Course Assessment Report
Washtenaw Community College

Discipline	Course Number	Title
Robotics	212	ROB 212 04/07/2023-Robotics II
College	Division	Department
Advanced Technologies and Public Service Careers	Advanced Technologies and Public Service Careers	Advanced Manufacturing
Faculty Preparer		Sean Martin
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?

   No

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

   3.

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

   5.

II. Assessment Results per Student Learning Outcome

Outcome 1: Recognize fixture and part-based offsets.

- Assessment Plan
  - Assessment Tool: Outcome-related multiple-choice and short-answer mid-term questions
  - Assessment Date: Fall 2025
  - Course section(s)/other population: All sections
  - Number students to be assessed: All students
  - 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

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)
	2023, 2022	2022

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

# of students enrolled	# of students assessed
30	28

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.

The two students in Blackboard that were not assessed were the lab technicians for the class.

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 final exams from Winter 2022, Summer 2022, and Winter 2023 were used.

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

A mix of multiple-choice, fill-in-the-blank, and short answer questions were used for theory-based questions in combination with a robot program that the students needed to complete and fill in missing information.

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>No</u>
Based on the data compiled, 64.29% of the total students assessed (18/28) scored either 70% or higher. The theory-based questions students seemed to mostly excel but had problems with applying the same knowledge to an actual robot program. The standard of success was not met since the majority of the applicable questions for this outcome were based on the robot program.

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

Most students did quite well with the theory-based questions for utilizing fixture-based offsets.

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.

Many students had troubles with implementing those same fixture-based offsets when asked to do so with a robot program.

Outcome 2: Interpret and apply nested loops and shifting offsets in a robot program.

- Assessment Plan
    - Assessment Tool: Outcome-related short-answer mid-term exam questions
    - Assessment Date: Fall 2025
    - Course section(s)/other population: All sections
    - Number students to be assessed: All students
    - 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

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)
	2023, 2022	2022

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

# of students enrolled	# of students assessed
30	28

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.

The two students in Blackboard that were not assessed were the lab technicians for the class.

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 final exams from Winter 2022, Summer 2022, and Winter 2023 were used.

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

A robot program that students needed to analyze and complete was used to assess this outcome.

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
Based on the data compiled, 71.43% of the total students assessed (20/28) scored either 70% or higher. Students were asked to complete a Fanuc robot program. Most students were able to set up the loops in the correct order to control the direction of travel but several students switched the offset distances. This would be an easy fix to notice and change if you were running the program on the robot.

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

Many students did quite well with setting up the nested loops so that the program was controlled in the correct order.

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.

Several students had an issue with flipping the offset distances for those same directions. This would be an easy thing to catch and fix if we had run the programs on a robot.

Outcome 3: Recognize the components of input/output (I/O) types and identify the information needed for correct configuration.

- Assessment Plan
    - Assessment Tool: Outcome-related final exam questions
    - Assessment Date: Fall 2025
    - Course section(s)/other population: All sections
    - Number students to be assessed: All students
    - 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

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

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

# of students enrolled	# of students assessed
30	28

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.

The two students in Blackboard that were not assessed were the lab technicians for the class.

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 final exams from Winter 2022, Summer 2022, and Winter 2023 were used.

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

A mix of multiple-choice, fill-in-the-blank, and short answer questions were used to assess this outcome.

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
Based on the data compiled, 100% of the total students assessed scored either 70% or higher. Students were asked several questions about Input & Output types and configuration data needed, as well as given schematics where they had to identify Input & Output configuration data for.

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

Students did an extremely good job of identify input and output types as well as their configuration data.

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.

Several students did have issues with identifying input and output wiring points on Fanuc since many robots and documents identify the first input or output as wiring point 0, whereas Fanuc uses 1 for the configuration data, but 0 for the wiring point.

Outcome 4: Demonstrate methods for integrating an industrial robot with a programmable logic controller (PLC).

- Assessment Plan
    - Assessment Tool: Outcome-related final exam questions
    - Assessment Date: Fall 2025
    - Course section(s)/other population: All sections
    - Number students to be assessed: All students
    - 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

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)
	2023, 2022	2022

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

# of students enrolled	# of students assessed
30	28

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.

The two students in Blackboard that were not assessed were the lab technicians for the class.

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 final exams from Winter 2022, Summer 2022, and Winter 2023 were used.

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

A mix of multiple-choice, fill-in-the-blank, and short answer questions were used to assess this outcome.

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
Based on the data compiled, 75% of the total students assessed (21/28) scored either 70% or higher. Most of this outcome utilized short answer questions where students needed to write parts of a program to demonstrate different scenarios for how a programmable logic controller would integrate with an industrial robot. Students were also asked to analyze a program and identify how it helped with integrating an industrial robot.

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

Students did an excellent job at identifying how to use world zones and reference positions as well as implementing group inputs and outputs to control a robot.

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.

When utilizing fixture request logic with the robots, several students were able to correctly identify when to use a request to enter, but many students forgot to put in requests to leave for those same applications.

Outcome 4: Demonstrate methods for integrating an industrial robot with a programmable logic controller (PLC).

- Assessment Plan
    - Assessment Tool: Student achievement checklist
    - Assessment Date: Fall 2025
    - Course section(s)/other population: All sections
    - Number students to be assessed: All students
    - How the assessment will be scored: Departmentally-developed rubric
    - 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

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)
	2023, 2022	2022

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

# of students enrolled	# of students assessed
30	0

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.

This method of assessment was not used because there is not enough integrated equipment in the lab to complete a hands-on final. We plan to fix this in the future by creating more integrated manufacturing systems.

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.

This method of assessment was not used because there is not enough integrated equipment in the lab to complete a hands-on final. We plan to fix this in the future by creating more integrated manufacturing systems.

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

This method of assessment was not used because there is not enough integrated equipment in the lab to complete a hands-on final. We plan to fix this in the future by creating more integrated manufacturing systems.

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: No
This method of assessment was not used because there is not enough integrated equipment in the lab to complete a hands-on final. We plan to fix this in the future by creating more integrated manufacturing systems.

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

Students did an excellent job at identifying how to use world zones and reference positions as well as implementing group inputs and outputs to control a robot.

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.

When utilizing fixture request logic with the robots, several students were able to correctly identify when to use a request to enter, but many students forgot to put in requests to leave for those same applications.

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.

No previous assessment report exists for the ROB 212 course.

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?

This second level robotics course serves its purpose of helping students understand how to integrate industrial robots with larger work cell systems. One thing that was surprising to notice was that students where having more issues with identifying how to utilize a fixture-based offset when I would have thought the nested loops would have been the area of struggle for most.

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

We will be sharing the report with other AMT faculty during our next department meeting.

4. Intended Change(s)

Intended Change	Description of the change	Rationale	Implementation Date
Course Assignments	To help correct for the deficiencies in Outcome 1, we will be changing some of the later labs in the class to require more switching of offset data to give students practice applying fixture-based offsets.	Outcome 1's standard of success was not met.	2024

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

We do still plan to implement the second assessment for Outcome 4 in the future as the lab continues to be updated.

III. Attached Files

ROB 212 Assessment Data
ROB 212 Final Exam Key

Faculty/Preparer: Sean Martin **Date:** 08/23/2023
Department Chair: Allan Coleman **Date:** 08/24/2023

Dean: Jimmie Baber **Date:** 08/28/2023

Assessment Committee Chair: Jessica Hale **Date:** 06/09/2024