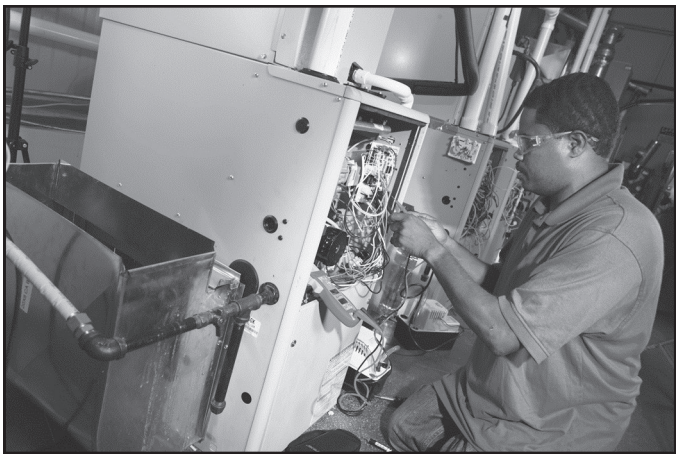
Course Outline/Description—
Air Conditioning, Refrigeration, and Heating



DIPLOMA PROGRAM

24 weeks – 31 semester credit hours (DAY)
52 weeks – 31 semester credit hours (EVENING)
Total 720 hours

OBJECTIVE

The Air Conditioning, Refrigeration, and Heating* program teaches the skills required to diagnose, maintain, and repair residential air conditioning and commercial air conditioning, heating, and refrigeration equipment. Students learn refrigeration through work with freezers, cold rooms, and ice machines. Federal environmental reclamation and recycling standards are taught. In the air conditioning and heating portion of the course, students are taught current technology relating to central air conditioning and window units, heat pumps, gas and oil-fired furnaces, and related ductwork. Principles of alternative energy are taught through radiant heat.

EMPLOYMENT OPPORTUNITIES

Graduates are employable in entry-level positions such as air conditioning technicians, refrigeration technicians, air conditioning and refrigeration mechanics or helpers, and general maintenance personnel. The Institute recommends that students take the E.P.A. exam at the completion of training to enhance employment opportunities.

	COURSE TITLE	CREDIT HOURS
601	Introduction to Safety in Air Conditioning, Refrigeration, and Heating	1.0
602	Fundamentals of Mathematics for Air Conditioning, Refrigeration, and Heating	1.0
603	Basic Tools for Air Conditioning, Refrigeration, and Heating	1.0
604	Air Conditioning, Refrigeration, and Heating Measurements	2.5
605	Electrical Theory and Applications	5.5
606	Heating Theory and Applications	3.0
607	Basic Compression Refrigeration	3.0
608	Tubing, Piping, and Soldering	2.0
609	Condensing Units	2.0
610	Air Conditioners	1.0
611	Heat Pumps	1.5
612	Domestic and Commercial Refrigerators	1.5
613	Recovery, Recycling, and Reclaiming	1.0
614	Industrial Refrigeration	0.5
615	Ductwork Application	1.0
616	Professional Development	3.5

** Students in this program are eligible to receive industry recognized certification from the National Occupational Competency Testing Institute (NOCTI) upon successful completion of certification exams.*

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601 INTRODUCTION TO SAFETY IN AIR CONDITIONING, REFRIGERATION, AND HEATING
This course familiarizes students with air conditioning, refrigeration, and heating terms, and modern developments in the fields of air conditioning, mechanical refrigeration, and heating. Students learn to recognize unsafe situations, follow rules for shop and personal safety, select the correct fire extinguisher for each class of fire, and match the safety color code with elements of its use. Included are specific safety rules pertaining to the field. Students are also able to match ampere figures to their effects on the human body. Students receive an introduction to Green Technology and Energy Efficiency in the trades.

602 FUNDAMENTALS OF MATHEMATICS FOR AIR CONDITIONING, REFRIGERATION, AND HEATING
This course provides a review of basic mathematics including fractions, decimals, percentages, square roots, and liquid and linear measurements.

603 BASIC TOOLS FOR AIR CONDITIONING, REFRIGERATION, AND HEATING
Students learn identification, use, and care of basic and specialized hand tools used in the trade.

604 AIR CONDITIONING, REFRIGERATION, AND HEATING MEASUREMENTS
This course covers the identification, care, and use of different types of instruments required to record temperature, pressure, and heat in various units of measurement as used in the air conditioning, refrigeration, and heating trades. Refrigeration cooling loads, heat load and heat gain loads are also taught.

605 ELECTRICAL THEORY AND APPLICATIONS
This course presents fundamentals of electricity, Ohm's Law, and electrical circuits. Students learn to identify and use electrical test instruments and understand the distribution of electrical power. Thermostats, relays, capacitors, protection devices, and electric motors are studied, as well as the reading of wiring diagrams.

606 HEATING THEORY AND APPLICATIONS
This course presents fundamentals of gas, oil, and electric forced hot air systems. This includes the duct system, the heat exchanger, the electrical controls, and the control circuitry. Energy conservation methods as they relate to heating and air conditioning are discussed. Students also learn to troubleshoot gas heaters. Students are taught the installation of solar hydronic radiant heat in the floor. Students make all connections for solar hydronic radiant heat systems. The focus is to teach students the efficiency of such systems and their green applications.

607 BASIC COMPRESSION REFRIGERATION
This course covers identification of compressors, evaporators, condensers, connecting refrigerant lines, and system accessories; use of refrigerants; evacuation; pressurizing; testing for leaks; and charging. Students will also tear down and inspect compressors.

608 TUBING, PIPING, AND SOLDERING
In this course, students learn to select pipe, tubing, and fittings; flare, bend, and swag tubing; and perform soft soldering, silver brazing techniques.

609 CONDENSING UNITS
In this course, students learn to define terms associated with sealed system components (condensing units) and to discuss, list, identify, operate, and repair them.

610 AIR CONDITIONERS
This course covers the major components of air conditioners; matching wire size to carrying capacity; parts identification; trouble-shooting, and repair of air conditioning units including split systems.

611 HEAT PUMPS
The theory of heating and/or cooling by heat pumps is discussed, along with their advantages and disadvantages.

612 DOMESTIC AND COMMERCIAL REFRIGERATORS
This course covers domestic refrigerators, commercial walk-in boxes, and ice-making machines. Students also learn the basics of electrical controls, refrigeration defrost controls, mechanical servicing, and troubleshooting techniques.

613 RECOVERY, RECYCLING, AND RECLAIMING
Students learn the effects of CFC refrigerants on the ozone layer of the atmosphere and the Environmental Protection Agency's rules governing the phasing out of CFCs and HCFCs. In all hands-on projects, students are instructed in the proper procedures required to recover CFCs. Department of Transportation regulations regarding the transport of refrigerant drums and cylinders are reviewed and discussed.

614 INDUSTRIAL REFRIGERATION
Students understand the functions of water cooling towers, shell and tube condensing units, oil pressure controls, hot gas defrost, electrical defrost, water pumps, and all ancillary controls associated with industrial refrigeration systems.

615 DUCTWORK APPLICATION
This course covers sizing and placement of ductwork, registers, and grills for proper air distribution.

616 PROFESSIONAL DEVELOPMENT
Students learn the skills employers require for positive work relationships and long-term employment. They include targeted workplace competencies: problem solving and other cognitive skills, oral communication skills, personal qualities, work ethic, and customer service, interpersonal and teamwork skills. Students also learn about the importance of professionalism on the jobsite and employer expectations. Employment Specialists teach students effective Internet, interviewing, and job search skills.