 7

This course provides the student with hands-on and a technical understanding of Shielded Metal Arc Welding Process for Structural welding. The student will be able to produce quality open root single v-grooves on 3/8" and 1" mild steel plate in the flat, horizontal, vertical and overhead positions.

Cardiopulmonary Resuscitation (CPR)

PROGRAM CODE: CPR CPR BLS for HealthCare providers CERTIFICATE

Part of programs: Dental Assisting, Medical Assisting, Certified Nursing Assistant, Licensed Vocational Nursing

Prerequisite

- ✓ Have a copy of the BLS for Healthcare Providers Course manual before class.
- ✓ Read the manual before class & bring their manual with them and follow along during class.
- ✓ Use the manual as a reference after class.
- ✓ If recertifying must possess current BLS card for Healthcare partners.

PROGRAM OBJECTIVE & CAREER OUTCOMES:

The Cardiopulmonary Resuscitation (CPR) Certification is a stand-alone course which is designed to provide healthcare personal the course needed to receive or to recertify in Cardiopulmonary resuscitation (CPR card).

This course provides initial CPR certification or re-certification for healthcare professionals. The courses within this program are taught by lecture. Lecture hours include faculty instruction, classroom activities, assessments, etc.

The American Heart Association designed the BLS for Healthcare Providers Course to prepare a wide variety of healthcare professionals to recognize several life-threatening emergencies and to provide CPR, use an AED and relieve choking in a safe, timely, and effective manner. The course includes adult, child and infant rescue skills in both the out-of-hospital and in-hospital settings.

PROGRAM INFORMATION

Class Time: Offer throughout the year see an Admissions Representative

Type of Award Given: Students will receive a Certificate once all requirements of completion have been satisfied.

Total Quarter Credit Hours: .5 **Teacher/Student ratio:** 1:9

Length of Class: 8 hours for full course / 4 hours for renewal

Course Title/Number		LECTURE Hours		LABORATORY Hours		EXTERNSHIP/Hours		TOTAL Hours	
		Clock /10	credit	Clock/20	credit	Clock/30	credit	clock	credit
CPR-BLS-1000	Certificate	8	0.5	0	0.0			8	.5
	Total	8	.5	0	0	0	0	8	.5

*REQUIREMENTS FOR COMPLETION:

Students must complete this course through demonstrating a satisfactory knowledge of the learning objectives for each course. Students are required to have 100% attendance. Student will receive a CPR card at the end of course.

LA City Certification Seminar

This seminar is an 8-hour workshop wherein the welding students review all processes required for the LA City Certification. This Certification is an option we offer students; Summit College does not pay for the testing nor is it a requirement to complete the program. Please see the Admissions Department for more information, test dates and cost.