Heating, Ventilation, Air Conditioning And Refrigeration (Day and Evening)

Mode of Delivery	**Residential**
Credential Awarded	**Diploma**
Contact Hours	**1200**
Program Quarter Credits	**62.5**
Instructional Weeks	**60.00**
Total Clock Hours	**Including Recognized Homework Work Hours: 1,668.75**

Program Description

The Heating, Ventilation, Air Conditioning and Refrigeration (HVACR) program provides students with skills with which to obtain entry-level employment in the climate control industry. Through classroom and lab exercises, students focus on a full range of topics in the HVACR field. The program includes training on AC circuits containing inductance and capacitors, and students apply electrical laws, theorems, and formulas to practical applications. This program emphasizes the principles and theory of thermodynamics and how they apply to the HVACR industry, as well as the methods and principles associated with evacuation, recovery and charging of HVACR equipment. Students also become familiar with direct digital controls, motors, and motor controls, including the operation, and troubleshooting of air-conditioning equipment. Students are also introduced to heating systems, where the focus is on maintenance and troubleshooting of electric and oil heating equipment, as well as geothermal heat pumps. Students are also trained in maintenance and troubleshooting techniques for gas heating equipment and controls.

This program prepares the student for the following EPA Certification-Type I Small Appliance, Type II Recovery, Recycling and Reclaim, and Type III Chiller. Upon graduation from the HVACR program, students will be qualified for entry-level work as Heating, Air Conditioning, and/or Refrigeration technicians in both residential and commercial sites.

To successfully pass the PDC-200 (Career Development) course, a minimum numeric grade of 80% or higher and 80% attendance is required in the course. To successfully pass the HV-145 (Troubleshooting) and HV-150 (EPA Certification) courses, a minimum numeric grade of 85% or higher is required and 90% attendance in the course.

Plan of Study

Course Code	Name	Clock Hours	Credits
ICS-100	Introduction to Craft Skills	60	3
ICS-110	Mathematics for the Trades	60	3
EL-110	Electrical Theory	60	3
EL-111	Electricity Essentials: AC	60	3
HV-102	Intro to Thermodynamics	60	3.5
HV-105	Intro to HVACR Controls	60	3
HV-108	Advanced Controls, Motors & Motor Controls	60	3
HV-110	Refrigerants	60	3
HV-120	Introduction to Air Conditioning	60	3
HV-121	Advanced Air Conditioning	60	3

HV-125	Introduction to Commercial Refrigeration	60	3
HV-126	Advanced Commercial Refrigeration	60	3
HV-131	Electric and Gas Heating Systems	60	3.5
HV-132	Oil Heating Systems	60	3
HV-133	Heat Pumps	60	3
HV-134	Water Based Heating Systems	60	3
HV-140	HVAC System Design	60	3.5
HV-145	HVAC Troubleshooting & Service Calls	60	3
HV-150	EPA Certification Preparation	60	3.5
PDC-200	Career Development	60	3

Schedule

Classes may be scheduled between 7:00 a.m. – 11:00 p.m. Monday through Friday, and 7:00 a.m. – 5:00 p.m. Saturday.

Course Descriptions

ICS-100 : Introduction to Craft Skills

Student will be introduced to basic workplace safety, OSHA safety regulations, construction math, hand tools, power tools and construction drawings. The basic rigging techniques used to move material and equipment form one location to another on job sites is introduced. An introduction and review of the American National Standards Institute (ANSI) hand signals will be given. Proper materials handling techniques and procedures will be explained. Basic communication and employability skills will be reviewed.

Credits	**3**
Clock Hours	**60**
Lab Hours	**30**
Lecture Hours	**30**
Prerequisites	**None**

ICS-110 : Mathematics for the Trades

This course provides trades students with an introduction and review of basic mathematical concepts by associating math with events that occur in their lives and on the job site. The course is designed to develop and reinforce students' mathematical reasoning abilities. It also builds a knowledge basis for trades students which they can apply in the classroom and workplace. Whole numbers, fractions, decimals, and percentages are introduced, reviewed, and applied to life and job site events. Measurement in English and metrics are introduced and calculated. Pre-algebra and algebra concepts are explained, reviewed, and used to solve problems and equations. Practical plan geometry, solid figures, triangle trigonometry, and trigonometric ratios are introduced, discussed, and computed. Statistical analysis is introduced and calculated.

Credits	**3**
Clock Hours	**60**

Lab Hours	30
Lecture Hours	30
Prerequisites	None

EL-110 : Electrical Theory

This course introduces students to basic concepts of electrical theory. It focuses on electrical quantities, Ohm's Law, resistance, circuits and measuring instruments. In addition, students learn how to use wire tables and determine conductor sizes.

Credits	3
Clock Hours	60
Lab Hours	30
Lecture Hours	30
Prerequisites	None

EL-111 : Electricity Essentials: AC

This course examines alternating current (AC) and how it produces most of the electric power used in the world. The focus is on AC circuits containing inductance and AC circuits containing capacitors. Students apply electrical laws, theorems, and formulas to practical applications.

Credits	3
Clock Hours	60
Lab Hours	30
Lecture Hours	30
Prerequisites	EL-110

HV-102 : Intro to Thermodynamics

In this course students become familiar with the principles and theory of thermodynamics and how they apply to the HVACR industry. The components and features of the HVACR system are also introduced.

Credits	3.5
Clock Hours	60
Lab Hours	15
Lecture Hours	45
Prerequisites	EL-110

HV-105 : Intro to HVACR Controls

In this course students gain a basic understanding of the principles and theory of HVACR controls.

Credits	3
Clock Hours	60
Lab Hours	30
Lecture Hours	30
Prerequisites	EL-110

HV-108 : Advanced Controls, Motors & Motor Controls

In this course students become familiar with direct digital controls, motors, and motor controls.

Credits	3
Clock Hours	60
Lab Hours	30
Lecture Hours	30
Prerequisites	HV-102, HV-105

HV-110 : Refrigerants

This course introduces refrigerants to the student. The methods and principles associated with evacuation, recovery and charging HVACR equipment are explored.

Credits	3
Clock Hours	60
Lab Hours	30
Lecture Hours	30
Prerequisites	HV-102

HV-120 : Introduction to Air Conditioning

In this course students become familiar with indoor air quality and refrigeration as it applies to air conditioning. They are introduced to major air conditioning components including condensers, compressors, accumulators, suction lines, evaporators, Metering devices, receivers, and condensate and liquid lines. Methods associated with the installation of air conditioning equipment are covered.

Credits	3

Clock Hours	60
Lab Hours	30
Lecture Hours	30
Prerequisites	HV-102, HV-110

HV-121 : Advanced Air Conditioning

This course is a continuation of the study of air conditioning. Covered are the controls, operation, and troubleshooting of air conditioning equipment.

Credits	3
Clock Hours	60
Lab Hours	30
Lecture Hours	30
Prerequisites	HV-102, HV-110, HV-120

HV-125 : Introduction to Commercial Refrigeration

This course provides the student with a basic understanding of the components, methods, and principles associated with HVAC-R equipment used in commercial HVAC-R systems.

Credits	3
Clock Hours	60
Lab Hours	30
Lecture Hours	30
Prerequisites	HV-102, HV-110

HV-126 : Advanced Commercial Refrigeration

This course provides the student with a basic understanding of the components, methods, and principles associated with refrigeration equipment used in commercial HVACR systems.

Credits	3
Clock Hours	60
Lab Hours	30
Lecture Hours	30

Prerequisites	HV-102, HV-110

HV-131 : Electric and Gas Heating Systems

Students are introduced to the principles and theory of electric and gas heating systems. Focus is on the equipment and controls of electric heating equipment and how to maintain and troubleshoot it. Students are also exposed to the theory of gas combustion and gas heating equipment and controls. They learn techniques for maintaining and troubleshooting gas heating equipment.

Credits	3.5
Clock Hours	60
Lab Hours	15
Lecture Hours	45
Prerequisites	HV-102

HV-132 : Oil Heating Systems

Oil-based heating systems are covered in this course. Students are exposed to the equipment and controls of oil heating equipment. In addition, they learn about its maintenance and how to troubleshoot oil-heating equipment.

Credits	3
Clock Hours	60
Lab Hours	15
Lecture Hours	45
Prerequisites	HV-102

HV-133 : Heat Pumps

This course provides students with a basic understanding of the principles and theory of heat pumps. The equipment and controls of air-source and geothermal heat pumps are covered. In addition, students learn about maintaining and troubleshooting heat pump equipment.

Credits	3
Clock Hours	60
Lab Hours	30
Lecture Hours	30
Prerequisites	HV-102

HV-134 : Water Based Heating Systems

Students become familiar with the principles and theory of water-based heating systems. They are introduced to the equipment and controls associated with hot water and steam-based heating equipment and the maintenance and troubleshooting of that equipment.

Credits	3
Clock Hours	60
Lab Hours	30
Lecture Hours	30
Prerequisites	HV-102

HV-140 : HVAC System Design

The principles and theory of airflow requirements, indoor air quality, duct design, load calculation, and sheet metal fabrication are covered in this course.

Credits	3.5
Clock Hours	60
Lab Hours	15
Lecture Hours	45
Prerequisites	HV-102

HV-145 : HVAC Troubleshooting & Service Calls

This course provides the student with the basic principles and methods for troubleshooting and repairing HVACR equipment. Focus is on HVACR service calls for residential and commercial equipment.

Credits	3
Clock Hours	60
Lab Hours	30
Lecture Hours	30
Prerequisites	ICS-100, ICS-110, EL-110, EL-111, PDC-200, HV-102, HV-105, HV-108, HV-110, HV-120, HV-121, HV-125, HV-126, HV-131, HV-132, HV-133, HV-134, HV-140

HV-150 : EPA Certification Preparation

Student will study a complete overview of all courses previously taken. They are to do a comprehensive study of the EPA certification tests so that they have full knowledge of the content of the tests. They can take optional EPA offered tests.

Credits	3.5
Clock Hours	60
Lab Hours	15
Lecture Hours	45
Prerequisites	ICS-100, ICS-110, EL-110, EL-111, PDC-200, HV-102, HV-105, HV-108, HV-110, HV-120, HV-121, HV-125, HV-126, HV-131, HV-132, HV-133, HV-134, HV-140

PDC-200 : Career Development

This course is designed to provide the student with the necessary marketable job search techniques and skills. It will encompass the phases of professional development related to employment. This course must be completed with a numeric grade of 80% or better to pass.

Credits	3
Clock Hours	60
Lab Hours	30
Lecture Hours	30
Prerequisites	None