Department of Chemistry: Master Assessment Plan

Assessment Coordinator: Emily Borda

Departmental Mission: The chemistry department contributes to Western Washington University’s mission by fostering lifelong learning in the chemical and biochemical sciences through exceptional classroom, laboratory, and research experiences. Students participating in our program will master content and develop critical thinking and communication skills that will help them be scientifically literate citizens and prepare them for professional careers as scientists, educators, and health professionals. Chemistry students, faculty and staff contribute to the scientific enterprise and broader community through outreach and a program of student-focused scholarship and research that strives to be the strongest of its kind in the nation.

Departmental Student Learning Outcomes: Upon graduation, majors will be able to

1. Understand and integrate fundamental chemical principles that unify all traditional and emerging areas of chemistry and biochemistry including:
   a. atomic theory
   b. molecular structure and bonding
   c. physical properties of molecules
   d. kinetics, thermodynamics and equilibrium
   e. reaction mechanisms
   f. chemical synthesis

2. Acquire detailed, in-depth knowledge from the traditional and emerging areas of chemistry and biochemistry and be able to integrate and apply these principles to solve complex scientific problems.

3. Acquire laboratory skills necessary to answer questions of chemical relevance, including:
   a. Understanding and demonstrating safe and effective laboratory practices.
   b. Understanding the theory behind and being able to interpret data generated by a variety of chemical instruments.
   c. Interpreting experimentally-generated data to reach a sound conclusion.
   d. Designing an experiment to answer a scientific question.

4. Connect the theory they learn in class with the experiments and procedures they perform in the lab.

5. Be able to critically analyze chemistry-related claims and connect chemistry-related ideas to everyday and societal contexts.

6. Develop effective quantitative reasoning skills.

7. Effectively communicate scientific information in written and oral forms.

8. Use primary literature to further their knowledge of advances in the fields of chemistry and biochemistry.

9. Work both individually and collaboratively with peers to advance the skills outlined above.

GUR Learning Outcomes:

1. Analyze and communicate ideas effectively in oral, written, and visual forms

2. Use quantitative and scientific reasoning to frame and solve problems
<table>
<thead>
<tr>
<th>Assessment Measures</th>
<th>SLO’s Assessed</th>
<th>Use of the Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Written research proposals in capstone courses</td>
<td>7, 8</td>
<td>Apply communication rubric developed by CUE. Identify 1-2 areas that can be improved.</td>
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<tr>
<td>2. Oral presentations in capstone courses</td>
<td>7</td>
<td>Apply communication rubric developed by CUE. Identify 1-2 areas that can be improved.</td>
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<tr>
<td>3. ACS exams (organic, p-chem)</td>
<td>1, 6</td>
<td>If possible, break down results into the 6 sub-categories under chem outcome 1 as well as itemizing those questions that require a range of quantitative skills, for outcome 6. Use these data to identify 1-2 areas that can be improved.</td>
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<tr>
<td>4. Online HW questions from general &amp; organic chem</td>
<td>1, 6, GUR comp. 3</td>
<td>ID HW questions related to each of the 6 sub-categories under chem outcome 1. Also ID questions that require a range of quantitative skills, for outcome 6. Require all instructors of 12X courses to incorporate these questions into their HW assignments. At the end of the year, meet regarding the aggregated data and identify 1-2 areas that can be improved.</td>
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<tr>
<td>5. Senior exit survey</td>
<td>1-9, GUR comp. 1,3</td>
<td>Ask students’ opinions of how well each program objective was reached in Likert Scale format. Compare with learning outcomes data above (#’s 3,4) to identify 1-2 areas that can be improved.</td>
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<tr>
<td>6. Alumni survey</td>
<td>1-9, GUR comp. 1,3</td>
<td>Ask graduates’ opinions of how well each program objective was reached in Likert Scale format. Compare with learning outcomes data above (#’s 3,4) to identify 1-2 areas that can be improved.</td>
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<td>7. Writing samples from WP courses + debriefing</td>
<td>7, GUR comp. 1</td>
<td>All instructors of WP courses during the academic year share 3-5 writing samples that exhibit a broad range of writing skills from their course with all faculty (or a sub-committee?). Using the writing rubric created by CUE, and/or other rubric(s) designed by chem faculty, the group analyzes these samples and identifies 2-3 strengths and 2-3 weaknesses.</td>
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<td>8. Instructor/TA observations of students during upper division labs</td>
<td>3, 4, 9</td>
<td>Instructors and/or TAs of upper division labs select 5-6 students, representing a range of abilities, to observe on the last day of lab, using a rubric developed by chem. faculty. These instructors then meet to identify 1-2 skills that can be improved.</td>
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<tr>
<td>9. Student work samples from advanced elective courses + debriefing</td>
<td>2, 5</td>
<td>Instructors of advanced elective courses that address competency 2 (chemistry &amp; society) during the academic year share 3-5 samples of student work (such as a final paper) that exhibit a broad range of abilities from their course with all faculty (or a sub-committee?). Using rubric created by chem faculty, the group analyzes these samples and identifies 2-3 strengths and 2-3 weaknesses.</td>
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