HVAC/R Systems Technology

Degree

- HVAC/R Systems Technology - Heating, Ventilation, Air Conditioning and Refrigeration Technician Option (HVA.HVT.AAS) (http://catalog.oaklandcc.edu/programs/hvacr-systems-technology/heating-ventilation-air-conditioning-refrigeration-technician-option-aas/)

Certificates

- HVAC/R Systems Technology - Heating (HVA.HVH.CT) (http://catalog.oaklandcc.edu/programs/hvacr-systems-technology/heating-certificate/)
- HVAC/R Systems Technology - Air Conditioning (HVA.HVC.CT) (http://catalog.oaklandcc.edu/programs/hvacr-systems-technology/air-conditioning-certificate/)
- HVAC/R Systems Technology - Refrigeration (HVA.HVR.CT) (http://catalog.oaklandcc.edu/programs/hvacr-systems-technology/refrigeration-certificate/)

Heating Ventilation Air Conditioning Courses

HVA 1114 Introduction to Refrigeration .....4 Credit Hours
Equivalent: TER 1114 | TER 1110
ESL Placement Level: For English-as-a-Second-Language (ESL) students, placement into ESL 1011 or higher.
The student will learn the basic principles of 25 current refrigeration systems and their application to the refrigeration cycle. Each type of unit is examined to determine function, best operating procedures and physical requirements. BILLABLE CONTACT HOURS: 4

HVA 1120 Sheet Metal Layout and Fabrication ..3 Credit Hours
Equivalent: TER 1120
ESL Placement Level: For English-as-a-Second-Language (ESL) students, placement into ESL 1011 or higher.
This introductory, hands-on course will cover the process of layout and fabrication of standard sheet metal fittings. The student, through the use of demonstrations and laboratory exercises, will design and construct duct work and fittings. BILLABLE CONTACT HOURS: 3.5

HVA 1150 Basic Principles of HVACR Controls .4 Credit Hours
Equivalent: TER 1150
ESL Placement Level: For English-as-a-Second-Language (ESL) students, placement into ESL 1011 or higher.
This introductory course is designed to provide a functional approach to HVACR controls. Emphasis will be placed on the basics of AC and DC and basic electrical and electronic circuits. Lab experiences will be provided through kits, components, and hot equipment. BILLABLE CONTACT HOURS: 4.5

HVA 1210 Domestic and Commercial Refrigeration .....4 Credit Hours
Equivalent: TER 1210
ESL Placement Level: For English-as-a-Second-Language (ESL) students, placement into ESL 2510 or higher.
Prerequisite: HVA 1114 or consent of instructor.
This course is designed to integrate the theory and troubleshooting consideration of domestic hermetic refrigerator and freezer systems with the theory and application of light commercial refrigeration with systems, such as walk-in coolers, reach-in and display coolers, ice machines, and multievaporator systems. Emphasis on head pressure control, pump-down systems and capacity control will be given. BILLABLE CONTACT HOURS: 4.5

HVA 1220 Commercial Refrigeration II ..... 3 Credit Hours
Equivalent: TER 1220
ESL Placement Level: For English-as-a-Second-Language (ESL) students, placement into ESL 2510 or higher.
Prerequisite: HVA 1114 and HVA 1210 or consent of instructor.
The student will learn the theory, application, operation, selection, installation and repair of common commercial refrigeration units such as ice machines, walk-in refrigerators and commercial storage units, covering topics such as: system components, controls, compressors, condensers, receivers, cooling towers and water treatment, defrosting, motor protectors, capacitors, accessories and dehydration. BILLABLE CONTACT HOURS: 3

HVA 1310 Heating, Ventilation, Air Conditioning and Refrigeration Design I .....4 Credit Hours
Equivalent: TER 1310
ESL Placement Level: For English-as-a-Second-Language (ESL) students, placement into ESL 2510 or higher.
Prerequisite: IST 1000 or MAT 1050 or equivalent; APP 2170 HVA 1114 and HVA 1610; or consent of instructor.
The student will develop the skills and abilities to use the concepts of human comfort and air conditioning system performance in the analysis of psychrometric properties, as well as to apply American Society of Heating, Refrigeration and Air Conditioning Engineers guide data to performing a comprehensive heat loss and gain analysis on residential and light commercial buildings. Additional emphasis will be given to computerized load and duct calculations. Lab experiments will be structured to reinforce the principles of equipment performance and servicing requirements. Students planning to transfer into an Engineering Technology program should take PHY 1610 instead of APP 2170. BILLABLE CONTACT HOURS: 4.5

HVA 1390 Heating, Ventilation, Air Conditioning and Refrigeration Design II .....3 Credit Hours
Equivalent: TER 1390
ESL Placement Level: For English-as-a-Second-Language (ESL) students, placement into ESL 2510 or higher.
Prerequisite: HVA 1310 or consent of instructor.
The student will be required to analyze system heat loss and gain and apply air flow design principles to the design of duct and hydronic systems. In addition, the student will be exposed to the theory of mechanical refrigeration and heat pump application as it relates to the design process. Control theory and zoning requirements will be studied, as well as their application to the several types of air conditioning systems found in the field. Emphasis will be given to lab performance objectives pertinent to servicing package equipment, as well as use of the computer to calculate load and duct sizing and piping systems. BILLABLE CONTACT HOURS: 4

HVA 1404 Cooperative Internship ..... 4 Credit Hours
Equivalent: IND 1404 | IND 1404
ESL Placement Level: For English-as-a-Second-Language (ESL) students, placement into ESL 2510 or higher.
Prerequisite: Completion of 12 Heating Ventilation Air Conditioning (HVA) credits. Consent of Instructor.
The student will be employed within his trade area in a supervised situation under the guidance of a coordinator. The student will identify and describe, through reports and position papers, technical problems encountered on the job. BILLABLE CONTACT HOURS: 4

HVA 1430 Residential and Commercial Control Systems ..... 4 Credit Hours
Equivalent: TER 1430
ESL Placement Level: For English-as-a-Second-Language (ESL) students, placement into ESL 2510 or higher.
Prerequisite: HVA 1114 HVA 1150 and HVA 1610; or consent of instructor.
The student will learn to read and interpret residential and light commercial wiring diagrams by identifying and tracing the schematics of several types of heating, refrigeration and air conditioning systems. Considerable emphasis on electrical problem solving will be given by lab simulators and trainers and troubleshooting. BILLABLE CONTACT HOURS: 4.5

HVA 1522 Refrigeration Code ..... 2 Credit Hours
Equivalent: TER 1522
ESL Placement Level: For English-as-a-Second-Language (ESL) students, placement into ESL 2510 or higher.
Prerequisite: HVA 1210 or consent of instructor.
This course provides the student or apprentice with the refrigeration safety code of the American Standard Association as approved by the American Society of Heating, Refrigerating and Air Conditioning Engineers. The topics considered are scope and purpose, definitions, refrigeration systems classification, refrigerant classification, systems required for various establishments, installation requirements, piping, valves, fittings, and related parts, safety devices, design and construction of equipment, refrigerant containing pressure vessels, methods of field tests and instructions. BILLABLE CONTACT HOURS: 2

HVA 1610 Heating Technology I ..... 4 Credit Hours
Equivalent: TER 1610
ESL Placement Level: For English-as-a-Second-Language (ESL) students, placement into ESL 1011 or higher.
This course is designed to teach the student the theory, installation requirements, and troubleshooting practices of residential gas-forced air heating systems. Additional emphasis will be placed on heating controls and the application of modern high-tech energy efficient residential and commercial heating systems. Biomass combustion systems and system operations will also be discussd. BILLABLE CONTACT HOURS: 4.5

HVA 1630 Heating Technology II ..... 3 Credit Hours
Equivalent: TER 1630
ESL Placement Level: For English-as-a-Second-Language (ESL) students, placement into ESL 2510 or higher.
Prerequisite: HVA 1610 or consent of instructor.
This course will provide the student with a comprehensive exposure to the theory, operation and services of gas, oil, solar, and biomass forced air, hot water boilers and steam boiler systems. Additional consideration will be given to operational sequence and service of hot water boilers that use back-up solar heat and its control system. BILLABLE CONTACT HOURS: 4

HVA 1650 Troubleshooting Air Conditioning ..... 2 Credit Hours
Equivalent: TER 1650
ESL Placement Level: For English-as-a-Second-Language (ESL) students, placement into ESL 2510 or higher.
Prerequisite: HVA 1114 and HVA 1210 or consent of instructor.
This course is designed to give students the concepts and skills that emphasize the use of gauges and electrical instruments to diagnose and troubleshoot air conditioning equipment. BILLABLE CONTACT HOURS: 2.5

HVA 1700 Heating Regulations ..... 2 Credit Hours
Equivalent: TER 1700
ESL Placement Level: For English-as-a-Second-Language (ESL) students, placement into ESL 2510 or higher.
Prerequisite: HVA 1610 or consent of instructor.
Heating Regulations is required by all students as preparation for obtaining a license. It will provide the student with Local and National Codes governing the safe design, construction, installation, testing and licensing as applied to heating. Safety features required for various types of fuel burning equipment, pressure vessels and system application. Rules applying to existing buildings and new construction. Requirements for approved equipment. Inspection and enforcement regulations. Relief devices and testing. BILLABLE CONTACT HOURS: 2

HVA 1800 Advanced Controls ..... 3 Credit Hours
Equivalent: TER 1800
ESL Placement Level: For English-as-a-Second-Language (ESL) students, placement into ESL 2510 or higher.
Prerequisite: HVA 1310 or consent of instructor.
Corequisite: HVA 1430 (Recommended)
This course is designed to investigate the theory, operation, design considerations, and servicing of advanced commercial and industrial proportional control systems. Additional emphasis will be given to proportional single zone and multi-zone/VAV systems, as well as other proportional applications as presently used and/or proposed in automated building control. BILLABLE CONTACT HOURS: 4

HVA 2010 Solar and Other Renewable Energy Systems ..... 4 Credit Hours
Equivalent: AET 2010
ESL Placement Level: For English-as-a-Second-Language (ESL) students, placement into ESL 2510 or higher.
The student will learn and demonstrate the principles of energy efficient and solar design analysis and construction. Students will analyze the solar energy systems and will calculate solar savings fractions, backup heat needs, and economic analysis. The student will investigate the technologies and applications of other non-polluting and renewable forms of energy including wind power, photovoltaic, and alternative transportation vehicles. BILLABLE CONTACT HOURS: 4

HVA 2400 Energy Management ..... 4 Credit Hours
Equivalent: AET 2400
ESL Placement Level: For English-as-a-Second-Language (ESL) students, placement into ESL 2510 or higher.
The student will perform critical examinations of energy consuming facilities both domestic and commercial for the purpose of identifying energy conservation opportunities. In addition, the student will identify various energy conservation techniques as well as equipment which can be installed to further conserve energy. Energy audits will be performed at various facilities in the students' vicinities. BILLABLE CONTACT HOURS: 4

HVA 2510 Direct Digital Controls ..... 3 Credit Hours
Equivalent: AET 2510
ESL Placement Level: For English-as-a-Second-Language (ESL) students, placement into ESL 2510 or higher.
Prerequisite: HVA 1800 and HVA 2400; or consent of instructor.
This course is designed to investigate the theory, operation, design considerations, and servicing of advanced commercial and industrial computerized control systems. Additional emphasis will be given to computerized single zone and multi-zone/VAV systems, as well as other computerized applications as presently used and/or proposed in automated building control. BILLABLE CONTACT HOURS: 4

HVA ELEC HVACR Transfer Elective ..... Credit Hours