WASHTENAW COMMUNITY COLLEGE

PROGRAM CHANGE FORM

CTHVRR

Program Code: ~~CTHVAC~~ **Program Name:** Heating Ventilation, Air Conditioning, and Refrigeration – Residential **Effective Term:** Fall 2004

Directions:

1. Attach the current program listing from the WCC catalog and indicate any changes to be made.
2. Draw lines through any text that should be deleted and write in additions. Extensive narrative changes can be included on a separate sheet.
3. Check the boxes below for each type of change being proposed. Changes to courses, discontinuing a course, or adding new courses as part of the proposed program change, must be approved separately using a Course Syllabus Form, but should be submitted at the same time as the program change form.

Requested Changes:

William Figg

- ☐ Remove _____ course(s)
- ☐ Add _____ course(s)
- ☐ Total credits: Current credits_____ After changes _____
- ☐ Title (title was _____)
- ☐ Description

Show all changes on the attached page from the catalog.

- ☒ Advisors ~~Ralph Hargrave~~ and Les Pullins
- ☐ Articulation information
- ☐ Program admission requirements
- ☐ Continuing eligibility requirements
- ☐ Program outcomes

Other _____

Rationale for proposed changes:

Reflect change in faculty responsibility.

Financial/staffing/equipment/space implications:

None

List departments that have been consulted regarding the use of this program.

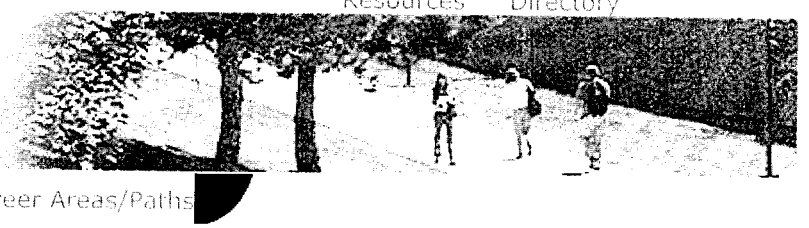
N/A

Signatures:

Reviewer	Print Name	Signature	Date
Program Change Initiator	Les Pullins	Les Pullins	9/9/04
Department Chair	Bill Figg	William H. Figg	9-9-04
Division Dean/Administrator	Granville Lee	Granville W. Lee	9/9/04
Vice President for Instruction	Roger Palay	Roger M. Palay	9/13/04

Please submit completed form to the Office of Curriculum and Articulation Services.

Access Program File_____ Log 9/13/04 fm Copied and Returned _____



Programs: Heating, Ventilation, Air Conditioning, and Refrigeration - Residential (CTHVAC)

Certificate

Program requirements shown below are for catalog year: 2004 - 2005 Change Year

Description: This program prepares you for entry-level jobs in HVAC contracting companies, HVAC servicing companies, hospitals, schools and other public institutions, and apprenticeships in large manufacturing plants and supply houses. In these commercial, residential, or institutional settings you will combine your diagnostic and repair skills with customer relations skills to service heating, ventilation, and air conditioning equipment. This program also helps prepare you for the third class refrigeration licensure examination.

Division: Health and Applied Technologies

Department: Welding and Fabrication

Advisors: [redacted] Achatz Kes Pullins BILL FIGG

Required Courses		(25 Credits)
HVA 101	Heating, Ventilating, and Air Conditioning I	4
HVA 102	Sheet Metal Fabrication	4
HVA 103	Heating, Ventilation, and Air Conditioning II	4
HVA 105	Heating, Ventilation, and Air Conditioning III	4
HVA 107	Heating, Ventilation, and Air Conditioning IV	4
HVA 108	Residential HVAC Codes and Competency Exams	3
WAF 104	Soldering & Brazing	2

Total Credits Required for the Program: **25 Credits**

Additional Information:

Related Web Sites: This website is for informational purposes only and is not to be construed as a binding offer or contract between WCC and the student. The information presented here is believed accurate, but is NOT guaranteed and is subject to change without notice.

For official information, see an Advisor.

Heating, Ventilation, Air Conditioning, and Refrigeration - Residential (CTHVAC) Certificate

Program Effective Term: Fall 2004

This program prepares you for entry-level jobs in HVAC contracting companies, HVAC servicing companies, hospitals, schools and other public institutions, and apprenticeships in large manufacturing plants and supply houses. In these commercial, residential, or institutional settings you will combine your diagnostic and repair skills with customer relations skills to service heating, ventilation, and air conditioning equipment. This program also helps prepare you for the third class refrigeration licensure examination.

Required Courses		**(25 credits)**
HVA 101	Heating, Ventilating, and Air Conditioning I	4
HVA 102	Sheet Metal Fabrication	4
HVA 103	Heating, Ventilation, and Air Conditioning II	4
HVA 105	Heating, Ventilation, and Air Conditioning III	4
HVA 107	Heating, Ventilation, and Air Conditioning IV	4
HVA 108	Residential HVAC Codes and Competency Exams	3
WAF 104	Soldering & Brazing	2

Minimum Credits Required for the Program: **25**

Washtenaw Community College
Office of Curriculum & Articulation Services

PROGRAM CHANGE FORM

Program Code:	Program Name:		Effective Term:
CTHVAC	Heating, Ventilation, Air Conditioning, and Refrigeration (HVACR)-Residential	CTHVRR	Fall 2003

Directions: 1.) Attach the current program listing from the WCC catalog and indicate any changes that you would like to make.

2.) Draw lines through anything that should be deleted and write in additions. Extensive narrative changes may be included on a separate sheet.

3.) Check the boxes below for each type of change being proposed. If you are making changes to courses or proposing new courses as part of this proposal, they must be approved separately using a Course-Syllabus Approval Form (CSAF). Courses that are being discontinued also should be submitted on CSAF forms.

1. Requested Changes:

- ☒ Remove TRI 103: Sheet Metal Blueprint Reading Course(s)
- ☒ Add HVA 108: HVACR-V Course(s)
- ☒ Total Credits: Current Credits 22 After Changes 20
- ☒ Change Course Semester Sequencing
- ☒ Change Title (title was Heating, Ventilation, and Air Conditioning)
- ☒ Description

Show all changes on the attached program sheet.

- ☒ Advisors
- ☐ Articulation Information
- ☐ Program Admission Requirements
- ☐ Continuing Eligibility Requirements
- ☐ Footnotes
- ☐ Other _____

Description: This program prepares students for entry-level employment in the residential heating, ventilation, and air-conditioning sector. Hands-on experience coupled with theoretical training provides students with necessary skills to install, maintain, and troubleshoot heating and cooling systems used in residential settings. Students are expected to pass the Residential Industry Competency Exam, the HVAC Excellence Exam, and the Environmental Protection Agency Technician Certification Exam.

2. Rationale for Proposed Changes:
Program revised to be better aligned with the goals of occupational education and pedagogical objectives that include cooperative learning, peer study groups, and an expanded use of planned laboratory learning as demonstrated in our WCC Welding and Fabrication Program of study.

3. Financial/Staffing/Equipment/Space Implications:
Current staffing (one full-time faculty)/Equipment (Hampden Trainers, etc. . .)/Space (OE 101classroom, 108 computer lab, 109 HVACR and 111 Sheet Metal Lab(s) are adequate. WAF 104: Soldering & Brazing uses the current welding lab (OE 141.)

4. Has the department consulted with all departments that may be impacted? Yes ☒ No ☐ NA ☐
Comments: None

***REMINDER:** Please include the current program sheet with all changes listed.

Signatures:

Reviewer	Print Name	Signature	Date
Program Change Initiator:	Thomas Achatz	Thomas Achatz	2/20/2003
Department Chair:	William Figg		2/21/03
Division Dean/Administrator:	Granville Lee		3/7/03
[redacted] Vice President, Instruction	Roger Palay	Roger M. Palay	3/20/03

***Please submit completed form to the Office of Curriculum and Articulation Services.**

mlbCurriculum Development\Forms\Program Forms\Program Change Form v2.3.doc 6/18/02

Access Program File S/S Log S/S Copied and Returned _____
Copies: Initiator, Department Chair, Dean, Curriculum Files
New Listing to: Counseling; Admissions, Student Records

File Name: ProgramChangeFormv2002-HVACR

CAREER PATH

This program prepares you for jobs in the field of facility management where you will manage corporate property assets. The program provides you with skills and knowledge in managing real property assets specifically in the design, operation, and maintenance of building systems. Management of the work environment, planning and project management, real estate, and general service activities are covered. The program helps prepare you for the Building Owners and Managers Institute (BOMI) certification.

Health and Applied Technologies Division
Technical Education Department

Advisor: Les Pierce

Major/Area Requirements **(10 Credits)**

FMA 101	Facility Management I	2
FMA 103	Facility Management II	2
FMA 105	Facility Management III	2
FMA 107	Technologies for Facility Management	2
FMA 109	Facilities Planning and Project Management	2

Minimum Credits Required for the Program: 10

Heating, Ventilation, and Air Conditioning (CTHVAC)

Certificate

CAREER PATH

This program prepares you for entry-level jobs in HVAC contracting companies, HVAC servicing companies, hospitals, schools and other public institutions, and apprenticeships in large manufacturing plants and supply houses. In these commercial, residential, or institutional settings you will combine your diagnostic and repair skills with customer relations skills to service heating, ventilation, and air conditioning equipment. This program also helps prepare you for the third class refrigeration licensure examination.

Health and Applied Technologies Division
Technical Education Department

Advisor: ~~Les Pierce~~ Thomas Achatz

Required Courses (20 Credits)

HVA 101	Heating, Ventilating, and Air Conditioning I	4
HVA 103	Heating, Ventilation, and Air Conditioning II	4
HVA 105	Heating, Ventilation, and Air Conditioning III	4
HVA 107	Heating, Ventilation, and Air Conditioning IV	4
~~TRI 103~~	~~Sheet Metal Blueprint Reading and Layout~~	~~4~~
WAF 104	Soldering & Brazing	2

Minimum Credits Required for the Program: ~~22~~ 20

HVA 108 Heating, Ventilating, Air Condition and Refrigeration V 2

CAREER PATH

Plumbers and Pipefitters the opportunity to app their work as certified apprentice instructors toward an associate degree in Industrial Trainir In addition to the fifteen credits awarded for com pletion of five summer apprentice training sessions, stu dents will complete a minimum of 18 credits in genera education courses and receive 30 non-traditional credit for experience in an area of specialization such as plun ing, pipefitting, HVAC, or sprinklerfitting.

Health and Applied Technologies Division
Technical Education Department

Advisor: Patricia Crider

Program Admission Requirements:

Open only to United Association of Plumbers Apprentices/Journeymen

Continuing Eligibility Requirements:

Students must demonstrate basic computer literacy sk by successfully passing the Computer and Information Literacy Test. The test may be taken at any point duri the program, but must be completed before graduating

General Education Requirements **(18 Cred**

Electives *	Complete one course from Group I of each of the six General Education Areas	18

Major/Area Requirements **(45 Cred**

Electives**	Complete a specialization in plumbing, pipefitting, HVAC, or sprinklerfitting	
UAT 111	Apprentice Training	
UAT 121	Apprentice Training II	
UAT 131	Apprentice Training III	
UAT 141	Apprentice Training IV	
UAT 151	Apprentice Training V	

Minimum Credits Required for the Program:

Footnotes:

**Credit for general education courses may be transferred from accredited colle or universities in the United States*

***Students should apply for non-traditional credit evaluation of their apprentice experiences to meet the specialization requirement.*

Heating, Ventilation, Air Conditioning-Refrigeration (HVAC-R) Program(s)

REVISED

Certificate

HVAC-Residential Certificate (CTHVAC):

HVA 101: HVAC I (4/90)
- *Introduction to HVAC*

(***Changed/TRI 103***) HVA 102: Sheet Metal Fabrication (4/60)

HVA 103: HVAC II (4/90)
- *HVAC Circuit sand Thermodynamics, Heat Transfer, and Psychrometrics*

WAF 104: Soldering & Brazing (2/60)

HVA 105: HVAC III (4/90)
- *Heating Systems and Cooling Systems*

HVA 107: HVAC IV (4/90)
- *HVAC Loads and HVAC Controls*

(***New***) HVA 108: HVAC V: C/IS with EPA 608, Residential ICE, and HVAC Excellence (3/60)

Total Credit Hours = 25 Contact Hours = 540

NEW

Advanced Certificate(s)

Advanced Certificate Core Classes:
Complete HVAC-Residential Certificate (CTHVAC) (25/540)
HVA 201: Energy Audits (3/60)
HVA 202: Air System Layout/Design (3/60)

NEW

HVAC-R: Commercial Advanced Certificate (XXXX):
Complete Advanced Certificate Core Classes (31/660)
HVA 203: Refrigeration Systems (3/60)
HVA 205: Hydronic Systems (3/60)
HVA 207: C/IS with Commercial ICE (3/60)
Total Credit Hours = 40 Contact Hours = 840

HVAC-R: Industrial Advanced Certificate (YYYY):
Complete Advanced Certificate Core Classes (31/660)
HVA 204: Central Heating Plants (3/60)
HVA 206: Central Cooling Plants (3/60)
HVA 208: C/IS with Industrial ICE (3/60)
Total Credit Hours = 40 Contact Hours = 840

Degree Options

AAS Occupational Studies – HVAC-R (APOST):
1. Complete (CTVAC) Certificate 25
2. Complete Gen Ed 18-21
3. Complete an additional OccEd credits 14-17

Minimum Credits AAS Occ Studies: HVAC-R . . 60

Reactivated/ Revised

AS HVAC-R Technology (RAC)
1. Complete (CTVAC) Certificate 25
2. Complete HVAC-R Advanced Certificate 15
3. *Math 151/152 Tech Algebra/Geometry & Trig.* . . . *8*
4. Complete Gen Ed Transfer Courses 19-21

Minimum Credits AS HVAC-R Technology 67

HEATING VENTILATION AIR-CONDITIONING REFRIGERATION

Thomas Achatz, PE, Program Advisor

3/27/2003 6:39:18 PM

Program Approval Document

Achievement Certificate In

HEATING, VENTILATING AND AIR CONDITIONING

Prepared by
Les Pierce
Washtenaw Community College

April 8, 1999

WASHTENAW COMMUNITY COLLEGE
PROGRAM AUTHORIZATION FORM

1. **Program Title:** Heating, Ventilating and Air Conditioning — **Program Code:** HVAC
2. **Division:** TEC — **3. Department:** TEC — **CIP Code:**
4. **Type of Program:** ☐ A.A. ☐ A.S. ☐ A.A.S. ☐ A.T.S.
   ☐ Advanced Certificate ☐ Mastery Certificate ☒ Achievement Certificate ☐ Certificate of Completion
5. **Will this program be Perkins funded?** ☒ yes ☐ no — **6. Effective Year:** Fall 1999

7. Program Description (for Catalog, brochures, etc.:
This certificate program is designed to provide skills for entry-level jobs in the Heating, Ventilating and Air Conditioning Industries. A series of courses have been developed that will introduce the student to theoretical concepts of thermodynamics, HVAC Systems, HVAC components, Diagnostics and repair strategies and customer relations. Students who successfully complete the program will find entry-level jobs in HVAC Contracting companies, HVAC Servicing companies, Hospitals, Schools and other public institutions, apprenticeships in large manufacturing plants and Supply Houses.

8. Advisors: Les Pierce

9. Admissions Criteria:	10. Criteria for Continuing Program Eligibility:
None	

11. Attach a Program Approval Document [PAD], which includes the following:

A. Program Description
B. Program Goals
C. Needs Assessment
D. Enrollment Projections
E. Program Cost Analysis
F. Course Descriptions
G. Analysis of Affected Instructional Units
H. Articulations
I. Licensure/Accreditation

Approval Recommended:	Print Name	Signature	Date
Program Initiator:	Les Pierce		
Department Chair/Director:	Les Pierce		
Dean:	Roger Bertola		
VP, Instruction/Student Services:	Guy Altieri		
President:	Larry Whitworth		6/3/99
Date of Board Approval:	May 25, 1999		

Available on disk

Curriculum and Articulation Services 5/14/1998 — Date File _____ Curriculum File _____ Catalog _____
Program Authorization Form
Department Chair, HVAC Approval
Copies: - Department Chair, Dean, Admissions, Counseling, Student Records, Curriculum Committee

COURSE REQUIREMENTS FOR PROGRAM

Course	Title	Credit	Pre-requisites/Co-requisites
HVAC I HVA ~~1~~ 101	Heating, Ventilating and Air Conditioning I	5	None
HVAC II 103 HVA ~~11~~	Heating, Ventilating and Air Conditioning II	5	HVAC I
HVAC III 105 HVA ~~123~~	Heating, Ventilating and Air Conditioning III	5	HVAC I and II
HVAC IV 107 HVA ~~1~~	Heating, Ventilating and Air Conditioning IV	5	HVAC I,II, and III
WAF 104	Soldering and Brazing	2	None
Minimum Credits Required:		**22**	

A. PROGRAM DESCRIPTION

This certificate program will prepare individuals with the skills to compete successfully in entry-level jobs in Heating, Ventilation and Air Conditioning and Commercial Refrigeration Service. It includes study in the theoretical aspects of thermodynamics and human comfort and food preservation. Students will be expected to complete routine coursework in addition to special lab activities designed to familiarize students with the role of field technician and service technician in the installation and/or repair of both domestic and light commercial HVAC systems.

B. PROGRAM GOALS

- The program is designed to provide successful students with entry-level skills in income-producing jobs that can lead to licensure in Heating, Ventilating and Air Conditioning. Successful graduates will be able to find jobs involving the installation of new equipment, the diagnosis and repair of existing equipment and the routine preventive maintenance required to keep HVAC equipment operational.

C. NEEDS ASSESSMENT

- Information about employment trends from the Michigan Occupational Information System (MOIS) suggests that, nationally, employment opportunities in the field of heating, ventilating and air conditioning is expected to increase faster than average for all occupations through the year 2006, with most openings in air conditions and refrigeration. In Michigan, employment opportunities in the field are expected to increase much faster than the average through 2005, with 340 openings projected annually (200 due to growth and 140 to replacement of workers who retire or leave the labor force). There is a shortage of climate control mechanics in Michigan that is expected to continue for several years.

- Information from MOIS suggests that, nationally, graduates of this program can expect to earn a median salary of $13.35. an hour. In Michigan, salaries are comparable, with employees earning between $14.19 and $37.02 and hour, depending on employer, position, and employee experience and responsibilities.

D. ENROLLMENT PROJECTIONS

Class capacity of 12 students for HVAC I is expected for Fall Term of 1999. Retention for successive terms is expected to remain at capacity. Adroit scheduling of the Refrigeration Laboratory and the addition of a lab instructor in subsequent terms will enable the department to serve all levels of competence simultaneously. It is projected that 30 graduates will complete the program by the fifth semester of operation. Advanced courses in Direct Digital Controls, fuels and diagnostics techniques will appeal to the graduates once they have completed 12 to 18 months of field experience.
Heating, Ventilating and Air Conditioning is a licensed occupation. There are few structures being built that do not require the installation of a complete system, it's continual maintenance and eventual replacement That factor plus the vicissitudes of human comfort expectations will assure that careers in HVAC Servicing will remain strong.

E. PROGRAM COST ANALYSIS

$125,000.00
$50,000.00 in new HVAC training equipment and servicing tools will be required. Ninety percent of the current instructional equipment is 25 years old or older. Improved lighting in the laboratory and the lowering of the existing Buss Bar will be required at an estimated cost of $15,000.00 Computer-based programs in HVAC simulation and diagnostics will bring the skills of graduates of WCC's program in line with graduates from surrounding Community Colleges. $25,000.00 for Computers and periferals plus $10,000.00 is software will be required.
A competent lab instructor will enable the instructor to conduct training for several levels of students simultaneously. This personnel cost should approximatate $25,000.00 per year. The competency-based instructional model is labor-intensive, but will produce excellent diagnosticians for the repair and maintenance of HVAC systems.

Ongoing Costs:
Consummable supplies will require no less than **$2000.00 per semester** to support the program. This includes copper tubing and fittings, solder, electrical connectors and conductors, freon and refrigerant oils, hoses and belts, filters and replacement parts, including compressors and evaporators, heaters and elements and solid state controls.
Major instructional equipment replacements including computers and software will be required every 5-7 years due to technological advancements. This amount is expected to approach **$30,000.00** conservatively.

F. COURSE DESCRIPTIONS

HVAC I Heating, Ventilating and Air Conditioning I
This course introduces the concept of thermodynamics and principles of refrigeration. Major units covered include: HVAC mathematics, refrigeration systems, refrigerants, refrigerant tables, refrigerant oils, contaminants, dryers, moisture in the air, food preservation, refrigerant components (i.e. compressors, condensers, cooling towers, evaporators, metering devices, motors and accessories), defrost systems, estimating heat loads and commercial refrigeration systems. An overview of domestic and commercial air conditioning systems and components will be provided from an operation and service perspective.

HVAC II Heating, Ventilating and Air Conditioning II
This is the second course in this series and covers Ohm's Law, voltage, amperage and circuitry as applies to HVAC and refrigeration systems. It also introduces AC motors, common control systems and applications, wiring schematics and diagrams for both high and low voltage systems. Basic diagnostic skills are covered.

HVAC III Heating, Ventilating and Air Conditioning III
This course covers common heating systems, including fuels and combustion characteristics, furnaces and furnace components and accessories, burner efficiency, and supply systems. Students use charts to determine heat load and system sizing principles. Control systems are covered and basic diagnostic skills are developed.

HVAC IV Heating, Ventilating and Air Conditioning IV
This is the final course in the series that prepares students to successfully enter the HVAC industry as repair personnel, sales personnel, maintenance staff, or apprentices. This capstone course provides learning experiences in design, application and servicing techniques for a wide range of refrigeration and HVAC equipment commonly found in domestic and commercial applications. Basic troubleshooting skills are identified and practiced.

WAF 104 Soldering and Brazing
This course is designed to provide knowledge of soft soldering, brazing, silver soldering, copper tubing and fittings, brazing of steel, silver soldering of copper and stainless. Practical application included.

G. ANALYSIS OF AFFECTED INSTRUCTIONAL UNITS

The coursework included in this program will be of interest to students enrolled in both the Facility Maintenance Program and the Industrial Maintenance Program. The high cost of labor is causing a consolidation of some traditional classifications, thereby requiring technicians to be trained in several specialties. Advanced coursework for the practicing professional in technical areas will be developed. Those who aspire to management positions or entreprenuership will benefit from programming available in the Business Division.

The overcrowding of the Refrigeration Lab will of necessity require the removal of the few remaining pieces of instructional equipment of the Stationary Engineering and Boiler Operator programming. This program will continue to operate as a theory course of study, supplemented by field trips and audio-visual instructional aids. Consolidation of the existing coursework is scheduled for 2000.

H. ARTICULATIONS

None

I. LICENSURE/ACCREDITATION (IF APPLICABLE)

Licensure is required of all individual who handle refrigerants. A Third Class Refrigeration License is issued by the State of Michigan Bureau of Licensing and Regulation. Technicians are allowed to sit for the examination once an experiential requirement under the supervision of a licensed contractor has been met.