Please enter the appropriate information concerning your student learning assessment activities for this year.

Academic Year of Report: ___'12/'13__________ College:  __COTS___________
Department  _Chemistry_   Program:  _MS in Chemistry___

1. What student learning outcomes were assessed this year, and why?
In answering this question, please identify the specific student learning outcomes you assessed this year, reasons for assessing these outcomes, with the outcomes written in clear, measurable terms, and note how the outcomes are linked to department, college and university mission and goals.

The chemistry department assessed two student learning outcomes for the MS degree program this year as follows:

1. MS students will write and speak clearly in the language and style of the discipline.

2. MS students will practice health and safety protocols that are integral to the discipline.

These outcomes were chosen from the Assessment Plan because of the fundamental importance of both academic success and student safety.

2. How were they assessed?
In answering these questions, please concisely describe the specific methods used in assessing student learning. Please also specify the population assessed, when the assessment took place, and the standard of mastery (criterion) against which you will compare your assessment results. If appropriate, please list survey or questionnaire response rate from total population.

A) What methods were used?

Among the assessment methods specified in the MS degree assessment plan for the first outcome listed above, the following methods were chosen for their relevance to the outcome and the availability of data:

- Feedback on students’ written theses and oral defenses provided on evaluation forms completed by thesis committee members, and (for oral presentation only) members of the audience.
- Self-reported information obtained from MS student exit surveys and department records regarding publications and presentations at conferences.
- The Mean GPA and range for MS graduates over the period 9/2008 – 8/2013.

Due to the small population of Chemistry MS students, the data analyzed and reported represents the 11 MS students graduating within a 5-year period from 9/2008 through 8/2013.
The second outcome listed above was evaluated using an assessment indicator other than what was specified in the department assessment plan (“grades in laboratory courses”). This change is the result of the department utilizing more direct methods to evaluate the effectiveness of safety training and policies. Specifically, records of lab accidents and incidents are being systematically collected and maintained by the department Safety Officer.

B) Who was assessed?

The sample assessed for the first outcome included the eleven MS students graduating within a 5-year period from 9/2008 through 8/2013.

The sample used for the second outcome includes all students taking chemistry lab courses, plus graduate and advanced undergraduate students serving as Teaching Assistants for undergraduate lab courses. Also included are graduate and undergraduate students participating in research using chemicals and related equipment in a faculty-mentored research group.

C) When was it assessed?

The outcomes were assessed after the end of the 2012/2013 academic year.

3. What was learned?

In answering this question, please report results in specific qualitative or quantitative terms, with the results linked to the outcomes you assessed, and compared to the standard of mastery (criterion) you noted above. Please also include a concise interpretation or analysis of the results.

First Outcome (MS students will write and speak clearly in the language and style of the discipline):

The items and sub-items on the evaluation forms that are most relevant to the outcome are given below, along with the mean numerical response from thesis committee members and the general audience on a scale of 1 to 5, where 1=unacceptable, 3=proficient, and 5=excellent. It must be noted that the evaluation system using forms was implemented in the fall of 2010 and so the data displayed below is limited to a subset of 6 MS graduates.

<table>
<thead>
<tr>
<th>Evaluation of Written Thesis by members of thesis committee</th>
</tr>
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<tbody>
<tr>
<td>item-&gt;</td>
</tr>
<tr>
<td>sub-item</td>
</tr>
<tr>
<td>(i)</td>
</tr>
<tr>
<td>(ii)</td>
</tr>
</tbody>
</table>

| item-> | “Student demonstrates critical thinking skills” |
| sub-item | mean score |
| (i) | Question-Hypothesis | 4.11 |
| (ii) | Results, Discussion, Conclusion | 3.98 |
The Standard of Mastery specified in the MS assessment plan for this method of assessment requires that MS students obtain a score of 3 or above for the relevant items on the evaluation forms. The data above show that the mean scores for relevant evaluation items for the 6 MS graduates all lie well above 3. An examination of the evaluation results by student showed that in every case, the average of the mean scores from evaluators for all of the relevant items is above 3. On this basis, we judge the specified Standard of Mastery to be met.

The second assessment metric related to the first outcome refers to the number of student presentations at professional meetings, including CWU SOURCE, and also the number of manuscripts the students submitted or plan to submit for peer-reviewed publication. The information presented in the table below was obtained from department records (for SOURCE) and from graduate exit surveys.

<table>
<thead>
<tr>
<th>Number of oral/poster presentations at CWU SOURCE</th>
<th>23 presentations (4 awards)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of oral/poster presentations at national and regional conferences</td>
<td>7*</td>
</tr>
<tr>
<td>planned manuscripts to be submitted for peer-reviewed publication</td>
<td>8*</td>
</tr>
<tr>
<td>manuscripts actually submitted or published</td>
<td>1*</td>
</tr>
</tbody>
</table>

*- self-reported on exit survey

Note that an additional 14 SOURCE presentations were made in the same 5-year time span by other MS students who did not graduate within the 9/2008 - 8/2013 timeframe.
The Standard of Mastery provided in the MS assessment plan that is relevant to the numbers of student presentations and manuscripts calls for at least 50% of the MS students presenting at professional meetings and at least 50% submitting or working toward submission of manuscripts to peer-reviewed journals. The assessment results confirm that these two criteria, as stated, have been met, although the number of manuscripts actually submitted is disappointingly low.

The final assessment metric related to the first outcome is simply the MS graduate GPA. We acknowledge that this is a very general metric that is not closely tied to the outcome, but we include it here since it is listed in the assessment plan and the data is readily available. For the sample of 11 MS students graduating 9/2008 through 8/2013, the mean GPA achieved is 3.93. The lowest GPA of the 10 is 3.495. The specified Standard of Mastery for this metric is 3.0, so it seems the criterion was met.

Second Outcome (MS students will practice health and safety protocols that are integral to the discipline): For the second outcome related to laboratory safety, the bar graph below shows the numbers of accidents and incidents occurring in teaching and research labs reported by academic quarter for the last two years. By the definitions used, an accident involves some sort of injury, even if very minor, whereas an incident involves a hazard or mishap that did not result in an injury of any sort. The details of every incident and accident were recorded along with the nature of any injury and the extent of the executed response.

The large spike in accidents in Winter 2013 is largely due to changes implemented in reporting practices. Department safety policy changes also went into effect Winter quarter of 2013.

Naturally, the desirable criterion of achievement for this method of assessing safety protocols integral to experimental chemistry is the complete absence of accidents and mishaps of all types. The more realistic approach adopted by the department is to establish a baseline based on well-maintained records that can help guide the department in the establishment of policies and practices that will effectively reduce the numbers of accidents and incidents in the future.
The graduate students play a key role in meeting department safety objectives for two reasons: the extensive time spent in research labs, and their frequent responsibilities supervising undergraduates in both teaching and research labs. They are a crucial component of the department’s safety culture!

4. What will the department or program do as a result of that information?
In answering this question, please note specific changes to your program as they affect student learning, and as they are related to results from the assessment process. If no changes are planned, please describe why no changes are needed. In addition, how will the department report the results and changes to internal and external constituents (e.g., advisory groups, newsletters, forums, etc.).

The assessment results for all of the methods used to evaluate progress toward the first outcome met the stated criterion of achievement in the MS assessment plan and thus do not indicate a present need for change. Student participation in research, working with faculty mentors, is one of the outstanding strengths of the Chemistry department and the department is committed to maintaining this strong point.

As described in #5 below, the department invested a great deal of effort during the 2012/2013 academic year to reevaluate its safety policies and protocols applied to the use of chemicals and related apparatus and equipment in teaching and research labs, and in the chemical stockroom. Throughout this current year, the department is implementing and enforcing the policy changes enacted February of 2013. The department has also strengthened measures to insure that all students, faculty, and staff receive safety training appropriate to their responsibilities and exposure to chemical and equipment hazards. While it’s not clear from bar graph above that the numbers of accidents and incidents have decreased since the changes in policies, there is anecdotal evidence that the number of accidents involving exposure to caustic chemicals, e.g. acid burns to exposed skin, has dropped dramatically.

The Chemistry department will continue to make student and employee safety a high priority in the coming year with improved training to emphasize safety awareness, as well as improved policy enforcement and incident reporting. The MS students play a key role in this effort.

5. What did the department or program do in response to last year’s assessment information?
In answering this question, please describe any changes that have been made to improve student learning based on previous assessment results. Please also discuss any changes you have made to your assessment plan or assessment methods.

It appears that assessment of outcomes for the MS program was not included in last year’s assessment submission from the department. For such a small number of students, it is a challenge to acquire meaningful assessment data on an annual basis. This is why we chose to use the accumulated MS graduates over the past 5 years as our sample for this report.

Substantial changes have been made to the MS degree options within the past year to broaden its appeal to people working in local and regional industry. We will likely be making revisions to the MS assessment plan for Fall 2014 to reflect the recent changes to the program, assuming we get clear and timely word on the predicted merging of the Strategic Planning and Learning Outcome Assessment reporting procedures for the next assessment cycle.
6. Questions or suggestions concerning Assessment of Student Learning at Central Washington University:

We favor the expressed intention to fold the department SLO Assessment Plan into the larger context of the department Strategic Plan. We also need to lock into a stable and well-defined definition of the planning/assessment cycle and associated timeline.
<table>
<thead>
<tr>
<th>Student Learning Outcomes (performance, knowledge, attitudes)</th>
<th>Related Program/Departmental Goals</th>
<th>Related College Goals</th>
<th>Related University Goals</th>
<th>Method(s) of Assessment (What is the assessment?)*</th>
<th>Who Assessed**</th>
<th>When Assessed (term, dates)***</th>
<th>Standard of Mastery/ Criterion of Achievement (How good does performance have to be?)</th>
</tr>
</thead>
</table>
| 1. Apply technical information and independently perform advanced experimental techniques and data analysis. | Goal 1 Goal 2 | Goal 1 Goal 1 | - Grades in relevant courses  
- Student written proposal and thesis  
- Alumni survey | - All Chemistry graduate students | - Quarterly for classes  
- Yearly for proposal and thesis | - Graduates maintain 3.0 for course average.  
- Standardized feedback forms from every committee member judging proposal and thesis. Obtain a 3 or above (5 max) on relevant criteria.  
- Alumni survey: ranking of 3 or above. |
| Obtain 2. Write and speak clearly in the language and style of the discipline. | Goal 1 Goal 1 Goal 1 | - Grades in relevant courses (CHEM 505 and other grad classes)  
- Student written proposal and thesis (CHEM 700), including committee members feedback form†  
- Student proposal defense and thesis defense (CHEM 589), including committee members feedback form‡  
- Number of student presentations at local/regional/national meetings (from our SOURCE pres. records and exit survey† question 4)  
- Number of planned and submitted manuscripts for peer review (from Exit survey† question 5b) | - All Chemistry graduate students | - Quarterly for classes  
- Yearly for proposal and thesis  
- At graduation from exit survey | - Graduates maintain 3.0 for course average.  
- Written: Obtain 3 or above (5 max) on relevant criteria on feedback forms.  
- Oral: Obtain 3 or above (5 max) on relevant criteria on feedback forms.  
- At least half of the graduate students present at meetings.  
- At least half of the graduate students have submitted or plan submissions of peer reviewed journal articles. |
<table>
<thead>
<tr>
<th>Goal 1</th>
<th>Goal 1</th>
<th>Goal 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. Demonstrate critical thinking skills that utilize qualitative and quantitative problem solving.</td>
<td>Goal 1</td>
<td>Goal 1</td>
</tr>
</tbody>
</table>
| | - Grades in relevant courses  
- Committee members feedback form  
- All Chemistry graduate students | - Quarterly for classes  
- Yearly for proposal and thesis  
- Graduates maintain 3.0 for course average  
- Obtain 3 (5 max) on relevant criteria on feedback forms. |
| 4. Retrieve and critically analyze chemical literature. | Goal 1 | Goal 1 |
| | Course grades in:  
- CHEM 505  
- CHEM 589, including feedback forms  
- CHEM 700, including feedback forms  
- Student proposal and thesis. | - All Chemistry graduate students  
- Quarterly for classes  
- Annual review of student proposals and theses.  
- Graduates maintain 3.0 for course average  
- Obtain an average of 4 or above (5 max) on relevant criteria feedback forms. |
| 5. Practice health and safety protocols that are integral to the discipline. | Goal 1 | Goal 1 |
| | - Methods section in student’s thesis  
- Safety training and quiz  
- CHEM700 evaluation & exit survey  
- Questions 3e and 6b. | - All Chemistry graduate students  
- Quarterly  
- Once at the beginning  
- Exit survey  
- Passed quiz  
- Obtain a ranking of 3 or above on relevant criteria in evaluation form and exit survey. |

Last updated 10/25/2012  
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