

# Program Plan and Findings: Four Column Layout



## Program (CAS) - CHEM - Chemistry (PhD) - 046

**Program Mission Statement:** The Department of Chemistry at Oklahoma State University: promotes the advancement and dissemination of knowledge that is central to many science reliant degree programs both within A&S and across College lines; nurtures the growth of future scientists through undergraduate and graduate research; supports creative endeavors in innovative instruction paradigms and scientific research by faculty and staff; enriches civilization by contributing to education and new technological developments.

### Program Information

*2019 - 2020*

#### Program Information

**Assessment Coordinator's Name:** Jacinta Mutambuki, Ph.D.

**Assessment Coordinator's E-mail Address:** Jacinta.mutambuki@okstate.edu

**Number of Students Enrolled in the Program:** 66

**Total Number of Students Graduated:** 9

**Number of Student Graduates from Stillwater Campus:** 9

**Number of Student Graduates from Tulsa Campus:** 0

**Were university assessment funds used by the department/program for assessment activities?:** Yes

**If yes, describe how funds were used and the contribution the funds had on the assessment process:** The funds were used to pay salary for a graduate student to help with analyses of student artifacts. The assessment GTA was able to analyze over 160 student artifacts.

### Annual Executive Summaries

*2019 - 2020*

**Program Assessment Coordinator:** Jacinta Mutambuki, Ph.D.

#### Plan Review and Approval

**Date Current Plan Was Reviewed and Approved:** 04/14/2016

**Date of Future Plan Review and Approval:** 04/14/2021

#### Summary of Assessment Findings

**Describe overall assessment findings and faculty members' interpretation of the assessment results:** Assessment of the PhD students on the three addressed SLOs, namely: Oral communication C2 : Oral communication skills, Oral communication C2 : Oral communication skills, and Teaching Skills C5 revealed that the program is adequately preparing students toward their degree pathway. Specifically, all the learning outcomes were met, with over 80% of the students assessed demonstrating

proficiency in Oral Communication Skills, Writing Communication skills, and Teaching skills. Results on "Oral and Writing communication skills" showed that the students are developing the expected skills as they progress through the program. The nine successful dissertation defenses are also good indicators of the successful progression and demonstration of excellent oral and written communication skills. Importantly, results revealed that most PhD students in the program who served as GTAs during 2019-2020 academic year demonstrated excellent teaching skills on all the teaching dimensions assessed. However, we noted potential areas of improvement in which a few individual students demonstrated insufficient skill sets specific. For instance, for Oral Communication skills, results suggested that some students demonstrated limited delivery techniques and difficulties in answering questions sufficiently. Based on the adopted OSU's Teaching Evaluation Survey, results showed that some GTAs will need to improve on specific teaching dimensions reported herein to better prepare them for current teaching assignments and future teaching positions or mentoring opportunities. Therefore, thorough training and experiential learning will be critical to help the GTAs develop concrete experiences and the necessary proficient skills. While improvements are expected to happen as the GTAs gain more teaching experiences and take continue to take chemistry courses and engagement in the research experiences, it might be worthwhile to start a formalized teaching development program for the GTAs where they could learn effective teaching strategies to improve their teaching approaches. In summary, the chemistry PhD program is adequately preparing doctoral students on the relevant training skills and experiences.

**Dissemination of Findings**

**Describe the individual(s) or committee responsible for reviewing and interpreting assessment data:** Drs. Jacinta Mutambuki and Christopher Fennell.

**Describe the process for sharing and discussing assessment findings with program faculty:** The findings will be shared with the chair who, in turn, will coordinate for a meeting with faculty to disseminate the findings. The Assessment Committee will then present the findings during the meeting.

**Program Improvements Based on Assessment**

**Based on data collected this year, what changes are being considered or planned for the program?:** Faculty discussions of the key findings reported herein will provide insights into the next steps for improving the programs.

**Based on this year's findings, what (if any) changes are planned for the assessment process?:** For assessment of the GTAs' Teaching Skills, we note that while the original assessment plan was to administer a supervisor evaluation survey in which the GTAs are assessed by their course supervisor. The Assessment Committee piloted the survey during spring 2020; however, the data were not representative to allow for statistical analysis. Importantly, the data revealed necessary modifications of the survey items. The assessment committee will refine the survey for administration during the 2020-2021 assessment period.

Given the current Assessment Committee members have less than two years of experience in assessing the program, the process has been helpful in identifying areas of improvements on both the articulated SLOs and the corresponding assessment tools. Unfortunately, some modifications are need to revise the SLOs and modify the assessment tools for better measurable and achievable outcomes.

**Describe the process for implementing these changes/planned program improvements:** For the new Teaching Evaluation Survey, the Assessment Committee will review the collected responses and reach out to faculty for insights on what other observable behaviors could be measured to help them provide constructive feedback and effective mentoring to the GTAs they supervise.

The Assessment Committee will plan a meeting with the Assessment advisors or council to discuss potential revisions on the SLOs and some of the assessment plans.

**Program Improvements Made in the Last Year:** Assessment Measure Improvements

**"Other" Improvements:** N/A

**Goals for the Coming Year:** Collect quality data and come up with effective assessment plans for assessing many of the SLOs that end up unaddressed due to lack of better assessment plans or tools.

**Is this Summary Report Complete?:** Yes

**List all individuals associated with this report preparation:** Dr. Jacinta Mutambuki and Dr. Christopher Fennell.

<i>Outcomes</i>	<i>Assessment Methods</i>	<i>Findings</i>	<i>Use of Findings (Actions)</i>
<b>Oral communication - C2 :</b> Oral communication skills: Program graduates will be able to apply the	Faculty used a rubric (see end of this document) that had been developed during the 2014 – 2015 academic	<b>Reporting Period:</b> 2019 - 2020 <b>Conclusion:</b> 3 - Meets Program Expectations (Proficient) Assessment of this SLO was applied for CHEM 5011, 6011,	<b>Use of Findings (Actions):</b> Current results imply that thorough training and practice on "Handling

Outcomes	Assessment Methods	Findings	Use of Findings (Actions)
<p>scientific method and effectively communicate their scientific findings in oral presentations in a formal professional environment.</p> <p><b>Outcome Status:</b> Active</p> <p><b>Planned Assessment Year:</b> 2016 - 2017, 2018 - 2019, 2019 - 2020, 2020 - 2021</p> <p><b>Start Date:</b></p> <p><b>Archived Date:</b></p> <p><b>Outcome Type:</b> Skills</p> <p><b>Reason for Archival:</b></p>	<p>year. The rubric identified four characteristics: Organization, Delivery, Subject Knowledge, and Ability to answer questions. Both students enrolled in the course and faculty attending the seminar completed the rubric. Following each seminar completed rubric responses were collected and used in a conference with the student to identify strengths and weaknesses in the presentation.</p> <p><b>* Learning Outcome</b></p> <p><b>Goal/Benchmark:</b> Since the 5011 is a course taught by a faculty member the goal is determined by the faculty member responsible for the class. All feedback is collected and used in the conference with the student to identify their strengths and weaknesses.</p> <p><b>Timeline for Assessment:</b> Yearly</p> <p><b>Other Assessment Type:</b></p>	<p>and Dissertation defense. For CHEM 5011 and 6011 seminar presentations, faculty evaluations of individual student presentations were utilized for analyses. Completed a Writing and Presentations Skills survey included in the appendix (Table 1). The survey comprises seven dimensions: Critical Thinking, Quality of Information, Organization, Organization, Grammar and Spelling, Visual Design, Oral Presentation, and Handling of Questions. These dimensions were measured on a Likert Scale (1 = poor to 5 = Excellent). Responses were collected and used in a conference with each student enrolled in CHEM 5011 and CHEM 6011 to identify strengths and weaknesses from their presentation. A total of 24 faculty completed surveys for 8 unique students enrolled in CHEM 5011 and CHEM 6011. For SLO: Oral communication C2, data on four relevant dimensions to the SLO were extracted and analyzed separately. The dimensions included: "Critical thinking", "Quality of information", "Oral presentation", and "Handling of questions". An average of the rated scores was computed to establish if students met the learning outcome.</p> <p>Results showed that the overall mean rating score of the four dimensions assessed was 3.5 out of 4 which exceeds the expected mean rating score by 0.5 for this learning outcome. Specifically, about 88% of the assessed students demonstrated oral communication skills above the expectation. Although all the mean rating scores for each dimension were either slight above or higher than the expected mean rating score, 3.0, mean scores, low mean scores were noted on "Handling of questions"—3.15 and "Oral presentation"— 3.26, whereas high mean rating scores were recorded on "Quality of information"—3.81 and "Critical thinking"— 3.71. A summary of the Oral Communication Skills results is presented in Figure 1—the blue bars. (09/12/2020)</p> <p><b>Number of Students Assessed:</b> 17</p> <p><b>Number of Successful Students:</b> 16</p> <p><b>How were students selected to participate in the assessment of this outcome?:</b> Survey responses assessing all students enrolled in CHEM 5011 and 6011 were considered. Additionally, all PhD candidates who graduate</p>	<p>of questions" and "Oral presentation" are needed to improve student performance in these areas. (09/12/2020)</p>

Outcomes	Assessment Methods	Findings	Use of Findings (Actions)
	<p><b>Rating of Skills</b> - Assessment of this SLO were applied for CHEM 5011, 6011, and Dissertation defense. For CHEM 5011 and 6011, Faculty used a revised version of a rubric (see end of this document) that had been developed during the 2014 – 2015 academic year. The rubric included seven categories: Critical Thinking, Quality of Information, Organization, Organization, Grammar and Spelling, Visual Design, Oral Presentation, and Handling of Questions. Both students enrolled in 5011 course and faculty attending the seminar completed the rubric. Following each seminar completed, rubric responses were collected and used in a conference with the student to</p>	<p>were included in assessing this outcome. There were a total of 8 students enrolled in CHEM 5011 and 6011 during 2019-2020. A total of 9 candidates also graduated during this period.</p> <p><b>What do the findings suggest about student achievement of this learning outcome?:</b> A mean rating score of 3.5 suggests that the learning outcome was proficiently met. Overall, students’ oral communication skills were “quite Good” but not “Excellent”. For “Quality information”, most students sufficiently covered the topic of interest and provided sufficient supporting details. For “Critical thinking”, most students (6 out of 8) demonstrated thoughtful and accurate presentation and justification of results. Results also suggest that some students demonstrated limited delivery techniques and difficulties in answering questions sufficiently; thus, thorough training and practice on the latter two dimensions are needed to improve student performance in these areas.</p> <p><b>Related Documents:</b>  <a href="#">CHEM 5011-6011 Presentation Evaluation Rubric.doc</a>  <a href="#">PhD SLOs Oral Communication and Writing Skills_Figure 1.pdf</a></p>	

Outcomes	Assessment Methods	Findings	Use of Findings (Actions)
	<p>identify strengths and weaknesses in the presentation. A total of 6 completed surveys for 5 unique students were collected and an average of the rated scores computed to establish if students met the Learning Outcome Goal/Benchmark.</p> <p><b>* Learning Outcome</b></p> <p><b>Goal/Benchmark:</b> 80% of students included in the assessment will receive at least a mean rating score of a 3 out of 4 on the rubric for CHEM 5011 and 6011 courses, and each PhD Candidate will obtain a passing score on the Dissertation defense. The latter Benchmark was considered an indicator for proficient Oral Communication Skills on the Dissertation defense.</p> <p><b>Timeline for Assessment:</b> Yearly</p> <p><b>Other Assessment Type:</b> Oral Presentation (Dissertation)</p> <p><b>Related Documents:</b></p> <p><a href="#">CHEM 5011-6011 Presentation Evaluation Rubric.doc</a></p>		
<p><b>Teaching Skills - C5:</b> Teaching Assistants (TAs) will demonstrate effective teaching skills, effective facilitation of laboratory activities, and execution of other TA assignments, such as grading, proctoring, and facilitating discussions outside classroom.</p> <p><b>Outcome Status:</b> Active</p> <p><b>Planned Assessment Year:</b> 2019 - 2020, 2020 - 2021, 2021 - 2022, 2022 - 2023, 2023 - 2024</p> <p><b>Start Date:</b> 01/13/2020</p> <p><b>Archived Date:</b></p>	<p><b>Supervisor Evaluation - TA</b></p> <p>Supervisors and the Laboratory Coordinators will fill out a TA Evaluation Survey to be administered at the conclusion of each semester to assess the TA's teaching effectiveness</p> <p><b>* Learning Outcome</b></p> <p><b>Goal/Benchmark:</b> 80% of the student TAs included in the assessment will receive a mean rating score of 4 out of 5 on the overall teaching effectiveness.</p> <p><b>Timeline for Assessment:</b> Yearly</p>		

Outcomes	Assessment Methods	Findings	Use of Findings (Actions)
<p><b>Outcome Type:</b> Skills <b>Reason for Archival:</b></p>	<p><b>Other Assessment Type:</b> <b>Survey</b> - OSU Teaching Evaluation Survey for Graduate Teaching Assistants <b>* Learning Outcome</b> <b>Goal/Benchmark:</b> 80% of the student TAs included in the assessment will receive a mean rating score of 4 out of 5 on the overall teaching effectiveness. <b>Timeline for Assessment:</b> Yearly <b>Other Assessment Type:</b></p>	<p><b>Reporting Period:</b> 2019 - 2020 <b>Conclusion:</b> 3 - Meets Program Expectations (Proficient) Chemistry GTAs are assigned to teach laboratory chemistry courses under the supervision of the instructor-of-record for the course. We note that while the original assessment plan was to include supervisor evaluations on the GTAs, for the first in assessing this learning outcome, we piloted the survey this semester and data that were collected are not representative to allow for statistical analysis. Importantly, the data revealed necessary modifications of the survey items to allow for measurable behaviors by the course supervisors and the primary instructors. Nevertheless, we capitalized on the OSU's Teaching Evaluation Survey to assess the teaching skills and effectiveness of the GTAs on their assignments. Therefore, the assessment of this SLO involved analyzing student evaluations of their assigned GTAs. The survey comprises six dimensions: Preparation and organization, Effort devoted, Presentation of the instructional material, Knowledge of the subject-matter, Ability to explain, and Positive attitude. These dimensions were measured on a Likert Scale (1 = Poor to 5 = Outstanding).</p> <p>Results showed that the overall mean rating score on GTAs' teaching effectiveness was <math>4.2 \pm 0.2</math> out of 5; thus, meeting the learning outcome. The overall mean ratings indicated that the GTAs demonstrated excellent teaching skills on all the categories; however, lower scores below 4.0 across all the categories were noted among 10 GTAs. A summary of the mean scores on individual teaching dimensions is presented in Figure 1 (Appendix). (09/12/2020)</p> <p><b>Number of Students Assessed:</b> 33 <b>Number of Successful Students:</b> 33 <b>How were students selected to participate in the assessment of this outcome?:</b> Survey responses from a total of 33 unique PhD students who served as GTAs and were evaluated during the 2019-2020 academic year were considered for analysis. <b>What do the findings suggest about student achievement of this learning outcome?:</b> Results suggest most GTAs are</p>	<p><b>Use of Findings (Actions):</b> Improvements are expected to happen as the GTAs gain more teaching experiences and take more chemistry courses or engage in research experiences. However, to catalyze the honing of the teaching skills and improve their teaching effectiveness, it might be worthwhile to start a formalized teaching development program for the GTAs in which they can learn effective teaching strategies. (09/12/2020)</p>

<i>Outcomes</i>	<i>Assessment Methods</i>	<i>Findings</i>	<i>Use of Findings (Actions)</i>
		<p>honing teaching skills around the six teaching dimensions assessed as expected during their training program. However, some GTAs will need to improve on specific teaching dimensions in preparation for future teaching positions or mentoring opportunities.</p> <p><b>Related Documents:</b> <a href="#">Chemistry PhD GTA Teaching Skills Results_Figure 1.pdf</a></p>	