

## Washtenaw Community College Comprehensive Report

### UAT 119 HVACR: Flow Measurements and Concepts (UA 6028) Effective Term: Spring/Summer 2025

#### Course Cover

**College:** Advanced Technologies and Public Service Careers

**Division:** Advanced Technologies and Public Service Careers

**Department:** United Association Department (UAT Only)

**Discipline:** United Association Training

**Course Number:** 119

**Org Number:** 28200

**Full Course Title:** HVACR: Flow Measurements and Concepts (UA 6028)

**Transcript Title:** HVACR: Flow Measurement(6028)

**Is Consultation with other department(s) required:** No

**Publish in the Following:** College Catalog , Time Schedule , Web Page

**Reason for Submission:** Course Change

**Change Information:**

Course title

Course description

Outcomes/Assessment

Objectives/Evaluation

**Rationale:** Course title and assessment change due to current trends and technology in the industry.

**Proposed Start Semester:** Spring/Summer 2025

**Course Description:** In this course, students will review resources related to Heating, Ventilation, Air Conditioning, Refrigeration (HVACR) equipment and engage in hands-on demonstrations and evaluation exercises. Students will learn how to conduct HVAC performance testing training for journeymen and apprentices, including airflow, fluid rates, and electrical power measurements. Through classroom discussion and related hands-on shop exercises students will facilitate methods of conducting HVACR service training. The title of this course was previously HVACR Residential Technician (UA 6028). Limited to United Association program participants.

#### Course Credit Hours

**Variable hours:** No

**Credits:** 1.5

**The following Lecture Hour fields are not divisible by 15: Student Min ,Instructor Min**

**Lecture Hours: Instructor: 22.5 Student: 22.5**

**The following Lab fields are not divisible by 15: Student Min, Instructor Min**

**Lab: Instructor: 1.5 Student: 1.5**

**Clinical: Instructor: 0 Student: 0**

**Total Contact Hours: Instructor: 24 Student: 24**

**Repeatable for Credit:** NO

**Grading Methods:** Letter Grades

Audit

**Are lectures, labs, or clinicals offered as separate sections?:** NO (same sections)

#### College-Level Reading and Writing

College-level Reading & Writing

#### College-Level Math

## **Requisites**

### **General Education**

#### **Degree Attributes**

Below College Level Pre-Reqs

### **Request Course Transfer**

#### **Proposed For:**

### **Student Learning Outcomes**

1. Demonstrate a duct traverse to determine the flow rate through airflow measurement analysis of inlet and outlet static pressures according to the manufacturer's recommendations.

#### **Assessment 1**

Assessment Tool: Outcome-related skills demonstration

Assessment Date: Spring/Summer 2025

Assessment Cycle: Every Three Years

Course section(s)/other population: All

Number students to be assessed: All

How the assessment will be scored: Skills demonstration checklist

Standard of success to be used for this assessment: 80% of the students will score 80% or higher.

Who will score and analyze the data: U.A. Instructors

2. Measure pressure differentials across a flow measurement device to the manufacturer's recommendations including Total Dynamic Head (TDH) readings.

#### **Assessment 1**

Assessment Tool: Outcome-related skills demonstration

Assessment Date: Spring/Summer 2025

Assessment Cycle: Every Three Years

Course section(s)/other population: All

Number students to be assessed: All

How the assessment will be scored: Skills demonstration checklist

Standard of success to be used for this assessment: 80% of the students will score 80% or higher.

Who will score and analyze the data: U.A. Instructors

3. Measure performance indicators for British Thermal Units per hour (BTUH) performance and power approximation calculations, including dry and wet bulb temperatures, voltage and current measurements.

#### **Assessment 1**

Assessment Tool: Outcome-related skills demonstration

Assessment Date: Spring/Summer 2025

Assessment Cycle: Every Three Years

Course section(s)/other population: All

Number students to be assessed: All

How the assessment will be scored: Skills demonstration checklist

Standard of success to be used for this assessment: 80% of the students will score 80% or higher.

Who will score and analyze the data: U.A. Instructors

### **Course Objectives**

1. Review specific tools and their operation to properly measure cubic feet per minute (CFM), gallons per minute (GPM), refrigerant flow, and power consumption.
2. Review charts and new electronic devices for specific heating and cooling equipment to determine their CFM, GPM, refrigerant flow, and electrical power consumption.
3. Calculate CFM air flow through specific furnaces and review effects of operation if not within parameters.
4. Calculate air flow and fluid flow ratios of a hydronic coil and its effect on system operation.
5. Plot pump curve and calculate horsepower.
6. Measure voltage and amp draw of specific pumps and fans to determine proper operation.
7. Review Personal Protective Equipment (PPE), tools, and instruments for Tasks.
8. Perform a duct traverse and calculate the airflow rate.
9. Measure TDH readings and compare them to the manufacturer's pump curves to determine the water flow rate.
10. Perform a pressure differential reading across a flow measurement device and calculate the water flow rate.
11. Measure the dry and wet bulb temperature readings across the Air Conditioning coil and determine the Delta Enthalpy to calculate the BTUH performance.
12. Measure the voltage and current readings at the Air Conditioning compressor and determine the BTUH performance.

### New Resources for Course

#### Course Textbooks/Resources

Textbooks

IPTJTC. *Start, Test, and Balance*, first ed. United Association , 2003

Manuals

Periodicals

Software

#### Equipment/Facilities

<u>Reviewer</u>	<u>Action</u>	<u>Date</u>
<b>Faculty Preparer:</b> <i>Tony Esposito</i>	<i>Faculty Preparer</i>	<i>Jan 28, 2025</i>
<b>Department Chair/Area Director:</b> <i>Marilyn Donham</i>	<i>Recommend Approval</i>	<i>Jan 30, 2025</i>
<b>Dean:</b> <i>Eva Samulski</i>	<i>Recommend Approval</i>	<i>Jan 30, 2025</i>
<b>Curriculum Committee Chair:</b> <i>Randy Van Wagnen</i>	<i>Recommend Approval</i>	<i>Apr 24, 2025</i>
<b>Assessment Committee Chair:</b> <i>Jessica Hale</i>	<i>Recommend Approval</i>	<i>Apr 26, 2025</i>
<b>Vice President for Instruction:</b> <i>Brandon Tucker</i>	<i>Approve</i>	<i>Apr 28, 2025</i>

## Washtenaw Community College Comprehensive Report

### UAT 119 HVACR Residential Technician (UA 6028) Effective Term: Spring/Summer 2018

#### Course Cover

**Division:** Advanced Technologies and Public Service Careers

**Department:** United Association Department

**Discipline:** United Association Training

**Course Number:** 119

**Org Number:** 28200

**Full Course Title:** HVACR Residential Technician (UA 6028)

**Transcript Title:** HVACR Resid Technician (6028)

**Is Consultation with other department(s) required:** No

**Publish in the Following:** College Catalog , Web Page

**Reason for Submission:** New Course

**Change Information:**

**Rationale:** New UAT course

**Proposed Start Semester:** Spring/Summer 2018

**Course Description:** In this course, students will focus on performance testing of residential Heating, Ventilation, Air Conditioning, Refrigeration (HVACR) equipment, measuring and analyzing of data for air flow, water flow, and electrical power input. Students will perform practical exercises on testing equipment training modules and/or functional building equipment. Upon completion, students are required to submit documentation on two field performance tests from their training center. Limited to United Association program participants.

#### Course Credit Hours

**Variable hours:** No

**Credits:** 1.5

**The following Lecture Hour fields are not divisible by 15: Student Min ,Instructor Min**

**Lecture Hours: Instructor: 22.5 Student: 22.5**

**The following Lab fields are not divisible by 15: Student Min, Instructor Min**

**Lab: Instructor: 1.5 Student: 1.5**

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**Total Contact Hours: Instructor: 24 Student: 24**

**Repeatable for Credit:** NO

**Grading Methods:** Letter Grades

Audit

**Are lectures, labs, or clinicals offered as separate sections?:** NO (same sections)

#### College-Level Reading and Writing

College-level Reading & Writing

#### College-Level Math

#### Requisites

#### General Education

Degree Attributes

Below College Level Pre-Reqs

## **Request Course Transfer**

**Proposed For:**

## **Student Learning Outcomes**

1. Perform air (CFM) and water (GPM) flow performance testing.

### **Assessment 1**

Assessment Tool: Skills demonstration

Assessment Date: Spring/Summer 2018

Assessment Cycle: Every Three Years

Course section(s)/other population: All

Number students to be assessed: All

How the assessment will be scored: Skills demonstration checklist

Standard of success to be used for this assessment: 90% of the students will score 100%

Who will score and analyze the data: U.A. training coordinator

2. Perform refrigerant flow and electrical power consumption testing.

### **Assessment 1**

Assessment Tool: Skills demonstration

Assessment Date: Spring/Summer 2018

Assessment Cycle: Every Three Years

Course section(s)/other population: All

Number students to be assessed: All

How the assessment will be scored: Skills demonstration checklist

Standard of success to be used for this assessment: 90% of the students will score 100%

Who will score and analyze the data: U.A. training coordinator

## **Course Objectives**

1. Review specific tools and their operation to properly measure CFM, GPM, refrigerant flow, and power consumption.
2. Review charts and new electronic devices for specific heating and cooling equipment to determine their CFM, GPM, refrigerant flow, and electrical power consumption.
3. Calculate CFM air flow through specific furnaces and review effects of operation if not within parameters.
4. Calculate air flow and fluid flow ratio of a hydronic coil and its effect on system operation.
5. Review refrigerant cycle and determine proper system pressures when using 410A refrigerant as well as safety precautions when measuring refrigerants.
6. Plot pump curve and calculate horsepower.
7. Measure voltage and amp draw of specific pumps and fans to determine proper operation.
8. Calculate cost efficiencies for financial savings of proper operation.

## **New Resources for Course**

### **Course Textbooks/Resources**

Textbooks

IPTJTC. *Start, Test, and Balance*, first ed. United Association, 2003

Manuals

Periodicals

Software

### **Equipment/Facilities**

<b><u>Reviewer</u></b>	<b><u>Action</u></b>	<b><u>Date</u></b>
<b>Faculty Preparer:</b> <i>Tony Esposito</i>	<i>Faculty Preparer</i>	<i>Nov 16, 2017</i>
<b>Department Chair/Area Director:</b> <i>Marilyn Donham</i>	<i>Recommend Approval</i>	<i>Nov 17, 2017</i>
<b>Dean:</b> <i>Brandon Tucker</i>	<i>Recommend Approval</i>	<i>Dec 27, 2017</i>
<b>Curriculum Committee Chair:</b> <i>David Wooten</i>	<i>Recommend Approval</i>	<i>Mar 12, 2018</i>
<b>Assessment Committee Chair:</b> <i>Michelle Garey</i>	<i>Recommend Approval</i>	<i>Mar 28, 2018</i>
<b>Vice President for Instruction:</b> <i>Kimberly Hurns</i>	<i>Approve</i>	<i>Mar 29, 2018</i>