

Environmental Science B.S.
Annual Assessment Report
Departments of Biology and Chemistry
2010-2011

Mission Statement: The mission of the Biology Department at PLNU coincides with the University mission to Teach, Shape, and Send.

To Teach: Our commitment is to provide students the opportunity to build a broad foundation in the major disciplines of biology, in the process of science skills, and in the critical thinking/quantitative skills that are required to apply their education to real world settings.

To Shape: In addition to the formal academic interactions, each student will have opportunities to enter into mentoring relationships with our faculty through advising, lab assisting, research experiences, and Departmental social functions. In these contexts, students can expect to dialogue about issues relating to their own personal and professional goals, the interface between biology and our society, and the relationship between faith and science.

To Send: The graduates of the Biology Department will be able to apply both their faith and education in biology related professions, such as medicine, allied health fields, education, or industry. They will feel confident that they have been well prepared to positively contribute in these fields and society in general.

Mission Statement: The mission of the Chemistry Department at PLNU coincides with the University mission to Teach, Shape, and Send.

To Teach: Our commitment is to provide students the opportunity to build a broad foundation of knowledge and understanding of the discipline of chemistry, to develop skills in the process of science, and in the practice of critical thinking and quantitative analysis; skills that are required to apply their education to real world situations.

To Shape: In addition to the formal academic interactions, each student will have opportunities to enter into mentoring relationships with our faculty through advising, lab assisting, research activities, and departmental social functions. In this way we intend our student to grow and mature as professionals and as individuals, coming to understand team work and to value personal integrity. We also expect our students to be in dialogue with us about issues relating to their personal and professional goals, and the interface between science, society, and Christian faith.

To Send: The graduates of this department will be able to apply both their faith and scientific understanding to addressing real world problems in professions, such as medicine, allied health fields, education, and industry. They will feel confident that they are well prepared to make positive contributes in their world.

Program Learning Outcomes:

- 1) Students will demonstrate an understanding of the process of science, and of the concepts and theories of biology across a broad range of organizational levels: molecular, cellular, organismal, and ecological.
- 2) Students will demonstrate a foundational knowledge of the principles of physical, organic, and inorganic chemistry, including the structure of matter, fundamental chemical reactions, and the factors that regulate such processes.
- 3) Students will understand the basic techniques of chemical investigation and the fundamental principles and operating procedures of the major instruments used in chemical characterization and analysis.
- 4) Students will participate in the life of the departments of Biology and/or Chemistry by involvement in science clubs and/or in various positions of responsibility such as graders, tutors, and teaching assistants.
- 5) Students will develop career goals and define a path by which to achieve these goals.
- 6) Students will develop a rationally defensible integration of science and faith, particularly with regard to environmental stewardship.
- 7) Students will gain entry to professional or graduate schools, or to science-related careers.

Curriculum Map:

See attached spreadsheet.

Multi-Year Assessment Plan: Our departments are still in the process of developing this plan.

Assessment Activities:

PLO 1

- 1) Students will take the ETS Major Fields Test in Biology as part of the capstone course in biology, Biology 497, Biology Seminar.

Criteria for success: The overall group mean on the ETS exam will be $\geq 75^{\text{th}}$ percentile and at least 50% of our students will have an overall score $\geq 60^{\text{th}}$ percentile. Additionally, the same criteria established for the overall ETS score will be applied to each of the 4 sub-disciplines, which are *Cell, Genetic & Molecular, Organismal, and Population, Ecological, & Evolutionary Biology*.

Results: The overall group mean of the 4 students who took the exam was at the 90^{th} percentile (**criteria met**). 80% of the students had an overall score $\geq 60^{\text{th}}$ percentile (**criteria met**). The overall group mean was at the 60^{th} , 55^{th} , 95^{th} and 95^{th} percentiles for each of the 4 sub-disciplines (**criteria not met for Cell or for Genetic & Molecular**). More than 50% of the students had an overall score $\geq 60^{\text{th}}$ percentile for all of the sub-

disciplines except Cell and Genetic & Molecular (**criteria not met for Cell or for Genetic & Molecular**).

- 2) In conjunction with the development of students' content knowledge and process of science skills, students' quantitative skills should also develop throughout the program. We use the ETS assessment indicator for quantitative skills to verify that these skills are in place by the time our students finish their education at PLNU. Since the Assessment indicator data is only given for the institution as a whole, this will be an average measure of how our department is doing in preparing students in this area as individual student data is not available.

Criteria for success: The overall group mean on the ETS exam for the quantitative assessment indicator will be $\geq 75^{\text{th}}$ percentile.

Results: The overall group mean was at the 75^{th} percentile (**criteria met**).

PLO 2

Students will be tested at various points in their college years to measure their acquisition of essential knowledge and understanding of certain areas of chemistry. Nationally normalized standardized exams prepared by the American Chemical Society will be used for this purpose. They will be administrated according to the following schedule:

End of General Chemistry Sequence	General Chemistry ACS Exam
End of Analytical Chemistry	Analytical Chemistry ACS Exam

- 1) Students took the ACS General Chemistry exam at the end of the General Chemistry sequence in the spring of 2011.
Criteria for success: The average score for the Environmental Science majors will be higher than the 50%tile.
Results: The average score for the 4 Environmental Science majors was 28.0/70.0 (29%tile) (**Criteria Not Met** but too few students in the class for the data to be statistically significant).

PLO 3-6

- 1) Assessment tools yet to be designed
Criteria for success: Criteria not yet determined
Results: PLO not assessed 2010-11

PLO 7

- 1) Data yet to be analyzed
Criteria for success: Criteria yet to be determined
Results: PLO not assessed 2010-11

Summary of Data Collected and Use of Results:

Only PLO1 and 2 were assessed this year. These data will be discussed at departmental meetings in the fall.

PLO 1: Since only 4 students took the ETS test, the data for PLO 1 is not statistically significant. Thus, we do not currently plan to change the program in any way. However, we do plan to make it a course requirement to take the ETS exam in the future, as several students did not take the exam. If students do not take the exam, they will receive a grade of NC for BIO497.

PLO 2: The chemistry part of the joint major curriculum will undergo a significant change next year. After surveying the programs of twenty other comparator schools we decided to bring our offerings more in line with the majority of those schools by consolidating the organic chemistry experience into the sophomore year and slightly expanding the amount of analytical chemistry we require. This results in a corresponding reduction in the elective units. We will track ACS exam scores into the future to see if this change strengthened the majors that depend on these courses.

PLO 3-7: Data will be collected and analyzed on these in the future.