

Plan for Assessment of Student Learning Outcomes
College of Arts and Sciences
The University of New Mexico

A. College, Department and Date

1. College: *Main Campus Arts & Sciences*
2. Department: *Chemistry & Chemical Biology*
3. Date: *November 15, 2016*

B. Academic Program of Study*

B.S. Chemistry

C. Contact Person(s) for the Assessment Plan

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D. Broad Program Goals & Measurable Student Learning Outcomes

1. Broad Program Learning Goals for this Degree/Certificate Program

A. Content Mastery: Understand major chemical concepts, theoretical principles and experimental findings in the field of chemistry

1. Apply their understanding of atomic theory, molecular structure and bonding, thermodynamics, kinetics, chemical reactions, spectroscopy and synthesis on examinations and laboratory exercises. (NM HED Area III: 2)
2. Be able to employ critical thinking to solve problems using multiple layers of data analysis (NM HED Area III: 2, 4)

B. Laboratory Skills: Demonstrate the ability to construct and test hypotheses using modern laboratory equipment and appropriate quantitative methods

1. Construct and test hypotheses (NM HED Area III: 1,2)
2. Design experiments (NM HED Area III: 2)
3. Use instrumentation to collect data (NM HED Area III: 2)
4. Process data using a computer and use statistics to evaluate data (NM HED Area III: 2, 4)
5. Have a working knowledge of basic chemical safety (NM HED Area III: 5)
6. Interpret experimental results and draw conclusions (NM HED Area III: 4, 5)

C. Communication Skills: Convincingly present scientific data and arguments in an oral and written format

1. Organize and represent experimental data using appropriate methods (spreadsheets, etc) (NM HED Area III: 1, 2, 4)
2. Write coherent scientific reports (NM HED Area III: 3)

3. Present scientific ideas and arguments in a professional setting (NM HED Area III: 3)

D. Professional Development: Be prepared for entry into professional school (e.g. medical, dental, pharmacy, etc) or the chemical industry or government service.

1. Demonstrate scientific literacy and be familiar with the status of current research in the field of chemistry (NM HED Area III: 3, 5)
2. Have general skills to work in small groups to accomplish scientific projects (NM HED Area III: 5)

2. List of Student Learning Outcomes (SLOs) for this Degree/Certificate Program

- A1.** Apply their understanding of atomic theory, molecular structure and bonding, thermodynamics, kinetics, chemical reactions, spectroscopy and synthesis on examinations and laboratory exercises. UNM Goals (Knowledge Skills Responsibility)
- A2.** Be able to employ critical thinking to solve problems using multiple layers of data analysis UNM Goals (Knowledge Skills Responsibility)
- B1.** Construct and test hypotheses UNM Goals (Knowledge Skills Responsibility)
- B2.** Design experiments UNM Goals (Knowledge Skills Responsibility)
- B3.** Use instrumentation to collect data UNM Goals (Knowledge Skills Responsibility)
- B4.** Process data using a computer and use statistics to evaluate data UNM Goals (Knowledge Skills Responsibility)
- B5.** Have a working knowledge of basic chemical safety UNM Goals (Knowledge Skills Responsibility)
- B6.** Interpret experimental results and draw conclusions UNM Goals (Knowledge Skills Responsibility)
- C1.** Organize and represent experimental data using appropriate methods (spreadsheets, etc) (Knowledge Skills Responsibility)
- C2.** Write coherent scientific reports (Knowledge Skills Responsibility)
- C3.** Present scientific ideas and arguments in a professional setting UNM Goals (Knowledge Skills Responsibility)
- D1.** Demonstrate scientific literacy and be familiar with the status of current research in the field of chemistry UNM Goals (Knowledge Skills Responsibility)
- D2.** Have general skills to work in small groups to accomplish scientific projects UNM Goals (Knowledge Skills Responsibility)

E. Assessment of Student Learning Three-Year Plan

1. Timeline for Assessment

SLO	Year 1: Course in which assessed	Year 2: Course in which assessed	Year 3: Course in which assessed
<p>A. Content Mastery: Understand major chemical concepts, theoretical principles and experimental findings in the field of chemistry</p> <ol style="list-style-type: none"> 1. Apply their understanding of atomic theory, molecular structure and bonding, thermodynamics, kinetics, chemical reactions, spectroscopy and synthesis on examinations and laboratory exercises 2. Be able to employ critical thinking to solve problems using multiple layers of data analysis 	<p>A1. 311/312 Indirect measure: Exit interview</p>	<p>A2. CHEM 431 Indirect measure: Exit interview</p>	<p>Indirect measure: Exit interview</p>
<p>B. Lab Skills: Demonstrate the ability to construct and test hypotheses using modern laboratory equipment and appropriate quantitative methods</p> <ol style="list-style-type: none"> 1. Construct and test hypotheses 2. Design experiments 3. Use instrumentation to collect data 4. Process data using a computer and use statistics to evaluate data 5. Have a working knowledge of basic chemical safety 6. Interpret experimental results and draw conclusions 	<p>B4. CHEM 253L B5. CHEM 432L Indirect measure: Exit interview</p>	<p>B1. CHEM 124L B6. CHEM 411L Indirect measure: Exit interview</p>	<p>B2. CHEM 453L B3. CHEM 453L Indirect measure: Exit interview</p>
<p>C. Communication Skills: Convincingly present scientific data and arguments in an oral and written format</p> <ol style="list-style-type: none"> 1. Organize and represent experimental data using appropriate methods (spreadsheets, etc) 2. Write coherent scientific reports 3. Present scientific ideas and arguments in a professional setting 	<p>C3. CHEM 432L Indirect measure: Exit interview</p>	<p>C2. CHEM 253L Indirect measure: Exit interview</p>	<p>C1. CHEM 453L Indirect measure: Exit interview</p>

<p>D. Professional Development: Be prepared for entry into graduate school or professional school (e.g. medical, dental, pharmacy, etc) or the chemical industry or government service.</p> <ol style="list-style-type: none"> 1. Demonstrate scientific literacy and be familiar with the status of current research in the field of chemistry 2. Have general skills to work in small groups to accomplish scientific projects 	<p>D1. CHEM 425/421 Indirect measure: Exit interview</p>	<p>D2. CHEM 457 Indirect measure: Exit interview</p>	<p>N/A Indirect measure: Exit interview</p>
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2. How will learning outcomes be assessed?

A. What:

1. Each SLO will be measured using samples of evidence of learning from courses listed in the table above.
2. Each SLO measured will be a direct measure or indirect measure determined by the nature of SLO and what data can be collected. At least half of the measures will be direct measures.. The indirect measure will be an end of program exit survey.
3. The program's assessment target is to have at least 60% of the students in the B.A. program to perform satisfactory or better. Scoring rubrics will be used for some measures, designed by the faculty member who analyzes the data, and explained in the annual reports.
4. All students would be included in the assessment of a service course without separating majors from the analysis with the assumption that a large sample can represent a small subset.

B. Who: We will try to include all students in Chemistry B.S. degree program in the assessment.

3. What is the unit's process to analyze/interpret assessment data and use results to improve student learning?

1. Priority SLOs will be measured by at least one semester's performance. The number of priority SLOs measured each year may vary between one and three SLOs. The results of the outcomes measured the previous fall will be discussed each August by an Assessment Committee. All department faculty will be notified via email and invited to the meeting no less than a week before the scheduled meeting.
2. The faculty collecting evidence during that academic year and the chair of the Assessment Committee will meet each August to analyze and interpret the assessment data. All contributing faculty will be invited to participate in the meeting. Each faculty member who collected data will present how they carried out the assessment (the tools/techniques used), how they analyzed the data, and what will be done to improve student learning. Finally, plans will then be made for the following year so that only one or two SLOs are tested using one or more direct measures.

3. Recommendations will be compiled after the faculty meeting by the assessment committee chair and communicated in writing to the department chair by December 15st each year. Copies of the document will be provided and discussed in the faculty meeting each October.