

Electricity Heating and Air Conditioning

Program Design Summary

Program Information

Organization	Washburn Institute of Technology
Program Number	47.0201
Instructional Level	Certificate
Instructional Area	Electricity, Heating and Air Conditioning
Original Developer(s)	Lee H. Veronie Kelvin Woodland
Last Revision Date	1/9/2009

Target Population

Students of the Secondary and Post Secondary levels

Description

This program prepares individuals to apply technical knowledge and skills for two segments: Electricity and/or Heating & Air Conditioning.

The Electrical segment prepares students for employment in electrical construction and maintenance. Heating & Air Conditioning prepares students for employment in any of the industries utilizing heating, air conditioning, and/or refrigeration.

Instructional areas include: safety; electrical theory; blueprint reading; wiring; electrical construction; residential/commercial electricity; gas pipe fitting; Uniform Mechanical Code; hydronics; electricity and gas heating; heat pumps; and advanced courses in residential and commercial refrigeration and air conditioning.

Indirect Measures

1. Rating on Competency Profiles
2. EPA refrigerant handling (Optional)
3. Key Train Scores must be one level higher than scores students had at entrance
4. Upon completion of the Electricity, Heating and Air Conditioning program, the graduate will be required to work toward acquiring an Industry Journeyman License.

External Requirements

1. Set of Basic Hand Tools and Safety Gloves and Safety Glasses

Entry Requirements

1. Complete the WorkKeys Entrance Assessment Testing to Level 5 in both Applied Math and Reading for Information

Evaluation Summary

Grading Criteria:

During a course of studies, the student will be periodically given a written test and follow-up in the student's evaluation with a lab assignment that will enforce the leaning of that course.

Makeup Policies for Absents:

After an absence has occurred and when asked for by a student, Make Up assignments can be done. In the Electricity, Heating and Air class, the instructors will sign a Make Up slip upon completion of the assignments. Make Up shall be completed in a timely manner. Make Up assignments will be by Textbook assignment or Lab assignments that include repair/rebuilding of trainers. A total of 6 hours per 3 hour student can be made up per semester.

ADA Statement:

Disability Services

The Special Support Services (SSS) Office is responsible for assisting in arranging accommodations and for identifying resources at Washburn Tech for persons with disabilities. Qualified students with disabilities MUST register and provide documentation with the office to be eligible for services. New requests for accommodations should be submitted two months or more prior to the date services should begin; however, contact the SSS Office as soon as a need may arise. Depending on the accommodation request, four to eight weeks lead time may be needed for timely and effective provision of services. SSS coordinates and assist in arranging services it deems appropriate for eligible students on a case-by-case basis.

If you are a student with a disability that may substantially limit your ability to participate in this class and believe you will need accommodations, it is your responsibility to contact:

Who: Special Support Services Coordinator
Location: Career Resource Center, Room 300
Phone: 785-228-6356
E-Mail: SSSCoordinator@washburntech.edu

Student may voluntarily identify themselves to the instructor for a referral to the Special Support Services Coordinator.

Program Outcomes

- A. Learn electrical theory and work basic wiring circuits and use Ohm's Law to various loads
- B. Assemble gas piping and install furnace in accordance to the Uniform Mechanical Code Book
- C. Learn and work with components of a basic furnace and wire up furnaces using various wiring diagrams
- D. Troubleshoot Heating Circuits, work with Boilers and Calculate Air Ducts and Loads using the J Manual
- E. Calculate and Apply National Electrical Code study's to various building components circuits
- F. Learn how to work with Blueprints, Types of Loads, Services, Transformers and other components of Commercial Buildings
- G. Learn Basic Refrigeration Theory's, do various Brazing Techniques and apply these skills to Lab Units
- H. Charge and Troubleshoot Air Conditioners and Work with Clean Up Procedures of Contaminated Systems
- I. Operate Air to Air, Dual Fuel and Geothermal Heat Pumps
- J. Commercial Refrigeration Apply knowledge learned to Commercial Refrigeration and Air

Conditioning Systems

Core Abilities

- A. Communicate effectively.
- B. Integrate technology.
- C. Learn effectively - use academics effectively.
- D. Demonstrate cooperative/teamwork skills
- E. Apply Safety
- F. Think critically and creatively
- G. Demonstrate responsible work ethics

Course Configuration						
Semester	Course #	Course Title	Credits	Contact Hrs	Category	Req?
	EHV110	Basic Electrical Theory	6	135	Core Course	Yes
	EHV120	Basic Wiring	6	135	Core Course	Yes
	EHV130	Uniform Mechanical Code	3	60	Core Course	Yes
	EHV140	Heating Systems Fundamentals	4	90		Yes
	EHV150	Advanced Heating and Lab Applications	5	120	Core Course	Yes
	EHV210	Basic Electrical Theory	5	105	Core Course	Yes
	EHV220	Commercial Wiring	7	165	Core Course	Yes
	EHV230	Heating Systems Fundamentals	3	60	Core Course	Yes
	EHV240	Fundamentals of Air Conditioning	4	90	Core Course	Yes
	EHV250	Heat Pumps	3	75	Core Course	Yes
	EHV260	Commercial Refrigeration	2	45	Core Course	Yes
	EHV270	EHVAC OJT	3	135	Elective	No

Program Course Detail

Course A -- Basic Electrical Theory

Course Number EHV110

Credits 6

Contact Hours 135

Total Hours 145

Category Core Course

Required Yes

Course Description The student will receive instructions on electrical theory's which involves atomic theories, electron theory's, effects of electricity and magnetism. The student will have knowledge on the production of electricity and how to apply Ohm's and Power Laws. The student

will receive instructions on basic electrical circuits and electrical safety.

Linked Program Outcomes

A. Learn electrical theory and work basic wiring circuits and use Ohm's Law to various loads

Course B -- Basic Wiring

Course Number EHV120

Credits 6

Contact Hours 135

Total Hours 135

Category Core Course

Required Yes

Course Description The student will receive instructions on the development of various circuit designs to include: Single Pole Single Throw switches, 3 and 4 way switches, receptacles and split wire receptacles along with lighting and troubleshooting basic circuits.

Linked Program Outcomes

A. Learn electrical theory and work basic wiring circuits and use Ohm's Law to various loads

Course C -- Uniform Mechanical Code

Course Number EHV130

Credits 3

Contact Hours 60

Total Hours 60

Category Core Course

Required Yes

Course Description The students will receive instructions on the use of the Uniform Mechanical Code book for the installation of gas piping, air movement and other facets' of installation of heating refrigeration and air conditioning systems.

Linked Program Outcomes

B. Assemble gas piping and install furnace in accordance to the Uniform Mechanical Code Book

Course D -- Heating Systems Fundamentals

Course Number EHV140

Credits 4

Contact Hours 90

Total Hours 90

Required Yes

Course Description This course will give students knowledge in combustion analysis, controls applications and troubleshooting simple circuits.

Linked Program Outcomes

C. Learn and work with components of a basic furnace and wire up furnaces using various wiring diagrams

Course E -- Advanced Heating and Lab Applications

Course Number	EHV150
Credits	5
Contact Hours	120
Total Hours	120
Category	Core Course
Required	Yes
Course Description	The student will receive instructions on troubleshooting residential condensing furnaces as well as working with electric heating, hot water and steam boilers. The students will also receive information on indoor air quality, load and air duct calculations.
Linked Program Outcomes	D. Troubleshoot Heating Circuits, work with Boilers and Calculate Air Ducts and Loads using the J Manual

Course F -- Basic Electrical Theory

Course Number	EHV210
Credits	5
Contact Hours	105
Total Hours	105
Category	Core Course
Required	Yes
Course Description	The student will receive instructions and be involved with the use of the NEC Code book for the purpose of calculating and installing of every aspect of residential wiring.
Linked Program Outcomes	E. Calculate and Apply National Electrical Code study's to various building components circuits

Course G -- Commercial Wiring

Course Number	EHV220
Credits	7
Contact Hours	165
Total Hours	165
Category	Core Course
Required	Yes
Course Description	The student will receive instructions on Safety, Blueprint reading and all that is involved with calculating electrical loads and branches. Additional instructions will be given on appliance circuits, motors as well as switches and receptacles on branch circuits.
Linked Program Outcomes	F. Learn how to work with Blueprints, Types of Loads, Services, Transformers and other components of Commercial Buildings

Course H -- Heating Systems Fundamentals

Course Number	EHV230
Credits	3
Contact Hours	60
Total Hours	60
Category	Core Course

Required Yes

Course Description The student will understand the basic mechanical refrigeration cycle and will also learn various methods used in correctly charging various types of refrigeration and air conditioning systems. The student will also learn and apply different brazing techniques.

Linked Program Outcomes G. Learn Basic Refrigeration Theory's, do various Brazing Techniques and apply these skills to Lab Units

Course I -- Fundamentals of Air Conditioning

Course Number EHV240

Credits 4

Contact Hours 90

Total Hours 90

Category Core Course

Required Yes

Course Description The student will work with various electrical circuits applied to air conditioning systems as well as practice procedures used for cleanup procedures of a contaminated sealed system.

Linked Program Outcomes H. Charge and Troubleshoot Air Conditioners and Work with Clean Up Procedures of Contaminated Systems

Course J -- Heat Pumps

Course Number EHV250

Credits 3

Contact Hours 75

Total Hours 75

Category Core Course

Required Yes

Course Description The student will learn basic functions of various Heat Pump designs as well as charging and troubleshooting procedures.

Linked Program Outcomes I. Operate Air to Air, Dual Fuel and Geothermal Heat Pumps

Course K -- Commercial Refrigeration

Course Number EHV260

Credits 2

Contact Hours 45

Total Hours 45

Category Core Course

Required Yes

Course Description The student will receive instructions on the operations of various commercial reach-in and walk-in coolers and freezers as well as the operations of roof top and larger air conditioning split systems.

Linked Program Outcomes J. Commercial Refrigeration Apply knowledge learned to Commercial Refrigeration and Air Conditioning Systems

Course L – EHVAC OJT

Course Number EHV270

Credits 3

Contact Hours 135

Total Hours 135

Category Elective

Required No

Course Description OJT (On-the-Job Training) is an elective course for a student to work at a job site to apply skills and knowledge acquired in the program. A student is eligible for OJT only upon completion of all the program competencies, 90% attendance throughout the program, all expenses paid to the school, completion of the institution exit assessment, and agreement completed with an employer. If a student does not comply to the attendance and job performance expectations of the employer, the student will be required to return to the program. This is a pass/fail course.