

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

A. College, Department and Date

1. College: Arts and Sciences: Health Sciences Center
2. Department: Biochemistry and Molecular Biology
3. Date: 11/7/16

B. Academic Program of Study

- B.S. Biochemistry
- B.A. Biochemistry

C. Contact Person 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

Students graduating from this program will:

- A. Understand major biochemical concepts, theoretical principles and experimental findings in the field of biochemistry
- B. Be able to employ critical thinking and hypothesis-driven methods of scientific inquiry
- C. Present scientific data in an appropriate context and in a variety of ways, at different levels.
- D. Appreciate and promote the ethical dimensions of science.
- E. Practice critical self-reflection in order to progress as a scientist and as a life-long learner

2. List of Student Learning Outcomes (SLOs) for Biochemistry BS/BA

Students in the degree program will be able to:

A.1. Demonstrate advanced knowledge, and apply their understanding of the **Core Concepts**: (as outlined by the American Society for Biochemistry and Molecular Biology (ASBMB), our accrediting body)

- 1) Evolution
- 2) Matter and energy transformation
- 3) Homeostasis
- 4) Biological information
- 5) Macromolecular structure and function

Aligned with UNM Learning Goals (Knowledge Skills Responsibility)

B.1. Develop a hypothesis; design and conduct appropriate experiments to test that hypothesis; analyze and interpret data; reflect on the evidence, the process, and plan the next experiment.

Aligned with UNM Learning Goals (Knowledge Skills Responsibility)

C. 1. Write, explain, and present on biochemical topics; using prose, drawings, flow-charts, tables, and figures; in quizzes, exams, papers, laboratory reports, presentations; in small- and large-group course settings, and in professional settings.

Aligned with UNM Learning Goals (Knowledge Skills Responsibility)

D.1. Explain the necessity of objectivity and honesty in the process of science.

Aligned with UNM Learning Goals (Knowledge Skills Responsibility)

E.1. Reflect on their strengths and weaknesses in Biochemistry and, with a mentor, develop related learning and career plans.

Aligned with UNM Learning Goals (Knowledge Skills Responsibility)

E. Assessment of Student Learning 2 Year Plan

1. Timeline for Assessment

Year/Semester	Assessment Activities
Year 1, Fall	Assessment activities related to SLOs A.1., B.1., C.1., D.1.
Year 1, Spring	Assessment activities related to SLOs A.1., B.1., C.1., D.1., E.1
Year 2, Fall	Assessment activities related to SLOs A.1., B.1., C.1., D.1.
Year 2, Spring	Assessment activities related to SLOs A.1., B.1., C.1., D.1., E.1

2. How will learning outcomes be assessed?

A. What?

The BS/BA degree programs in BMB have not had an assessment plan in place for several years. This new plan involves assessing 5 learning objectives over a 2 year period.

BMB will assess the A.1 SLO through

-A repeated subset of questions on the final exams in the courses Biochem 445 and 446 (yr 1). These are secure exams. The questions have been developed/edited by a committee of faculty in the department over 10+ years. They are based on the broad course goals and on the specific course objectives in these courses; the goals and objectives are in turn based on the ASBMB Core Concepts. Student learning will be assessed by the course instructor(s) at the end of the semester: a criterion for success will be that 80% of the class achieves 75% or better on each of the Core Concept areas. If this goal is not met, then BMB will concentrate on making improvements in that Core Concept. The 445/446 instructors will compile the data and report the findings annually at a BMB faculty meeting in May/June of each year.

BMB considers this assessment a direct measure of student learning.

-The ASBMB certification exam (year 2). This ASBMB certification exam is available only to students in Biochemistry departments that have been accredited by the ASBMB (we achieved accreditation in 2015), and students who achieve a satisfactory grade are entitled to claim that their degree is ASBMB-certified. The BMB department conducted a pilot delivery of the ASBMB certification exam in Spring 2016; 25% of the 20 students who elected to take the exam achieved certification. Starting this Spring 2017, all graduating BMB students must take the exam. The department will pay the exam fee for all students. The exam is graded by a committee of ASBMB members (it is NOT graded internally.)

A criterion for success will be that each cohort of graduating UNM BMB students achieve at least the national average (it was 36.4% for Spring 2016) for certification by 2 years from now (Fall 2019.) The ASBMB exam results include cohort

percentages for question topics/core concepts addressed in the exam, which we will use to compare to the Core Concepts areas assessed in Biochem 445/446 as described above. The ASBMB results are not available until late Summer; results will be communicated annually at a BMB faculty meeting in August/September.
BMB considers this assessment a direct measure of student learning.

BMB will assess the B.1 SLO through

-A variety of assessments in the BMB courses (yrs 1 and 2):

- Bioc 445 and 446 incorporate inquiry-based components and are taught in a studio classroom designed for collaborative learning that includes **case-based learning**. Students are challenged to address important problems and questions in the health sciences that require a deeper understanding of biochemical principles and concepts, and **employ quantitative reasoning and knowledge of experimental techniques** (two-step problem solving), and to **design experimental approaches** to solve complex real-world biochemical problems both as individuals and as teams (multi-step problem solving).
- Bioc 448L incorporates lecture, inquiry-based exercises, small group discussion/study, and **experiential laboratory exercises**.
- Bioc 463 and 464 incorporate both lecture and small group study components that include **writing of hypothesis-driven experimental plans, and evaluation of data from peer-reviewed literature and BMB faculty research**.

All Biochemistry course instructors will compile data on a subset of their assessments related to this SLO and report the findings annually at a BMB faculty meeting in May/June. (The department faculty have not yet agreed on which course assessments from each course will be included.)

BMB considers this assessment a direct measure of student learning.

-The ASBMB certification exam (year 2). This exam, described above, also incorporates questions that test critical thinking skills.

BMB considers this assessment a direct measure of student learning.

BMB will assess the C.1 SLO through

-A variety of assessments in the BMB courses (yrs 1 and 2):

- Bioc 445 and 446 incorporate **peer instruction**. The course Objectives include **writing, teaching, and presenting to peers in every class**.
- Bioc 448L incorporates **small group discussion of experiments and presentations of data from the laboratory experiences**.
- Bioc 463 and 464 small group study components that include **writing of hypothesis-driven experimental plans, and evaluation of data from peer-reviewed literature and BMB faculty research**.

All Biochemistry course instructors will compile data on a subset of their assessments related to this SLO and report the findings annually at a BMB faculty meeting in May/June. (The department faculty have not yet agreed on which course assessments from each course will be included.)

BMB considers this assessment a direct measure of student learning.

BMB will assess the D.1 SLO through

-A variety of assessments in the BMB courses (yr 2):

- Bioc 448L incorporates a **small group discussion of the ethics underpinning the practice and process of science.**
- Bioc 463 and 464 incorporate small group study components that include student **evaluations of the objectivity of peer-reviewed papers.**

These Biochemistry course instructors will compile data on a subset of their assessments related to this SLO and report the findings annually at a BMB faculty meeting in May/June. (The department faculty have not yet agreed on which course assessments from each course will be included.)

BMB considers this assessment a direct measure of student learning.

BMB will assess the E.1 SLO through

-An exit survey that will be developed to ascertain student perceptions of their learning in the BMB program, and to document their next steps (academic and/or professional). The department has used a short survey for over 15 years to gather some of this information; this Spring 2017, the BMB faculty advisors will revise this instrument based on templates from other STEM departments at UNM, and on exemplary national examples of exit surveys (for example, Washington University, University of Colorado at Boulder.) Results will be reported annually at a BMB faculty meeting in May/June.

BMB considers this assessment an indirect measure of student learning.

B. Who?

The A.1. SLO will be evaluated for all students in Biochem 445 in each Fall semester (it is only offered in the Fall) and in Biochem 446 in each Spring semester (it is only offered in the Spring.)

The ASBMB certification exam will be evaluated for all students each August/September (this will occur after the students have graduated; the ASBMB results are not reported until several months after the exam is administered).

The B.1. SLO will be evaluated for all students in Biochem 445 in each Fall semester (it is only offered in the Fall) and in Biochem 446 in each Spring semester (it is only

offered in the Spring), in Biochem 448 in each Spring semester (it is only offered in the Spring); in Biochem 463 in each Fall semester (it is only offered in the Fall) Biochem 464 in each Spring semester (it is only offered in the Spring)
The ASBMB certification exam will be evaluated for all students each August/September.

The C.1. SLO will be evaluated for all students in Biochem 445 in each Fall semester (it is only offered in the Fall) and in Biochem 446 in each Spring semester (it is only offered in the Spring), in Biochem 448 in each Spring semester (it is only offered in the Spring); in Biochem 463 in each Fall semester (it is only offered in the Fall) Biochem 464 in each Spring semester (it is only offered in the Spring)

The D.1. SLO will be evaluated for all students in Biochem 448 in each Spring semester (it is only offered in the Spring); in Biochem 463 in each Fall semester (it is only offered in the Fall) Biochem 464 in each Spring semester (it is only offered in the Spring)

The E.1. SLO will be evaluated for all students who graduate from either the BS or BA programs; most students graduate in May, with a few graduating in December of each year. Reporting to the faculty will occur once a year, in a faculty meeting in May/June.

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

During BMB faculty meetings, faculty will review and discuss student learning outcomes data as they become available. This past Summer 2016, the department held an Educational Retreat based on the program's recent Academic Program Review and the suggestions received from ASBMB during our accreditation process. This meeting led to several changes in the curricula for the BS and BA program, which will not affect the Goals, SLOs, and assessments described here.

Another retreat is being planned for Summer 2017; decisions on which subsets of assessments should be used for SLOs B.1., C.1., and D.1., and the results of the new exit survey, will be the main topics of discussion at that retreat.

All BMB faculty collecting evidence during that academic year will prepare a short presentation on their course(s) assessment data for the annual BMB Education Retreat/faculty meeting in May/June. They will present how they carried out the assessment (the tools/techniques used), how they analyzed the data, and all faculty will be invited to offer suggestions to improve student learning, including curricular adjustments, course materials, pedagogical approaches, and assessment tools.

Appendix A 1-3

ASBMB Certification Exam Description (from ASBMB Website)