

## Program-Level Assessment: Annual Report

Program Name (no acronyms): Chemistry MS	Department: Chemistry
Degree or Certificate Level: Graduate	College/School: Science & Engineering
Date (Month/Year): September 2022	Assessment Contact: Marvin Meyers
In what year was the data upon which this report is based collected? 2021-2022	
In what year was the program's assessment plan most recently reviewed/updated? 2018	
Is this program accredited by an external program/disciplinary/specialized accrediting organization? No	

### 1. Student Learning Outcomes

Which of the program's student learning outcomes were assessed in this annual assessment cycle? (Please list the full, complete learning outcome statements and not just numbers, e.g., Outcomes 1 and 2.)

This is Year 2 of a three year cycle. The Outcomes 1, 2, 4 and 5 were evaluated according to the program assessment plan.

Outcome 1: Demonstrate advanced level knowledge in both (i) synthesis and materials chemistry and (ii) analytical and physical chemistry methods, with a higher level of knowledge expected in the student's area of focus.

Outcome 2: Use standard search tools and retrieval methods to obtain information about a topic, substance, technique, or an issue relating to chemistry and assess relevant studies from the chemical literature.

Outcome 3: Communicate scientific findings from literature and original findings from the student's own advanced research in written publications and oral presentations.

Outcome 4: Acquire the basic tools, including chemical practices and theories, needed to conduct advanced chemical research. Students will become proficient in their specialized area of chemistry and complete an advanced research project.

Outcome 5: Adhere to accepted ethical and professional standards in chemistry.

### 2. Assessment Methods: Artifacts of Student Learning

Which artifacts of student learning were used to determine if students achieved the outcome(s)? Please describe the artifacts in detail and identify the course(s) in which they were collected. Clarify if any such courses were offered a) online, b) at the Madrid campus, or c) at any other off-campus location.

For Outcome 1, using a scale of 1 to 4 (1 = Poor, 2 = Fair, 3 = Good, 4 = Excellent), a rubric on the student's "Mastery of Chemical Concepts and Knowledge of the Chemical Literature" for the MS final defense was used.

For Outcome 2, the overall score out of 100 points on a rubric for the research paper from CHEM 5470 Medicinal Chemistry was used. Criteria used for assessment was as follows:

>90% Exceeds expectations

70 - 89% Meets expectations

65 - 69% Approaching expectations

<65% Not meeting expectations

For Outcome 4, using a scale of 1 to 4 (1 = Poor, 2 = Fair, 3 = Good, 4 = Excellent), the overall score on the rubric for the MS Thesis was used.

For Outcome 5, this outcome was not assessed due to lack of a tool rubric to assess ethical considerations in the MS Thesis (not currently a requirement in the MS thesis)

No courses were offered online. Madrid does not have a graduate program in Chemistry.

### 3. Assessment Methods: Evaluation Process

What process was used to evaluate the artifacts of student learning, and by whom? Please identify the tool(s) (e.g., a rubric) used in the process and **include them in/with this report document** (please do not just refer to the assessment plan).

Rubrics were used for all artifacts. These were completed by instructors for course work (Outcome 2), and MS research mentors (Outcomes 1 and 4).

### 4. Data/Results

What were the results of the assessment of the learning outcome(s)? Please be specific. Does achievement differ by teaching modality (e.g., online vs. face-to-face) or on-ground location (e.g., STL campus, Madrid campus, other off-campus site)?

For Outcome 1, using a scale of 1 to 4 (1 = Poor, 2 = Fair, 3 = Good, 4 = Excellent), a rubric on the student's "Demonstrate advanced level of knowledge..." for the MS final defense was used.

Individual student scores: 4,2,2. Avg = 2.7; Median = 2

Assessment of Outcome 1: Note that this is a limited sample size as our MS program only graduated 3 students in the past year. Two of the students were rated as "fair" which is equivalent to approaching expectations. In one of these situations, the student had failed our comprehensive exams (PhD program), which assess overall knowledge, and elected to complete their MS. The other student also struggled to complete their MS in a timely fashion. This highlights the need to ensure that we are admitting students whom have the background to successfully complete our advanced graduate coursework prior to arrival or provide additional supports to identify gaps in knowledge and implement remedial coursework to address.

For Outcome 2, the overall score out of 100 points on a rubric for the research paper from CHEM 5470 Medicinal Chemistry was used. Criteria used for assessment was as follows:

	>90% Exceeds expectations	70 - 89% Meets expectations	65 - 69% Approaching expectations	<65% Not meeting expectations
Total number in category	1	0	0	0

Assessment of Outcome 2: Only one student outcome to assess which exceeded expectations.

For Outcome 4, using a scale of 1 to 4 (1 = Poor, 2 = Fair, 3 = Good, 4 = Excellent), the overall score on the rubric for the MS Thesis was used.

Student	Thesis format	Background Knowledge	Presentation of Advanced Research	Written Communication
1	4	3	3	3
2	3	3	2	3
3	3	2	3	2

Assessment of Outcome 4: Only 3 students to assess with one strong student meeting our expectations and the other two approaching/meeting our expectations. These are the same two students as assessed in Outcome 1, both being weaker students whom we need to identify earlier in our program to provide assistance for improved outcomes (see Section 5 below).

For Outcome 5, this outcome was not assessed due to lack of a tool rubric to assess ethical considerations in the MS Thesis (not currently a requirement in the MS thesis)

## 5. Findings: Interpretations & Conclusions

What have you learned from these results? What does the data tell you?

Some of our MS students did not fully meet our expectations in terms of knowledge (Outcome 1) and research (Outcome 4). It is difficult to make generalizations based on a sample size of only 3 students, but it does warrant consideration about how to better assess incoming students and provide the supports that they may need entering our program rather than later in the program.

## 6. Closing the Loop: Dissemination and Use of Current Assessment Findings

A. When and how did your program faculty share and discuss these results and findings from this cycle of assessment?

The results and findings were shared with faculty by email and discussed in our dept administrative meeting.

B. How specifically have you decided to use these findings to improve teaching and learning in your program? For example, perhaps you've initiated one or more of the following:

Changes to the Curriculum or Pedagogies

- Course content
- Teaching techniques
- Improvements in technology
- Prerequisites

- Course sequence
- New courses
- Deletion of courses
- Changes in frequency or scheduling of course offerings

Changes to the Assessment Plan

- Student learning outcomes
- Artifacts of student learning
- Evaluation process

- Evaluation tools (e.g., rubrics)
- Data collection methods
- Frequency of data collection

Please describe the actions you are taking as a result of these findings.

We are reviewing our program to identify improvements which could be made to identify knowledge weaknesses in students earlier in their program. Proposed changes will be discussed with faculty over the course of the fall semester.

If no changes are being made, please explain why.

N/A

## 7. Closing the Loop: Review of Previous Assessment Findings and Changes

A. What is at least one change your program has implemented in recent years as a result of assessment data?

We have not made any specific changes to our program as our assessment data consistently shows that our students are meeting and exceeding expectations on our outcomes.

B. How has this change/have these changes been assessed?

N/A

C. What were the findings of the assessment?

N/A

D. How do you plan to (continue to) use this information moving forward?

We will continue to monitor the progress of our students and as areas of concern arise, we will make adjustments to address issues.

**Rubrics used for graduate program assessments:**

2<sup>nd</sup> Year Update Rubric: <https://docs.google.com/document/d/1RXVwF5b-nRw5W6gkfeOYZf2s9MVFjuR1/edit?usp=sharing&oid=115269951254626488709&rtpof=true&sd=true>

MS Thesis Rubric:

[https://docs.google.com/document/d/1nS2J8Wt18Pf9WkI9rKCeTvqz\\_tjQXxSI/edit?usp=sharing&oid=115269951254626488709&rtpof=true&sd=true](https://docs.google.com/document/d/1nS2J8Wt18Pf9WkI9rKCeTvqz_tjQXxSI/edit?usp=sharing&oid=115269951254626488709&rtpof=true&sd=true)

MS Final Defense Rubric:

[https://docs.google.com/document/d/1T4TfCKYtxBW\\_sWna4KlucHUxObTgRNiS/edit?usp=sharing&oid=115269951254626488709&rtpof=true&sd=true](https://docs.google.com/document/d/1T4TfCKYtxBW_sWna4KlucHUxObTgRNiS/edit?usp=sharing&oid=115269951254626488709&rtpof=true&sd=true)

CHEM 5470 Medicinal Chemistry Research Paper Rubric:

<https://drive.google.com/file/d/1COLIqVK9SpH9bx0PrwHPuQdiuOgqJ3Wt/view?usp=sharing>