

HVAC

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 residential and commercial heating and air conditioning systems and prepare for entry level positions in the HVAC industry. 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).



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CLASSIFICATION OF INSTRUCTION (CIP) CIP# CODE: 47.0201, 15.0501

Heating, Ventilation, and Air Conditioning (HVAC), Heating and Air Conditioning Maintenance, Technology /Technician, Refrigeration Maintenance Technology/Technician,

ADMINISTRATIVE STANDARD OCCUPATIONAL CLASSIFICATION (SOC): 49-9021

Air Conditioning Technician; Heating, Ventilation, and Air Conditioning Installer; HVAC Mechanic, HVAC Service Tech; HVAC Specialist; HVAC Tech;

• Total Instructional Hours 720 • Total Quarter Credit Hours 54 • Weeks of Classes 36 • Method of Delivery: Residential		THEORY HOURS		LABORATORY HOURS		MINIMUM WORK OUTSIDE OF CLASSROOM	TOTAL INSTRUCTIONAL HOURS & CREDITS	
Module Number & Title		Clock	Credit	Clock	Credit	Hours	Clock	Credit
Prerequisite Modules								
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

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

On Ground Lecture (Didactic) and Lab Skills

DEFINITION OF CLOCK HOUR TO CREDIT HOUR CONVERSION

One Quarter Credit Hour = 10 classroom /lecture hours; or 20 lab/shop hours; or 30 extern hours

*Homework Hours – are estimated and not included in total Clock Hours or Quarter Credit Hours

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.

DESCRIPTION OF INSTRUCTION:

The courses within this program are taught by lecture, lab. 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. Homework assignments are given for outside the classroom preparation and reading.

***REQUIREMENTS FOR COMPLETION:**

Students must complete courses through demonstrating a satisfactory knowledge of the learning objectives for each course. This is tracked through the student's cumulative GPA and is also monitored through their attendance. Students are required to have 80% overall program attendance. All courses within this program must be complete in order for the student to be eligible for a certificate of completion.

Student will receive a Certificate of Completion once all requirements of completion have been satisfied. *

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 & Commercial AC Units
- 3 Ton Heat Pump
- 3 Ton Condenser Complete (various)
- 5 Ton Condenser Complete (various)
- Ice Maker, Refrigerator / Freezer (various kinds)

UNIFORM/EQUIPMENT/CONSUMABLES

2 – HVAC Shirts, Safety Glasses, Pair of Gloves (given at the beginning of HV525), & Classroom consumables as needed.

BOOK TITLES / DIGITAL COURSEWARE**ISBN Number**

Refrigeration & Air Conditioning Technology	9780357933992
The Complete HVAC Lab Manual	9798214112299
Electricity for Refrigeration, Heating, and Air Conditioning	9780357618707
Plumbing 401	9781337391832
Commercial Refrigeration for Air Conditioning Technicians	9780357453704
Renewable Energy & Sustainable Design	9781111542702
Practical Problems in Mathematics for Heating and Cooling Technicians	9781111541354
Heat Pumps	9781305081635
The Guide to Photovoltaic System Installation	9781111639969

GRADING SCALE & BREAKDOWN

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

Test	25%
Quiz	15%
Homework	10%
Attendance	10%
Participation	10%
Laboratory	30%

MODULE DESCRIPTION**Title: Principles of Heat, Energy, and Pressure**

Course Number: HV510 / IDL HV510_0

Credit/Clock Hours: 6 -- 40 Lecture/40 Lab

Homework Hours: 12

Course Length: 4 Weeks/80 hours

Prerequisite: None

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.

Title: Electrical Systems and Components

Course Number: HV520 / IDL HV520_0

Credit/Clock Hours: 6 -- 20 Lecture / 60 Lab

Homework Hours: 12

Course Length: 4 Weeks/80 hours

Prerequisite: None

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 learn 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.

Title: HVAC Brazing Techniques

Course Number: HV525 / IDL HV525_0

Credit/Clock Hours: 6 -- 40 Lecture / 40 Lab

Homework Hours: 12

Course Length: 4 Weeks/80 hours

Prerequisite: None

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.

Title: Commercial Environmental Systems

Course Number: HV530 / IDL HV530_0

Credit/Clock Hours: 6 -- 40 Lecture / 40 Lab

Homework Hours: 12

Course Length: 4 Weeks/80 hours

Prerequisite: HV-510/520/525/575

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.

Title: Commercial Refrigeration

Course Number: HV540 / IDL HV540_0

Credit/Clock Hours: 6 -- 40 Lecture/ 40 Lab

Homework Hours: 12

Course Length: 4 Weeks/80 hours

Prerequisite: HV-510/520/525/575

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.

Title: HVAC System Design

Course Number: HV550 / IDL HV550_0
 Credit/Clock Hours: 6 -- 40 Lecture / 40 Lab
 Homework Hours: 12
 Course Length: 4 Weeks/80 hours
 Prerequisite: HV-510/520/525/575

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.

Title: Residential and Commercial Systems

Course Number: HV560 / IDL HV560_0
 Credit/Clock Hours: 6 -- 40 Lecture/ 40 Lab
 Homework Hours: 12
 Course Length: 4 Weeks/80 hours
 Prerequisite: HV-510/520/525/575

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.

Title: Refrigerants and Refrigeration Systems

Course Number: HV570 / HV570_0
 Credit/Clock Hours: 6 -- 40 Lecture/ 40 Lab
 Homework Hours: 12
 Course Length: 4 Weeks/80 hours
 Prerequisite: HV-510/520/525/575

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.

Title: Green Job Training

Course Number: HV575 / IDL HV575_0
 Credit/Clock Hours: 6 -- 40 Lecture / 40 Lab
 Homework Hours: 12
 Course Length: 4 Weeks/80 hours
 Prerequisite: None

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.

LICENSURE & CERTIFICATIONS

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.

The EPA Section 608 consists of four types of HVAC Technician certifications. These certifications are required before you can start to professionally perform repair, service, maintenance or chemical disposal. The types of required certifications are listed below for your reference. This program teaches multiple attributes for your final exam and requirements for completion of the Universal Certifications:

TYPE I CERTIFICATION

HVAC technicians, whose primary job is to service small appliances such as vending machines, window air conditioners, and domestic refrigerators, may take the Type I certification.

TYPE II CERTIFICATION

HVAC technicians whose primary job is servicing and disposal of equipment with high pressure refrigerant such as residential air conditioners and heat pumps, supermarket refrigeration and process refrigeration, are required to have a Type II certification.

TYPE III CERTIFICATION

HVAC technicians whose primary job is to service and dispose of equipment with low-pressure refrigerant, like chillers, may get the type III certification.

UNIVERSAL CERTIFICATION

HVAC technicians who want to service all types of equipment must possess the Universal Certification. The EPA Universal Certification Exam contains: ITEMS OF MULTIPLE-CHOICE QUESTIONS, 25 ITEMS OF CORE QUESTIONS, and 25 ITEMS EACH OF TYPE I, TYPE II, TYPE III QUESTIONS

In order to pass the exam, you need to get a score of 72% on each section. Meaning you need to have 18 correct answers out of the 25 questions to acquire a certification for each section.

However, if the prospective HVAC technician fails to pass all the given sets of questions but passes one type of exam, he or she will still be given a certification on the type of exams passed. However, the requirement for Summit College program completion is for the student to pass the EPA Universal Exam.