Annual Academic Assessment Report Cover Sheet

Assessment reports are due the 1st Wednesday after the Fall Term
Email to: assessment@unlv.edu

Program Information:

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<th>Program Assessed</th>
<th>BS Chemistry, BS Biochemistry, BA Chemistry</th>
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<td>Department</td>
<td>Chemistry and Biochemistry</td>
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<td>College</td>
<td>Sciences</td>
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<td>Department Chair</td>
<td>David Hatchett</td>
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<td>Assessment Coordinator</td>
<td>Larry Tirri</td>
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<td>Date Submitted</td>
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Contact Person for This Report

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<th>Larry Tirri</th>
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Please attach a narrative (not to exceed 4 pages, excluding appendices) addressing the following:

- What are the student learning outcomes? Please provide a numbered list.
- Which learning outcomes were assessed?
- How were they assessed? (Programs must use at least one direct assessment of student learning.)
- Undergraduate programs should assess at least one University Undergraduate Learning Outcome (UULO) each year, which may or may not overlap with a program learning outcome.
- Graduate programs should assess at least one outcome related to one of the following graduate level requirements each year:
  - student engagement in research, scholarship, creative expression and/or appropriate high-level professional practice.
  - activities requiring originality, critical analysis and expertise.
  - the development of extensive knowledge in the field under study.
- What was learned from the assessment results?
- How did the program respond to what was learned?

Please limit the narrative portion of your report to no more than four pages. You may attach appendices with data, tables, charts, or other materials as needed. Please explain the relevant conclusions from any appendices in your narrative. Please contact the Office of Academic Assessment if you have questions or need assistance.
There are several sources of information by which the Undergraduate Degree Programs are assessed. First and foremost, the American Chemical Society (ACS) Committee on Professional Training (CPT) has established guidelines for course and program content that must be met for every B.S. Chemistry ACS Certified Degree Program. A student who completes this program will be recognized by the ACS as having met the criteria to be a graduate from a “Certified B.S. Program”. The programs for the B.S. Biochemistry Degree and the B.A. Chemistry Degree require almost all of the same courses as the B.S. Certified Degree, thus the Department of Chemistry and Biochemistry performs one combined assessment of all three undergraduate degrees.

The three UULOs that the Department identified are 1) Inquiry and Critical Thinking, 2) Communication, and 3) Citizenship and Ethics. Related to these UULOs are learning outcomes 1) ability to use chemistry concepts and apply them to answer questions and solve problems in both lecture and research lab environments; 2) ability to write clear concise reports in the form of laboratory reports, literature surveys, and presenting seminars and posters; 3) developing an understanding how to identify and mitigate laboratory related hazards as well as properly manage generated wastes consistent with institutional and governmental regulatory policy. This past year the department focused on communication skill development in the form of the “Milestone” experience and the development and implementation of a progressive chemical hazard assessment program to establish a safety culture and prepare a written hazard assessment report. This last activity serves as our departmental “Capstone” or “Culminating” experience to prepare our graduates to enter the chemistry profession. These are described and discussed below in the context of formal program review.

The ACS CPT recently conducted a comprehensive program review and recommended that our B.S. Chemistry degree certification be continued. Additionally, several specific areas were identified that should be enhanced to continue the development of our program. Except for two specific areas that are outside of direct departmental control, we have either addressed the areas or are developing methods to do so. These areas are:

**Tracking graduates** - The department is discussing how to best track the career paths taken by our graduates.

**Sabbaticals** - It was pointed out that only two faculty members took sabbaticals over the time period covered by the report. Since the report was submitted, one additional faculty member took a sabbatical. However, in general, sabbatical opportunities are limited because of the highly competitive nature of the awards and the fact that there are several unfilled faculty vacancies for which the department has not received permission to recruit. When someone takes a sabbatical leave, the department has difficulty identifying faculty to teach all of the necessary courses without placing undue stress on existing faculty workloads. It is only recently that the department has received two FIR positions to help address the workload issue. It is expected that applications for sabbatical leave will be forthcoming.

**Support Staff** – This issue is also identified in another institutional program review conducted earlier in 2015. Specifically, the ACS CPT report identified the lack of an instrument technician to ensure that laboratory instruments are properly maintained and in good operating condition. The institutional program review identified the lack of sufficient administrative support staff, and the need for additional staffing of the chemical storeroom and academic laboratory supervision. Funding for addressing these staffing issues has been requested several times, but until very recently, staffing issues have not been addressed. This will be discussed below.
Office of Academic Assessment

**Student Skills** – The specific skill identified that needs to be enhanced is with the use of the chemical literature and scientific software for the microcomputer. It was suggested that students be provided more formalized training and that it be provided much earlier in their academic careers. The department is now introducing students to the use of software applications during the first year general chemistry laboratory courses rather than in a junior level course.

**Research Reports** – The ACS CPT observed that the quality of student research reports should be improved. As part of the department’s response to “General Education Reform”, we are requiring a literature search and the writing of a report in the junior level CHEM 355 Quantitative Analysis curriculum. This report requires students to identify literature focused on a classical analytical method covered in the course. They are required to evaluate the current method versus the classical method covered in the course. Finally they are expected to provide an assessment of the data and statistics in terms of the validity of the method. This written report has been identified as the “Milestone Experience”, a component of institutional curricular reform.

**Self-Evaluation** – The Department identified a faculty member to address program evaluation and this person also served as the college representative on the Institutional Assessment Committee. These experiences have provided an assessment foundation on which to improve department self-evaluations.

The ACS CPT adopted enhanced guidelines for certified degree programs during its March 2015 National Meeting held in Denver, CO. Enhancements included

1) adding a course in Polymer Chemistry or enhancing the curricula of several other courses to include the various aspects of polymers. The department reinstated a course devoted to Polymer Chemistry and revised its program degree requirements to include this course as a required course for the “Certified” degree program and listed it as an elective for the other two programs.  
2) establishing a department Safety Committee to address safety issues and foster the development of an enhanced safety culture. The department has in fact established a standing “Safety Committee” and included it in its Department By-Laws. Additionally, the department has implemented a Hazard Identification and Awareness Program in every laboratory course offered by the department. For our majors, each student is required to write a “Hazard Assessment Report” as a laboratory requirement for their senior laboratory course and this requirement has been identified as the “Capstone” or “Culminating” Experience to meet such requirement for the General Education Curricular Reform.

This past Spring Semester, Dr. Michael Ketterer, Metropolitan State University of Denver and Dr. Peter W. Langhoff, University of California San Diego reviewed program documents submitted by the Department and UNLV Administration, conducted an external review and submitted their independent assessment report of the programs. Although this report was considerably more comprehensive than the ACS CPT report and focused more on the graduate programs and level of support for the department, several of the issues identified above could also be found in their report document. In particular, they reported the quality of the programs “…is very high, consequent of the dedication and capabilities of the UNLV Chemistry Faculty and Staff”, while pointing out issues of concern that would present impediments to continued improvement and growth. Specifically, they noted that the current level of support, i.e., physical is inadequate, while the fiscal and staffing support is minimally adequate. This level of support would not encourage future program development and growth.

The single operational and physical issue that must be addressed is the quality of the laboratory environment. The Chemistry Building was constructed over 50 years ago and has undergone several renovations, including the conversion of Physics Laboratories (The Department of Physics once shared
this building) into Chemistry Laboratories. The ventilation systems and equipment are inadequate for the current type of use; i.e., types of experiments and hazard level of chemicals used in these experiments. In response to this issue, the department is revising its laboratory curriculum to eliminate those experiments that produce highly hazardous vapors that are not sufficiently removed by the ventilation systems in the building. This curricular revision also provides the department with an opportunity to select new experiments that require smaller quantities of chemicals and consequently reduced quantities of waste products. This is considered a win – win project. Nevertheless, the need for an improved ventilation system remains urgent.

As stated above, Dr. Ketterer and Dr. Langhoff pointed out that there is no technical support staff that could provide electronic troubleshooting of instruments, nor provide repair/maintenance services of everyday laboratory equipment and instrumentation. In the past, for many decades, the College of Science enjoyed the services of such a technician. The person provided support to all departments in the COS and was a valuable asset. When the most recent technician retired over five years ago departments in COS requested that the position be filled. To this day, the position remains vacant. In fact, we do not know if the position still exists; it may have been reassigned for some other purpose.

Dr. Ketterer and Dr. Langhoff pointed out that our department administrative staff requires an additional position to support our needs. It should be pointed out that one of our two current administrative staff will be retiring in the next couple of months and most likely, the other staff member will retire about one year later. Recent discussions with the Provost resulted in authorization to recruit a replacement for the administrative staff position that will be vacated in the coming months. This will provide the replacement an opportunity to be trained in the coming year by the administrative assistant before he retires next year. This is a critical issue for the Department because it will provide the administrative continuity necessary for a smooth transition of personnel.

Dr. Ketterer and Dr. Langhoff also recognized that the course offerings cannot be expanded because of logistical constraints. Daytime laboratory offerings for General Chemistry courses are currently at maximum capacity. Offering evening laboratory sections requires that a member of staff be present to supervise the TAs and to provide stockroom support after regular business hours. The Provost recognized this logistical constraint and authorized the creation of this position. This will provide the department the opportunity to expand evening laboratory sections to meet increased enrollment demands.

In the face of these deficiencies, Dr. Ketterer and Dr. Langhoff remarked that the Department of Chemistry and Biochemistry continues to offer high quality undergraduate degree programs with the resources provided, but that future growth and development will require additional support that is now forthcoming.

In conclusion, the Department has moved forward with the assessment of its undergraduate degree programs, developing and implementing programs to address those areas that are within its control, while continuing to point out serious deficiencies and needs to our College and Institutional Administrative officers who have just recently began to address some of our most critical personnel issues. It should be pointed out in this report that the Provost also recognizes a critical need for the future growth in our Graduate Programs in the form of additional Graduate Assistantships. This will be more fully discussed in the Graduate Program Assessment Report, but it is mentioned here because each additional GAs position will teach two undergraduate laboratory sections.