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 3** of a three year cycle. The Outcomes 3 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 in written publications and oral presentations.**

Outcome 4: Apply learned chemical practices and theories to proposed problems.

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 3, 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 5, we currently do not have a mechanism for assessment as these students do not normally take CHEM 5000 where research ethics are addressed.

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 tools(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.

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 2, only 1 MA students enrolled in courses identified in our assessment plan 2020-2023. That student exceeded expectations.

For Outcome 5, we devote a class period in CHEM-5000, our introductory research course, devoted to discussion of research ethics. Students are given real world examples as pre-reading, preparing them to participate in discussion. The only student in this cohort did participate in this discussion as they started out in the MS/PhD program but switched to the MA program.

5. Findings: Interpretations & Conclusions
What have you learned from these results? What does the data tell you?

The MA program is generally for part-time students who may be far removed from their undergraduate courses and have obligations in terms of work and/or family that impact their preparation for courses. Due to the small number of students in this program, it is difficult to do detailed breakdowns. We typically see variations in achievement for these students.

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 communicated via the department’s Microsoft Teams meeting portal and opened for discussion online and in the department faculty 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

- Changes to the Assessment Plan
  - Student learning outcomes
  - Artifacts of student learning
  - Evaluation process

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

  • 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 will develop a mechanism to assess research ethics (outcome 5) by incorporation into CHEM-5980 Graduate Reading which typically is taken in the last semester of the MA program.

If no changes are being made, please explain why.

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 based solely on the assessment data for the MA program.

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?
   N/A
# CHEM-5470 Research Paper Rubric

<table>
<thead>
<tr>
<th>Standards</th>
<th>5 - 4 Exemplary</th>
<th>3 - 2 Satisfactory</th>
<th>1 - 0 Weak</th>
<th>Score</th>
<th>Weight</th>
<th>Total Score</th>
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<tbody>
<tr>
<td><strong>Introduction</strong></td>
<td>Provides background research into the topic and summarizes important findings</td>
<td>Provides background research into the topic and</td>
<td>Provides background research into the topic but does not</td>
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<td></td>
<td>from the review of the literature; describes problem to be solved; explains the</td>
<td>describes the problem to be solved; insufficient or</td>
<td>describe the problem to be solved; insufficient or</td>
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<td></td>
<td>significance of the problem to an audience of non-specialists</td>
<td>non-existent explanation of details to non-specialists</td>
<td>non-existent explanation of details to non-specialists</td>
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<tr>
<td><strong>Integration of</strong></td>
<td>Discusses at least four topics covered during the course. Demonstrates full</td>
<td>Discusses three topics covered during the course.</td>
<td>The paper does not demonstrate that the author has fully</td>
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<tr>
<td>Knowledge</td>
<td>understanding and application of concepts learned in course. Chemical detail of</td>
<td>Demonstrates satisfactory understanding and application</td>
<td>understood and applied concepts learned in the course.</td>
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<td><strong>Discussion</strong></td>
<td>structures and discussion is accurate.</td>
<td>of concepts learned in course. Chemical detail of</td>
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<td><strong>Depth</strong></td>
<td>Paper presents a complete story of the discovery of the selected drug, including</td>
<td>Paper presents a partial story of the discovery of the</td>
<td>Incomplete coverage of discovery.</td>
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<td>medical need, biological target or assay, medicinal chemistry optimization, and</td>
<td>selected drug.</td>
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<td>development.</td>
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<td><strong>Cohesiveness</strong></td>
<td>Addresses the topic with clarity; organizes and synthesizes information; and</td>
<td>Addresses the topic; lacks substantive conclusions;</td>
<td>Presents little to no clarity in formulating conclusions</td>
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<td></td>
<td>draws conclusions</td>
<td>sometimes digresses from topic of focus</td>
<td>and/or organization</td>
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<td><strong>Summary</strong></td>
<td>Presents a summary of the topic with clear recommendations and/or implications</td>
<td>Presents a summary of the topic</td>
<td>Missing or does not summarize the topic</td>
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<td>for future research</td>
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<td><strong>Mechanics and</strong></td>
<td>Is free or almost free of errors of grammar, spelling, and writing mechanics;</td>
<td>Has errors but they don’t represent a major</td>
<td>Has errors that obscure meaning of content or add</td>
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<td>documentation**</td>
<td>appropriately documents sources (ACS style)</td>
<td>distraction; documents sources</td>
<td>confusion; neglects important sources or documents few</td>
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<td>to no resources</td>
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Adapted from Dorothy Mitstifer, https://rubrics.kon.org