

**Course Assessment Report
Washtenaw Community College**

Discipline	Course Number	Title
Heating, Ventilation, Air Conditioning and Refrigeration	102	HVA 102 04/28/2023- HVAC Sheet Metal Fabrication
College	Division	Department
Advanced Technologies and Public Service Careers	Advanced Technologies and Public Service Careers	Heating, Ventilation and A/C
Faculty Preparer		Brian Martindale
Date of Last Filed Assessment Report		

I. Review previous assessment reports submitted for this course and provide the following information.

1. Was this course previously assessed and if so, when?

Yes Fall 2008.

2. Briefly describe the results of previous assessment report(s).

Students met the standard of success for all five outcomes, and performed very well on Outcomes 1, 2 and 4.

3. Briefly describe the Action Plan/Intended Changes from the previous report(s), when and how changes were implemented.

In 2020, quiz assignments were created in Blackboard. In 2021/2022, the majority of the lab drawings were revised using Illustrator to support student learning.
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II. Assessment Results per Student Learning Outcome

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

- Assessment Plan
 - Assessment Tool: multiple choice test
 - Assessment Date: Winter 2016
 - 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

1. Indicate the Semester(s) and year(s) assessment data were collected for this report.

Fall (indicate years below)	Winter (indicate years below)	SP/SU (indicate years below)
2022	2022, 2023	2022

2. Provide assessment sample size data in the table below.

# of students enrolled	# of students assessed
71	59

3. If the number of students assessed differs from the number of students enrolled, please explain why all enrolled students were not assessed, e.g. absence, withdrawal, or did not complete activity.

Students dropped or withdrew from the course.

4. Describe how students from all populations (day students on campus, DL, MM, evening, extension center sites, etc.) were included in the assessment based on your selection criteria.

All students were face-to-face in morning, afternoon and evening sections.

5. Describe the process used to assess this outcome. Include a brief description of this tool and how it was scored.

For this outcome, we used 15 matching identification questions from the final exam scored by an answer key.

6. Briefly describe assessment results based on data collected for this outcome and tool during the course assessment. Discuss the extent to which students achieved this learning outcome and indicate whether the standard of success was met for this outcome and tool.

Met Standard of Success: Yes

The assessment plan lists the standard of success as: 70% of the students will score 70% or higher.

It was more efficient for us at this time to do an item analysis of the data and identify the percentage of students who scored each question correctly. For this

outcome, we are measuring success as 70% of the students scoring 70% of the questions correctly. In the future, we will collect individual student data.

For 13/15 questions (87%), more than 70% of the students answered the question correctly.

7. Based on your interpretation of the assessment results, describe the areas of strength in student achievement of this learning outcome.

For the most part, students had a very strong knowledge of the hand tools and the machines they were operating during the labs. Students successfully identified these tools and machines on the final exam.

8. Based on your analysis of student performance, discuss the areas in which student achievement of this learning outcome could be improved. If student met standard of success, you may wish to identify your plans for continuous improvement.

The two terms students struggled to match correctly were "hand flanger" and "aviation snips." These terms may have not been discussed enough in labs for the students to be able to identify them in the final exam. Instructors will make a conscious effort to address this weakness in student learning for this outcome.

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

- Assessment Plan
 - Assessment Tool: skill assessment
 - Assessment Date: Winter 2016
 - 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

- 1. Indicate the Semester(s) and year(s) assessment data were collected for this report.

Fall (indicate years below)	Winter (indicate years below)	SP/SU (indicate years below)
2022	2023, 2022	2022

2. Provide assessment sample size data in the table below.

# of students enrolled	# of students assessed
71	59

3. If the number of students assessed differs from the number of students enrolled, please explain why all enrolled students were not assessed, e.g. absence, withdrawal, or did not complete activity.

Students dropped or withdrew from the course.

4. Describe how students from all populations (day students on campus, DL, MM, evening, extension center sites, etc.) were included in the assessment based on your selection criteria.

All students were face-to-face in morning, afternoon and evening sections.

5. Describe the process used to assess this outcome. Include a brief description of this tool and how it was scored.

For this outcome, we used 12 questions from the final exam scored by an answer key.

6. Briefly describe assessment results based on data collected for this outcome and tool during the course assessment. Discuss the extent to which students achieved this learning outcome and indicate whether the standard of success was met for this outcome and tool.

Met Standard of Success: Yes

The assessment plan lists the standard of success as: 70% of the students will score 70% or higher.

It was more efficient for us at this time to do an item analysis of the data and identify the percentage of students who scored each question correctly. For this outcome, we are measuring success as 70% of the students scoring 70% of the questions correctly. In the future, we will collect individual student data.

For 11/12 questions (92%), more than 70% of the students answered the question correctly.

7. Based on your interpretation of the assessment results, describe the areas of strength in student achievement of this learning outcome.

Students scored very well in the area of the appropriate use of tools and machinery. The knowledge and practice of safety was also strongly achieved.

8. Based on your analysis of student performance, discuss the areas in which student achievement of this learning outcome could be improved. If student met standard of success, you may wish to identify your plans for continuous improvement.

There was only 1 of the 12 questions where the students did not meet the standard of success. This was a multiple-choice question related to making a radius duct work elbow.

The students make a minimum of 5 different fittings that this technique is applied to. More time on this theory has been spent in class, including in this Summer 2023 semester.

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

- Assessment Plan
 - Assessment Tool: skill assessment
 - Assessment Date: Winter 2016
 - 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

1. Indicate the Semester(s) and year(s) assessment data were collected for this report.

Fall (indicate years below)	Winter (indicate years below)	SP/SU (indicate years below)
2022	2023, 2022	2022

2. Provide assessment sample size data in the table below.

# of students enrolled	# of students assessed
71	59

3. If the number of students assessed differs from the number of students enrolled, please explain why all enrolled students were not assessed, e.g. absence, withdrawal, or did not complete activity.

Students dropped or withdrew from the course.

4. Describe how students from all populations (day students on campus, DL, MM, evening, extension center sites, etc.) were included in the assessment based on your selection criteria.

All students were face-to-face in morning, afternoon and evening sections.

5. Describe the process used to assess this outcome. Include a brief description of this tool and how it was scored.

For this outcome, we used two labs that required drawing the lab paper first before laying it out on sheet metal.

6. Briefly describe assessment results based on data collected for this outcome and tool during the course assessment. Discuss the extent to which students achieved this learning outcome and indicate whether the standard of success was met for this outcome and tool.

Met Standard of Success: Yes

The assessment plan lists the standard of success as: 70% of the students will score 70% or higher.

It was more efficient for us at this time to do an item analysis of the data and identify the percentage of students who completed the lab correctly, on a pass/fail basis. For this outcome, we are measuring success as 70% of the students completing the lab correctly.

For 2/2 labs, more than 70% of the students completed the labs correctly.

7. Based on your interpretation of the assessment results, describe the areas of strength in student achievement of this learning outcome.

The students did extremely well on Outcome #3. Two fittings were identified for manipulating and creating drawings to then apply to sheet metal stock to complete the fittings.

8. Based on your analysis of student performance, discuss the areas in which student achievement of this learning outcome could be improved. If student met standard of success, you may wish to identify your plans for continuous improvement.

The students met the standard of success on this outcome. We plan to have the students continue to apply these techniques to these labs in the future semesters.

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

- Assessment Plan
 - Assessment Tool: skill assessment
 - Assessment Date: Winter 2016
 - 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

1. Indicate the Semester(s) and year(s) assessment data were collected for this report.

Fall (indicate years below)	Winter (indicate years below)	SP/SU (indicate years below)
2022	2023, 2022	2022

2. Provide assessment sample size data in the table below.

# of students enrolled	# of students assessed
71	59

3. If the number of students assessed differs from the number of students enrolled, please explain why all enrolled students were not assessed, e.g. absence, withdrawal, or did not complete activity.

Students dropped or withdrew from the course.

4. Describe how students from all populations (day students on campus, DL, MM, evening, extension center sites, etc.) were included in the assessment based on your selection criteria.

All students were face-to-face in morning, afternoon and evening sections.

5. Describe the process used to assess this outcome. Include a brief description of this tool and how it was scored.

For this outcome, we used eight labs from the required labs for the course.

6. Briefly describe assessment results based on data collected for this outcome and tool during the course assessment. Discuss the extent to which students achieved this

learning outcome and indicate whether the standard of success was met for this outcome and tool.

Met Standard of Success: <u>Yes</u>
The assessment plan lists the standard of success as: 70% of the students will score 70% or higher.
It was more efficient for us at this time to do an item analysis of the data and identify the percentage of students who completed each lab correctly. For this outcome, we are measuring success as 70% of the students completing 70% of the labs correctly. In the future, we will collect individual student data.
For 8/8 labs, more than 70% of the students completed the lab correctly.

7. Based on your interpretation of the assessment results, describe the areas of strength in student achievement of this learning outcome.

The students have exceeded the standard of success for the 8 labs used for Outcome #4.
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8. Based on your analysis of student performance, discuss the areas in which student achievement of this learning outcome could be improved. If student met standard of success, you may wish to identify your plans for continuous improvement.

We plan to have the student`s continue the practices of using the ductwork equipment correctly and applying proper methods of safety within an accurate tolerance of 1/8".
We will also continue to enforce the use of safety glasses during all labs. The students have been very compliant with this requirement.

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

- Assessment Plan
 - Assessment Tool: multiple choice test
 - Assessment Date: Winter 2016
 - 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

1. Indicate the Semester(s) and year(s) assessment data were collected for this report.

Fall (indicate years below)	Winter (indicate years below)	SP/SU (indicate years below)
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2. Provide assessment sample size data in the table below.

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71	59

3. If the number of students assessed differs from the number of students enrolled, please explain why all enrolled students were not assessed, e.g. absence, withdrawal, or did not complete activity.

Students dropped or withdrew from the course.

4. Describe how students from all populations (day students on campus, DL, MM, evening, extension center sites, etc.) were included in the assessment based on your selection criteria.

All students were face-to-face in morning, afternoon and evening sections.

5. Describe the process used to assess this outcome. Include a brief description of this tool and how it was scored.

For this outcome, we used two of the required labs that used sheet metal fasteners and connectors to complete the labs.

6. Briefly describe assessment results based on data collected for this outcome and tool during the course assessment. Discuss the extent to which students achieved this learning outcome and indicate whether the standard of success was met for this outcome and tool.

Met Standard of Success: Yes

The assessment plan lists the standard of success as: 70% of the students will score 70% or higher.

It was determined that a lab-based skills checklist is a better tool for assessing this outcome. It was more efficient for us at this time to do an item analysis of the data and identify the percentage of students who completed each lab correctly. For this

outcome, we are measuring success as 70% of the students completing 70% of the labs correctly. In the future, we will collect individual student data.

For 2/2 labs, more than 70% of the students completed the labs correctly.

7. Based on your interpretation of the assessment results, describe the areas of strength in student achievement of this learning outcome.

The students have done extremely well on outcome #5. They have met the standards of success for this outcome.

8. Based on your analysis of student performance, discuss the areas in which student achievement of this learning outcome could be improved. If student met standard of success, you may wish to identify your plans for continuous improvement.

Because outcomes #4 and #5 assess essentially the same skills, we will be removing outcome #5 for future assessments.

III. Course Summary and Intended Changes Based on Assessment Results

1. Based on the previous report's Intended Change(s) identified in Section I above, please discuss how effective the changes were in improving student learning.

The addition of the quizzes being available on Blackboard has helped increase the lab and lecture time to help meet the standards of success. This has also allowed for the additional time to discuss the quizzes once completed. The revised drawings have helped improved the accuracy and clarity of the expectation of the final product.

2. Describe your overall impression of how this course is meeting the needs of students. Did the assessment process bring to light anything about student achievement of learning outcomes that surprised you?

The assessment using various questions from the final exam has helped make increased awareness of areas of success and weaknesses in student learning clear. Areas of weaknesses will be addressed and areas of success will be reinforced during the course.

3. Describe when and how this information, including the action plan, was or will be shared with Departmental Faculty.

The completed assessment will be shared with departmental faculty and we will have a completed copy of the report and the data on hand to review for future assessments.

4.

Intended Change(s)

Intended Change	Description of the change	Rationale	Implementation Date
Outcome Language	<p>Terminology related to areas that did not meet the standard of success will be discussed more during lectures (Outcome #1).</p> <p>Outcome #2 will be assessed using the exam moving forward; "Identify" is a more appropriate verb.</p> <p>Outcome #5 will be removed.</p>	<p>Questions #4 and #8 did not meet the standard of success. The material from these two questions will be discussed more during tool terminology lectures.</p> <p>Outcome #4 and #5 assess the same skills, so we will remove #5.</p>	2024
Other: credit/contact hours	<p>The course will be reduced from 4 credits to 3 credit hours.</p> <p>Contact hours will be 45 lecture and 15 lab, instead of 60 lecture.</p>	<p>The class is primarily a hands-on class, and the lab time should be reflected in the contact hours.</p>	2024

5. Is there anything that you would like to mention that was not already captured?

The master syllabus will need to have the course credit and contact hours corrected. The previous master syllabus notes that there are 60 hours of lecture; however, the class is primarily hands-on.

III. Attached Files

- [HVA 102 Final Exam answer key](#)
- [HVA 102 Outcome #1 2023](#)
- [HVA 102 Outcome #2 2023](#)
- [HVA 102 Outcome #3 2023](#)

[HVA 102 Outcome #4 2023](#)

[HVA 102 Outcome #5 2023](#)

Faculty/Preparer:	Brian Martindale	Date: 08/30/2023
Department Chair:	Brian Martindale	Date: 09/01/2023
Dean:	Jimmie Baber	Date: 09/05/2023
Assessment Committee Chair:	Jessica Hale	Date: 12/15/2023

COURSE ASSESSMENT REPORT

I. Background Information

1. Course assessed:
 Course Discipline Code and Number: HVA 102
 Course Title: HVAC Sheet Metal fabrication
 Division/Department Codes: VCT/ WAF

2. Semester assessment was conducted (check one):
 Fall 2008
 Winter 20__
 Spring/Summer 20__

3. Assessment tool(s) used: check all that apply.
 Portfolio
 Standardized test
 Other external certification/licensure exam (specify):
 Survey
 Prompt
 Departmental exam
 Capstone experience (specify):
 Other (specify):

4. Have these tools been used before?
 Yes
 No

If yes, have the tools been altered since its last administration? If so, briefly describe changes made.

5. Indicate the number of students assessed/total number of students enrolled in the course.
 12/16

6. Describe how students were selected for the assessment.
 All students in all sections who took the final.

II. Results

1. Briefly describe the changes that were implemented in the course as a result of the previous assessment.
 None

2. List each outcome that was assessed for this report exactly as it is stated on the course master syllabus.
 - a. Identify the use of commonly used sheet metal tools and equipment-Assessed by multiple choice test.
 - b. Apply the appropriate use of tools and machinery, safety precautions and practices, while working with sheet metal- assessed by skills assessment.
 - c. Manipulate HVAC ductwork pictorial drawings to create logical mechanical drawings, and transfer them to sheet metal stock- assessed by skills assessment.
 - d. Construct residential HVAC ductwork using correct equipment, methods, and safety practices within 1/8" tolerances- assessed by skills assessment.
 - e. Determine the correct sheet metal fasteners and connectors to use in the installation and fabrication of sheet metal ductwork-Assessed by multiple choice test.

COURSE ASSESSMENT REPORT

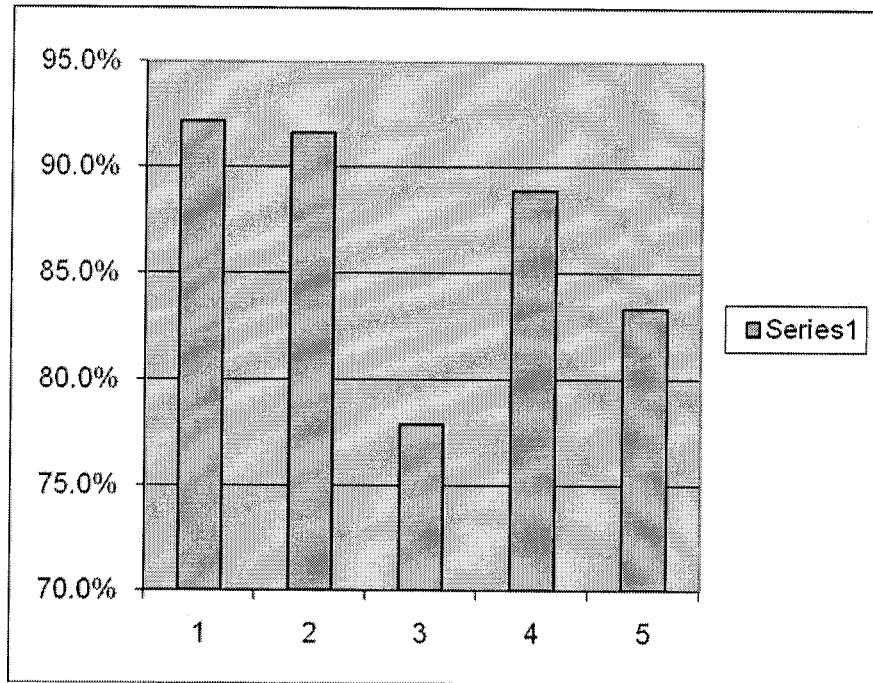
- Briefly describe assessment results based on data collected during the course assessment, demonstrating the extent to which students are achieving each of the learning outcomes listed above. *Please attach a summary of the data collected.*

Outcomes 2, 3 and 4 were written as practical outcomes to be reviewed using skill assessment. Once in the classroom it became obvious that there were not enough workstations to perform a practical skill assessment for each student separately (without being able to look at another student's work). Instead, it was decided to include final exam test questions to be used to evaluate these outcomes. The skill activity is an important part of the learning process and continues to be a critical element in the class. However, the assessment of an individual is difficult within this classroom environment.

Outcomes #1 and #5 were appropriately assessed by using the final exam. Outcome #2, 3 and 4 were also assessed by using the final exam instead of the skills assessment..

Percent of Correct Answers

	Outcome #1	Outcome #2	Outcome #3	Outcome #4	Outcome #5
Average					
Summary	92.2%	91.7%	77.9%	88.9%	83.3%



The collection of the data yielded an analysis as a percentage of questions answered correctly. These results are shown in the chart above. The data shows that over 70% of the questions for each outcome were answered correctly.

- For each outcome assessed, indicate the standard of success used, and the percentage of students who achieved that level of success. *Please attach the rubric/scoring guide used for the assessment.*

COURSE ASSESSMENT REPORT

The standard of success identified in the syllabus said "70% of the students will achieve an overall average of 70% or higher on outcome questions." We did not collect the data in a form to allow this specific analysis. I feel that the analysis of the data did say that the students were able to achieve an overall 70% competency.

Because the assessment of Outcomes 2, 3, and 4 were not able to be assessed in the manner originally intended; I did the assessment based upon test questions specifically included in the final to cover these outcomes.

5. Describe the areas of strength and weakness in students' achievement of the learning outcomes shown in assessment results.

Strengths: The students did extremely well on outcomes 1, 2, and 4.

Weaknesses:

- 1) Skill assessment is not a good application in this setting. Therefore, the outcomes and assessment methods need to be rewritten in order to reflect a viable assessment method.
- 2) The assessment results for Outcome #3 are the lowest of the five areas.
- 3) The data collection procedure did not fit with the standard of success.

III. Changes influenced by assessment results

1. If weaknesses were found (see above) or students did not meet expectations, describe the action that will be taken to address these weaknesses.

- o Skill assessment is not a good application in this setting. Therefore, the outcomes and assessment methods need to be rewritten in order to reflect a viable assessment method.
- o In outcome #3, I will review the questions and determine if the questions were valid. If we determine that the questions are valid, we will consider if the instruction needs to be changed.
- o The standard of success or the data collection method will be revised on the next version of the master syllabus.

2. Identify intended changes that will be instituted based on results of this assessment activity (check all that apply). Please describe changes and give rationale for change.

- a. Outcomes/Assessments on the Master Syllabus

Change/rationale: The outcomes and assessment methods for 2, 3 and 4 will be revised. The standard of success or the data collection method will be revised on the next version of the master syllabus.

- b. Objectives/Evaluation on the Master Syllabus

Change/rationale:

- c. Course pre-requisites on the Master Syllabus

Change/rationale:

- d. 1st Day Handouts

Change/rationale:

- e. Course assignments

Change/rationale: Based on the relatively poor performance on outcome 3 we will add assignments for homework to have the students layout certain fittings, and after approval by the instructor, the student will then transfer the layout to the sheet metal.

- f. Course materials (check all that apply)

Textbook

Handouts

Other:

COURSE ASSESSMENT REPORT

g. Instructional methods
Change/rationale: Increase student homework.

h. Individual lessons & activities
Change/rationale:

3. What is the timeline for implementing these actions? Winter 2009

IV. Future plans

1. Describe the extent to which the assessment tools used were effective in measuring student achievement of learning outcomes for this course.

The assessment completed did allow analysis of the results and afforded the instructors knowledge of changes to be implemented. The students did learn the intended outcomes, and also information was evident as to course changes the instructors will implement.

2. If the assessment tools were not effective, describe the changes that will be made for future assessments.

3. Which outcomes from the master syllabus have been addressed in this report?

All Selected

If "All", provide the report date for the next full review: Fall 2011

If "Selected", provide the report date for remaining outcomes: _____

Submitted by:

Print: L.K. Swanson
Faculty/Preparer

Signature

Date:

January 8, 2009

Print: Wm Figg
Department Chair

Signature

Date:

January 20, 2009

Print: Bruce Greene
Dean/Administrator

Signature

Date:

Jan 20, 09

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