

Course Assessment Report  
Washtenaw Community College

Discipline	Course Number	Title
Chemistry	105	CEM 105 08/09/2021- Fundamentals of Chemistry
College	Division	Department
	Math, Science and Engineering Tech	Chemistry
Faculty Preparer		Kathleen Butcher
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 the concepts and principles of general chemistry relating to matter, energy, fundamental measurements, stoichiometry, electronic structure, periodic properties, chemical bonding, energy and heat, intermolecular forces, acids/bases and redox reactions.

- Assessment Plan
  - Assessment Tool: ACS exam
  - Assessment Date: Winter 2017
  - 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: 75% of students will score at or above the national average on the exam.
- 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)
	2021	

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

# of students enrolled	# of students assessed
25	23

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.

Section 01: 11 students assessed  
 Section 02: 12 students assessed  
 Though more students were initially enrolled in each section, the number assessed represents the students who were still actively attending the classes.

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.

Only two sections of CEM 105 ran in Winter 2021.  
 All sections were completely virtual due to Covid-19.

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

The tool is attached. The final assessment had 26 questions covering outcomes 1 and 3.

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

87% of all students (20/23) assessed achieved a 70% or better on this assessment. The standard of success outlined in the master syllabus states: 75% of students will score a 70% or higher. The standard of success was met.

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

Outcome 1 directly measures the ability of students to learn and apply the foundational concepts in chemistry. Without these basic fundamentals, students would struggle to understand additional concepts and be unable to successfully perform laboratory skills and calculations (see outcomes #2 and #3). Given that students not only met the standard of success, but exceeded it, I feel very confident that this outcome is meeting the students' needs.

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.

For this outcome, given that the standard of success was met and the language is clear and concise, I don't feel there is much need for change or improvement for Outcome #1. I will continue to review additional ways to add and improve on these concepts so that there is continuous student success.

Outcome 2: Perform laboratory procedures related to stoichiometry, electronic structure, periodic properties, chemical bonding, energy and heat, intermolecular forces and physical properties of substances.

- Assessment Plan
    - Assessment Tool: Lab Reports
    - Assessment Date: Fall 2017
    - Course section(s)/other population: All sections
    - Number students to be assessed: Random sample of 25% of students in each section.
    - How the assessment will be scored: Departmentally-developed rubric
    - Standard of success to be used for this assessment: 75% of the students assessed will score 6 out of 9 or higher on the lab report.
    - 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)
	2021	

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

# of students enrolled	# of students assessed
25	23

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 total represents the number of students actively participating in the course by the last day of 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.

Due to Covid-19, all classes were completely virtual. There was one day section (01) and one evening section (02).

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

As the class sizes were relatively small, I decided to use all students' lab reports rather than a 25% sampling.

The lab reports we analyzed using a rubric which is the same as the rubric used for most Chemistry courses here at WCC. A 9-point system is used. The rubric considers: lab format (1pt.), data collection (2 pt.), calculations (2 pt.), significant figures (2 pt.), and finally results and conclusion (2 pt.).

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, 22 out of 23 students (96%) scored a 6 or higher on the lab report, with the overall average being 8.4 (92%). Given these results, the standard of success was met and exceeded.

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

Outcome #2 directly measures laboratory skills for chemistry students. This is an essential and required skill to be able to successfully navigate further chemistry courses and pursue a career in chemistry. The standard of success was met for this outcome. I am very pleased with 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.

Laboratory skills and exercises are constantly changing and being improved upon. While the standard of success was met, we as a department will continue to review, change, and improve upon the lab aspect of the course.

Outcome 3: Apply the basic concepts to calculate stoichiometric quantities; determine electron configurations and predict trends in periodic properties; draw Lewis Structures and predict molecular shape and properties; calculate temperature, pressures, volumes or amounts of gases; analyze intermolecular forces of substances and predict properties.

- Assessment Plan
  - Assessment Tool: ACS exam
  - Assessment Date: Winter 2017
  - 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: 75% of students will score at or above the national average on the exam.
  - 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)
	2021	

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

# of students enrolled	# of students assessed
25	23

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.

Section 01: 11 students assessed

Section 02: 12 students assessed

Though more students were initially enrolled in each section, the number assessed represents the students who were still actively attending the classes.

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.

Only two sections of CEM 105 ran in Winter 2021.

All sections were completely virtual due to Covid-19.

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

The tool is attached. The final assessment had 26 questions covering outcomes 1 and 3.

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, 20 out of 23 students (87%) scored a 75 or higher on the assessment exam. The average score overall was 80.2. The standard of success was met and exceeded.

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

Performing calculations is critical for students to be successful in chemistry. This outcome represents the application and analysis of data and chemical concepts that are critical for understanding and moving forward; both in higher courses and a potential career. Students met the standard of success. Given the inherent difficulty with math and calculations, this is always the most challenging aspect of the course. We, as a department, allocate a lot of our resources and time to work on improving these skills. I am very pleased that students seem to be learning these concepts at the appropriate level.

- 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.

While the standard of success was met, multi-step problems continue to be difficult for some students and we want to continue to address how best to teach and assess these skills. Likewise, figuring out how to offer these students additional resources and/or tutoring to improve upon these skills is an ongoing conversation.

### III. Course Summary and Intended Changes Based on Assessment Results

- 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.

NA - CEM 105 had no previous assessment.

- 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?

Overall, since all the outcomes standards of success were met, the course and its outcomes seem to be meeting the students' needs. Likewise, since these students' move on into additional CEM courses, we have additional assessment data from courses in the sequence (CEM 140, CEM 111) that show that students understand the content and are being successful in the upper courses.

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

A formal C&A report will be filed with the Committees and the results of the assessment will be discussed at a departmental meeting.

- Intended Change(s)

Intended Change	Description of the change	Rationale	Implementation Date
Assessment Tool	Develop alignment between outcomes and test questions.	To be able to retrieve outcome-specific assessment data, which may yield additional insight.	2022

Course Materials (e.g. textbooks, handouts, on-line ancillaries)	Offer additional resources and/or tutoring related to multi-step problems	Based on the current assessment, multi-step problems are difficult for students.	2022
Course Materials (e.g. textbooks, handouts, on-line ancillaries)	Continue to review, change and improve upon the lab aspect of the course.	To ensure students engage with current and relevant laboratory skills and exercises.	2022

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

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### III. Attached Files

- [Assessment Exam](#)
- [Assessment data outcomes 1 and 3](#)
- [Assessment exam answer key](#)
- [Assessment rubric](#)
- [Outcome 2 data sheet - updated](#)

**Faculty/Preparer:** Kathleen Butcher **Date:** 09/03/2021  
**Department Chair:** Tracy Schwab **Date:** 09/09/2021  
**Dean:** Victor Vega **Date:** 09/13/2021  
**Assessment Committee Chair:** Shawn Deron **Date:** 12/02/2021