

# Washtenaw Community College Comprehensive Report

## HVA 102 HVAC Sheet Metal Fabrication

**Effective Term: Fall 2024**

### 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:** 102

**Org Number:** 14750

**Full Course Title:** HVAC Sheet Metal Fabrication

**Transcript Title:** HVAC Sheet Metal Fabrication

**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:**

**Consultation with all departments affected by this course is required.**

**Credit hours**

**Total Contact Hours**

**Outcomes/Assessment**

**Objectives/Evaluation**

**Rationale:** Master syllabus update based on course assessment; update credits/contact hours to reflect current course content.

**Proposed Start Semester:** Winter 2024

**Course Description:** In this course, students receive an introduction to layout, design and fabrication of sheet metal with an emphasis on residential HVAC applications. Topics will include safety, sheet metal tools and equipment, fabricating HVAC duct using patterns and drawings, and installation techniques, standards and good practices. This course was previously offered as four credits.

### Course Credit Hours

**Variable hours:** No

**Credits:** 3

**Lecture Hours: Instructor:** 45 **Student:** 45

**Lab: Instructor:** 15 **Student:** 15

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

**Total Contact Hours: Instructor:** 60 **Student:** 60

**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

## General Education

## Request Course Transfer

### Proposed For:

## Student Learning Outcomes

1. Identify the purpose of commonly used sheet metal tools and equipment.

### **Assessment 1**

Assessment Tool: Outcome-related final exam questions

Assessment Date: Winter 2026

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 the students will score 80% or higher.

Who will score and analyze the data: Departmental faculty

2. Identify the appropriate use of tools and machinery, safety precautions, and practices while working with sheet metal.

### **Assessment 1**

Assessment Tool: Outcome-related final exam questions

Assessment Date: Winter 2026

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 the students will score 75% or higher

Who will score and analyze the data: Departmental faculty

3. Manipulate HVAC duct work pictorial drawings to create logical mechanical drawings, and transfer them to sheet metal stock.

### **Assessment 1**

Assessment Tool: Outcome-related lab layout drawings

Assessment Date: Winter 2026

Assessment Cycle: Every Three Years

Course section(s)/other population: All

Number students to be assessed: All

How the assessment will be scored: Checklist

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

Who will score and analyze the data: Departmental faculty

4. Construct residential HVAC duct work using correct equipment, methods, and safety practices within 1/8 " tolerances.

### **Assessment 1**

Assessment Tool: Outcome-related hands-on lab projects

Assessment Date: Winter 2026

Assessment Cycle: Every Three Years

Course section(s)/other population: All

Number students to be assessed: All

How the assessment will be scored: Checklist

Standard of success to be used for this assessment: 70% of the students will score 70% or higher on all lab projects.

Who will score and analyze the data: Departmental faculty

### **Course Objectives**

1. Identify and describe the uses of commonly used snips.
2. Identify and describe the uses of commonly used sheet metal marking tools.
3. Identify and describe the uses of commonly used measuring tools.
4. Identify and describe the uses of commonly used hand tools.
5. Identify and describe the uses of commonly used hand operated burring, turning, crimping, beading, seaming and rolling machines.
6. Identify and describe the uses of commonly used sheet metal brakes.
7. Identify and describe the uses of commonly used sheet metal lock-forming machines.
8. Use proper protective equipment and safety practices while moving sheet metal stock.
9. Apply operational and safety practices while using electrical and manually powered sheet metal forming machines.
10. Demonstrate correct operational and safety practices while cutting sheet metal with hand operated snips, and a foot operated stomp shear.
11. Demonstrate correct operational and safety practices while bending sheet metal using brakes and folders.
12. Demonstrate correct operational safety practices while using burring, turning, crimping, beading, seaming and rolling machines.
13. Use the triangulation method of layout to find unknown measurements.
14. Utilize required allowances for lock-forming machines when laying out a mechanical drawing.
15. Transfer mechanical drawings by prick punching sheet metal stock.
16. Cutout patterns transferred to sheet metal stock using the correct tools and methods.
17. Fold sheet metal patterns using the correct tools and methods.
18. Use a Pittsburgh lock forming machine to create a Pittsburgh lock.
19. Assemble pieces of the sheet metal ductwork so that the fitting is within a 1/8" tolerance from the mechanical drawing.
20. Identify the uses of rivets in regards to HVAC sheet metal ductwork.
21. Identify the uses of self-drilling screws in regards to HVAC sheet metal ductwork.
22. Identify the applications of a drive clip, s-clip, snap-lock and standing s-clip.

### **New Resources for Course**

New drawings were created for the students to use during their labs.

### **Course Textbooks/Resources**

Textbooks

Meyer, Leo A.. *Sheet Metal with Color Illustrations*, 2nd ed. ATP, Inc., 2006, ISBN: 9780826919106.

Manuals

Periodicals

Software

### **Equipment/Facilities**

Other: Students have equipment and sheet metal tools provided to complete all labs.

**Reviewer**

**Action**

**Date**

**Faculty Preparer:**

*Brian Martindale*

*Faculty Preparer*

*Jul 31, 2023*

**Department Chair/Area Director:**

<i>Brian Martindale</i>	<i>Recommend Approval</i>	<i>Aug 04, 2023</i>
<b>Dean:</b> <i>Jimmie Baber</i>	<i>Recommend Approval</i>	<i>Aug 09, 2023</i>
<b>Curriculum Committee Chair:</b> <i>Randy Van Wagnen</i>	<i>Recommend Approval</i>	<i>Jan 22, 2024</i>
<b>Assessment Committee Chair:</b> <i>Jessica Hale</i>	<i>Recommend Approval</i>	<i>Jan 25, 2024</i>
<b>Vice President for Instruction:</b> <i>Brandon Tucker</i>	<i>Approve</i>	<i>Jan 27, 2024</i>

# Washtenaw Community College Comprehensive Report

## HVA 102 HVAC Sheet Metal Fabrication

Effective Term: Spring/Summer 2014

### Course Cover

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

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

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

**Course Number:** 102

**Org Number:** 14750

**Full Course Title:** HVAC Sheet Metal Fabrication

**Transcript Title:** HVAC Sheet Metal Fabrication

**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:**

**Consultation with all departments affected by this course is required.**

**Objectives/Evaluation**

**Rationale:** Regular three-year review

**Proposed Start Semester:** Spring/Summer 2014

**Course Description:** In this course, students receive an introduction to layout, design and fabrication of sheet metal with an emphasis on residential HVAC applications. Topics will include safety, sheet metal tools and equipment, fabricating HVAC duct using patterns and drawings, and installation techniques, standards and good practices. This course was previously TRI 103.

### Course Credit Hours

**Variable hours:** No

**Credits:** 4

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

**Lab: Instructor: 0 Student: 0**

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

**Total Contact Hours: Instructor: 60 Student: 60**

**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

#### General Education

#### Request Course Transfer

Proposed For:

### Student Learning Outcomes

1. Identify the use of commonly used sheet metal tools and equipment.

**Assessment 1**

**Assessment Tool:** multiple choice test

**Assessment Date:** Winter 2016

**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 the students will score 70% or higher

**Who will score and analyze the data:** Departmental Faculty

2. Apply the appropriate use of tools and machinery, safety precautions, and practices while working with sheet metal.

**Assessment 1**

**Assessment Tool:** skill assessment

**Assessment Date:** Winter 2016

**Assessment Cycle:** Every Three Years

**Course section(s)/other population:** all

**Number students to be assessed:** all

**How the assessment will be scored:** Checklist

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

**Who will score and analyze the data:** Departmental Faculty

3. Manipulate HVAC duct work pictorial drawings to create logical mechanical drawings, and transfer them to sheet metal stock.

**Assessment 1**

**Assessment Tool:** skill assessment

**Assessment Date:** Winter 2016

**Assessment Cycle:** Every Three Years

**Course section(s)/other population:** all

**Number students to be assessed:** all

**How the assessment will be scored:** Checklist

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

**Who will score and analyze the data:** Departmental Faculty

4. Construct residential HVAC duct work using correct equipment, methods, and safety practices within 1/8 " tolerances.

**Assessment 1**

**Assessment Tool:** skill assessment

**Assessment Date:** Winter 2016

**Assessment Cycle:** Every Three Years

**Course section(s)/other population:** all

**Number students to be assessed:** all

**How the assessment will be scored:** Checklist

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

**Who will score and analyze the data:** Departmental Faculty

5. Determine the correct sheet metal fastener and connectors to use in the installation and fabrication of sheet metal ductwork.

**Assessment 1**

**Assessment Tool:** multiple choice test

**Assessment Date:** Winter 2016

**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 the students will score 70% or higher

**Who will score and analyze the data:** Departmental Faculty

### **Course Objectives**

1. Identify and describe the uses of commonly used snips.  
**Matched Outcomes**
2. Identify and describe the uses of commonly used sheet metal marking tools.  
**Matched Outcomes**
3. Identify and describe the uses of commonly used measuring tools.  
**Matched Outcomes**
4. Identify and describe the uses of commonly used hand tools.  
**Matched Outcomes**
5. Identify and describe the uses of commonly used hand operated burring, turning, crimping, beading, seaming and rolling machines.  
**Matched Outcomes**
6. Identify and describe the uses of commonly used sheet metal brakes.  
**Matched Outcomes**
7. Identify and describe the uses of commonly used sheet metal lock-forming machines.  
**Matched Outcomes**
8. Use proper protective equipment and safety practices while moving sheet metal stock.  
**Matched Outcomes**
  2. Apply the appropriate use of tools and machinery, safety precautions, and practices while working with sheet metal.
9. Apply operational and safety practices while using electrical and manually powered sheet metal forming machines.  
**Matched Outcomes**
  2. Apply the appropriate use of tools and machinery, safety precautions, and practices while working with sheet metal.
10. Demonstrate correct operational and safety practices while cutting sheet metal with hand operated snips, and a foot operated stomp shear.  
**Matched Outcomes**
  2. Apply the appropriate use of tools and machinery, safety precautions, and practices while working with sheet metal.
11. Demonstrate correct operational and safety practices while bending sheet metal using brakes and folders.  
**Matched Outcomes**
  2. Apply the appropriate use of tools and machinery, safety precautions, and practices while working with sheet metal.
12. Demonstrate correct operational safety practices while using burring, turning, crimping, beading, seaming and rolling machines.  
**Matched Outcomes**
  2. Apply the appropriate use of tools and machinery, safety precautions, and practices while working with sheet metal.
13. Use the triangulation method of layout to find unknown measurements.  
**Matched Outcomes**
  3. Manipulate HVAC duct work pictorial drawings to create logical mechanical drawings, and transfer them to sheet metal stock.
14. Utilize required allowances for lock-forming machines when laying out a mechanical drawing.  
**Matched Outcomes**
  3. Manipulate HVAC duct work pictorial drawings to create logical mechanical drawings, and transfer them to sheet metal stock.
15. Transfer mechanical drawings by prick punching sheet metal stock.

**Matched Outcomes**

3. Manipulate HVAC duct work pictorial drawings to create logical mechanical drawings, and transfer them to sheet metal stock.

16. Cutout patterns transferred to sheet metal stock using the correct tools and methods.

**Matched Outcomes**

4. Construct residential HVAC duct work using correct equipment, methods, and safety practices within 1/8 " tolerances.

17. Fold sheet metal patterns using the correct tools and methods.

**Matched Outcomes**

4. Construct residential HVAC duct work using correct equipment, methods, and safety practices within 1/8 " tolerances.

18. Use a Pittsburgh lock forming machine to create a Pittsburgh lock.

**Matched Outcomes**

4. Construct residential HVAC duct work using correct equipment, methods, and safety practices within 1/8 " tolerances.

19. Assemble pieces of the sheet metal ductwork so that the fitting is within a 1/8" tolerance from the mechanical drawing.

**Matched Outcomes**

4. Construct residential HVAC duct work using correct equipment, methods, and safety practices within 1/8 " tolerances.

20. Identify the uses of rivets in regards to HVAC sheet metal ductwork.

**Matched Outcomes**

5. Determine the correct sheet metal fastener and connectors to use in the installation and fabrication of sheet metal ductwork.

21. Identify the uses of self-drilling screws in regards to HVAC sheet metal ductwork.

**Matched Outcomes**

5. Determine the correct sheet metal fastener and connectors to use in the installation and fabrication of sheet metal ductwork.

22. Identify the applications of a drive clip, s-clip, snap-lock and standing s-clip.

**Matched Outcomes**

5. Determine the correct sheet metal fastener and connectors to use in the installation and fabrication of sheet metal ductwork.

**New Resources for Course****Course Textbooks/Resources**

Textbooks  
Manuals  
Periodicals  
Software

**Equipment/Facilities****Reviewer****Action****Date****Faculty Preparer:**

*Michael Kontry*

*Faculty Preparer*

*Oct 21, 2013*

**Department Chair/Area Director:**

*Default Washtenaw*

*Default*

*Dec 16, 2013*

**Dean:**

*Marilyn Donham*

*Recommend Approval*

*Dec 16, 2013*

**Vice President for Instruction:**

*Bill Abernethy*

*Approve*

*Jan 15, 2014*