

## Washtenaw Community College Comprehensive Report

### HVA 101 Heating, Ventilation and Air Conditioning I Effective Term: Spring/Summer 2025

#### Course Cover

**College:** Advanced Technologies and Public Service Careers  
**Division:** Advanced Technologies and Public Service Careers  
**Department:** Heating, Ventilation and A/C  
**Discipline:** Heating, Ventilation, Air Conditioning and Refrigeration  
**Course Number:** 101  
**Org Number:** 14750  
**Full Course Title:** Heating, Ventilation and Air Conditioning I  
**Transcript Title:** HVAC I  
**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:**

**Pre-requisite, co-requisite, or enrollment restrictions**

**Rationale:** Remove MTH 067 as a prerequisite (listed in the catalog) and add MTH 125X and 160X as options.

**Proposed Start Semester:** Winter 2025

**Course Description:** In this course, students will be introduced to the concept of thermodynamics and principles of refrigeration. Major units covered include refrigeration systems, refrigerants, refrigerant tables, contaminants, dryers, moisture in the air, refrigeration components (i.e. compressors, condensers, evaporators, metering device motors and accessories) and defrost systems. The components and operation of residential furnaces will be discussed. An overview of heating and A/C systems and components will be provided from an operation and service perspective. HVAC mathematics will be introduced and used to convert temperatures between Fahrenheit and Celsius.

#### Course Credit Hours

**Variable hours:** No

**Credits:** 4

**Lecture Hours: Instructor: 60 Student: 60**

**Lab: Instructor: 30 Student: 30**

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

**Total Contact Hours: Instructor: 90 Student: 90**

**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

Level 2

**Requisites****Prerequisite**

Academic Math Level 2

or

**Prerequisite**

MTH 125; may enroll concurrently

or

**Prerequisite**

MTH 125X; may enroll concurrently

or

**Prerequisite**

MTH 160; may enroll concurrently

or

**Prerequisite**

MTH 160X; may enroll concurrently

**General Education****Request Course Transfer****Proposed For:**

Eastern Michigan University

Ferris State University

**Student Learning Outcomes**

1. Recognize the proper function of the major components within an A/C system.

**Assessment 1**

Assessment Tool: Outcome-related departmental final exam

Assessment Date: Winter 2020

Assessment Cycle: Every Three Years

Course section(s)/other population: All

Number students to be assessed: All

How the assessment will be scored: Answer key

Standard of success to be used for this assessment: 70% of students will score 70% or higher.

Who will score and analyze the data: Departmental faculty

2. Recognize the physical state of the refrigerant as it circulates in the refrigeration cycle.

**Assessment 1**

Assessment Tool: Outcome-related departmental final exam

Assessment Date: Winter 2020

Assessment Cycle: Every Three Years

Course section(s)/other population: All

Number students to be assessed: All

How the assessment will be scored: Answer key

Standard of success to be used for this assessment: 70% of students will score 70% or higher.

Who will score and analyze the data: Departmental faculty

3. Identify the major components of a furnace and their proper operation.

**Assessment 1**

Assessment Tool: Outcome-related departmental final exam

Assessment Date: Winter 2020

Assessment Cycle: Every Three Years

Course section(s)/other population: All

Number students to be assessed: All

How the assessment will be scored: Answer key

Standard of success to be used for this assessment: 70% of students will score 70% or higher.

Who will score and analyze the data: Departmental faculty

### Course Objectives

1. Identify the major components of an A/C system.
2. Explain the operation of the four major A/C components.
3. Identify in proper order how A/C components relate to each other.
4. Describe the term “ton of refrigeration”.
5. List the proper evacuation practice.
6. Explain how to charge fixed orifice, capillary tube, and piston (short-tube) air-conditioning systems using charging charts and curves.
7. Identify the physical state of refrigerant in the four major components of an A/C system.
8. Define the relationship between temperature and pressure.
9. Determine the refrigerant's physical state and A/C unit proper operation using temperature and pressure readings.
10. Describe the basic refrigeration cycle.
11. Describe how refrigerant is charged into systems in vapor and liquid states.
12. Explain the operation of furnace components.
13. Discuss flame roll out switches, auxiliary limit switches, and draft safeguard switches.
14. Discuss the meaning of a redundant gas valve.
15. Describe the difference between induced-draft and forced-draft systems.
16. State the purpose of a limit switch compared to a flame roll out.
17. Describe the operations of three flame-proving devices.
18. Discuss flame rectification and how it pertains to a local and remote flame sensing.
19. Describe typical preventive maintenance procedures.
20. Use HVAC mathematics to convert temperatures between Fahrenheit and Celsius.

### New Resources for Course

#### Course Textbooks/Resources

Textbooks

Whitman Silverstein et al. *Refrigeration and Air Conditioning Technologies*, 9th ed. Delmar, 2016

Manuals

Periodicals

Software

#### Equipment/Facilities

Level III classroom

<u>Reviewer</u>	<u>Action</u>	<u>Date</u>
<b>Faculty Preparer:</b> <i>Brian Martindale</i>	<i>Faculty Preparer</i>	<i>Oct 17, 2024</i>
<b>Department Chair/Area Director:</b> <i>Brian Martindale</i>	<i>Recommend Approval</i>	<i>Oct 21, 2024</i>
<b>Dean:</b> <i>Eva Samulski</i>	<i>Recommend Approval</i>	<i>Oct 22, 2024</i>
<b>Curriculum Committee Chair:</b> <i>Randy Van Wagnen</i>	<i>Recommend Approval</i>	<i>Jan 11, 2025</i>
<b>Assessment Committee Chair:</b> <i>Jessica Hale</i>	<i>Recommend Approval</i>	<i>Jan 22, 2025</i>
<b>Vice President for Instruction:</b>		

*Brandon Tucker*

*Approve*

*Jan 30, 2025*

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#### Course Cover

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**Department:** Heating, Ventilation and A/C

**Discipline:** Heating, Ventilation, Air Conditioning and Refrigeration

**Course Number:** 101

**Org Number:** 14750

**Full Course Title:** Heating, Ventilation and Air Conditioning I

**Transcript Title:** HVAC I

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

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

**Reason for Submission:** Three Year Review / Assessment Report

**Change Information:**

**Total Contact Hours**

**Rationale:** Update as a result of assessment of course and redistribute the contact hours. 60 hours lecture  
30 hours lab

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

**Course Description:** This course introduces the concept of thermodynamics and principles of refrigeration. Major units covered include refrigeration systems, refrigerants, refrigerant tables, contaminants, dryers, moisture in the air, refrigeration components (i.e. compressors, condensers, evaporators, metering device motors and accessories) and defrost systems. The components and operation of residential furnaces will be discussed. An overview of heating and A/C systems and components will be provided from an operation and service perspective. HVAC mathematics will be introduced and used to convert temperatures between Fahrenheit and Celsius.

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

#### College-Level Reading and Writing

College-level Reading & Writing

#### College-Level Math

Level 2

#### Requisites

#### General Education

#### Request Course Transfer

**Proposed For:**

Eastern Michigan University  
Ferris State University

**Student Learning Outcomes**

1. Identify the major components of an A/C system.

**Assessment 1**

Assessment Tool: Departmental final exam  
Assessment Date: Winter 2020  
Assessment Cycle: Every Three Years  
Course section(s)/other population: Random sample of two sections  
Number students to be assessed: All  
How the assessment will be scored: Answer key  
Standard of success to be used for this assessment: 70% of students will score 70% or higher  
Who will score and analyze the data: Departmental faculty

2. Recognize the physical state of the refrigerant as it circulates in the refrigeration cycle.

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Assessment Tool: Departmental final exam  
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Number students to be assessed: All  
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3. Identify the major components of a furnace and their proper operation.

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**Course Objectives**

1. Identify the components of an A/C system.
2. Explain the operation of the four major A/C components.
3. Identify in proper order how A/C components relate to each other.
4. Describe the term “ton of refrigeration”.
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15. Describe the difference between induced-draft and forced-draft systems.

- 16. State the purpose of a limit switch compared to a flame roll out.
- 17. List three flame-proving devices and describe the operation of each.
- 18. Discuss flame rectification and how it pertains to a local and remote flame sensing.
- 19. Describe typical preventive maintenance procedures.
- 20. Use HVAC mathematics to convert temperatures between Fahrenheit and Celsius.

**New Resources for Course**

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**Equipment/Facilities**

Level III classroom

<b><u>Reviewer</u></b>	<b><u>Action</u></b>	<b><u>Date</u></b>
<b>Faculty Preparer:</b> <i>Brian Martindale</i>	<i>Faculty Preparer</i>	<i>Apr 03, 2018</i>
<b>Department Chair/Area Director:</b> <i>Robert Carter</i>	<i>Recommend Approval</i>	<i>May 13, 2018</i>
<b>Dean:</b> <i>Brandon Tucker</i>	<i>Recommend Approval</i>	<i>May 24, 2018</i>
<b>Curriculum Committee Chair:</b> <i>Lisa Veasey</i>	<i>Recommend Approval</i>	<i>Aug 01, 2018</i>
<b>Assessment Committee Chair:</b> <i>Shawn Deron</i>	<i>Recommend Approval</i>	<i>Aug 06, 2018</i>
<b>Vice President for Instruction:</b> <i>Kimberly Hurns</i>	<i>Approve</i>	<i>Aug 16, 2018</i>