

**OHIO NORTHERN UNIVERSITY**  
**2006 ANNUAL REPORT ON THE ASSESSMENT OF STUDENT LEARNING**

Academic Program: Biochemistry  
Department: Chemistry and Biochemistry  
College: Arts and Sciences  
Submitted by/Date: \_\_\_\_\_

The Annual Report on the Assessment of Student Learning consists of three parts.

Part I provides the learning objectives and measures as previously identified.

Part II requests information about assessment activities for the previous academic year.

Part III requests information about programmatic or operational changes occurring or being proposed as a result of assessment activities.

Reports must be submitted by department chairs to the Office of Institutional Research by ***December 1, 2006***. Each annual report will be evaluated by the University Assessment Committee and returned to the department chair and the respective Dean by ***March 1, 2007***.

## **I. ASSESSMENT PROGRAM COMPONENTS**

*Instructions: Please review the following and make changes as needed.*

### **A. Learning Objectives**

1. Acquire a wide base of knowledge of descriptive chemistry.
2. Develop skills in quantitative modeling of static and dynamic chemical systems.
3. Select and apply appropriate physical measurements to laboratory investigations.
4. Attain proficiency in conducting safe and proficient chemical/biochemical laboratory procedures.
5. Develop an understanding of the energetics and catalytic processes that constitute intermediary metabolism.
6. Develop laboratory competence in separation, analysis, and characterization of macromolecules from biological sources.
7. Appraise biological phenomena in chemical terms.
8. Demonstrate fluency in written and spoken communication of the results of chemical investigations.

### **B. Measurements**

- ACS Standardized Examinations
- Evaluations of Senior Capstone experience

## II. ASSESSMENT ACTIVITIES FOR 2005-06 (ACADEMIC YEAR)

*Instructions: Please complete the following sections.*

### A. Describe the *measures* used to collect the data?

(Which measures did you use during the past year? Which learning objectives does each measure address? How and when did you administer the measures?)

American Chemical Society examinations are given for all courses where their administration is appropriate. The exams given in 2005-6 included the following: Introductory, Organic, Thermodynamics, Quantitative Analysis, and Instrumental. Biochemistry majors are not required to take Chemistry 462, Advanced Analytical Chemistry (Instrumental). Thus, they do not take the ACS Instrumental Exam.

The table below indicates which exam assesses the listed learning objectives. This is a rudimentary table and the marks indicate which test might be a primary measure of the specified learning objective. There may however, be some measure of a learning objective by a test not indicated.

Learning Objective	Intro	Organic	Thermo	Quant	Biochem
1	X	X			
2	X		X		
3				X	X
4		X		X	X
5					X
6					
7					X

The eighth learning objective is covered primarily by the Senior Capstone. The Senior Capstone experience in the chemistry department consists of an oral student seminar covering an area of current research. The research topic discussed is not in an area in which the student has conducted research in and therefore requires in depth reading and understanding on the student's part. A written "term" paper is also part of the capstone experience.

A student is given a grade for this course. The instructor of the course and other faculty members guide and evaluate the student's preparation for the seminar. An evaluation device is being developed for use with the seminars in the 2006-7 academic year. All chemistry faculty members attending a given seminar will submit evaluations. The results of these evaluations will provide a basis for modifying the curriculum to improve the student's performance in the capstone.

### B. Present the *results* of the data collection and analysis for each measure listed above.

(Present the data resulting from 2005-06 assessment activities. What are the standards and expectations for performance? Did the students meet the standards? What gaps were found between the standards for student learning and the actual results?)

ONU Course/Sequence	Associated ACS Exam	Score 05-06 (Percentile)
Chem 171,2,3	Introductory Chemistry	73.5
Chem 251,2,3	Organic Chemistry	81
Chem 311, 312	Biochemistry	NA
Chem 341	Thermodynamics	75.9
Chem 351	Quantitative Analysis	72

## III. PROGRAMMATIC /OPERATIONAL ADJUSTMENTS

*Instructions: Please complete the following sections.*

**A. Describe the *adjustments*, if any, to the program or the program's operations (including budgetary) which are either being proposed or have already been made in order to narrow the gaps identified between learning objectives and actual outcomes.**

(What changes in curriculum, instructional strategies, course content, personnel, facilities, equipment, resource allocation, etc. are recommended to address the gaps between expected performance and actual results?)

ACS exams scores support that the learning objectives one through five are largely being met. The use of clicker technology and guided inquiry based teaching continues to be explored and implemented.

Learning objective eight is formally assessed during the senior capstone and the consensus opinion through out the department is that the students should be capable of performing at a higher level than is often observed. Starting in academic year 2007-8 a new course, Introduction to Research (CHEM 200), will be required of all chemistry majors. With this new course and the revision of the existing CHEM 300 course (renamed from Introduction to Research to Preparation for Careers in Chemistry and Biochemistry) the students should be better prepared to demonstrate their mastery of learning objective seven during their senior capstone. The expectation is that introducing chemical research in the sophomore year (CHEM 200) and including discussions of research in the current literature (CHEM 300) in the curriculum will result in improved performance in the senior capstone.

**B. Describe the *changes* that need to be made to the assessment plan and practices for the future?**

(Have questions been raised about the effectiveness of the assessment plan? If so, what changes are needed? Are different objectives, measures, analysis, etc. needed? )

To allow for better assessment of learning objective eight, evaluations of capstone performance will come from a broader segment of the faculty rather than just from the formal course instructor. In course work leading up to their senior capstone, students are required to make oral presentations in several courses. These opportunities might need to be expanded or modified. Evaluations of student performance in the capstone should help identify areas in which the students need assistance. Another possible change is a dramatic revision of the capstone itself, with a possible requirement that the students make presentations based upon research they have been involved with.

Assessment of student placement and success after leaving ONU would also be a valuable measure.