Biochemistry Concentration Assessment Plan
July 2010

Whose work to assess.

The concentration has no courses that are taken exclusively by concentrators and the capstone experience is integrated into a lab course that some concentrators take as early as the Fall term of their junior year. In looking over the learning outcomes for the concentration, we realized that all of these are also outcomes that we would like to see achieved by all students who take the core courses of the concentration. Our assessment efforts will therefore be focused on everyone enrolled in these core courses – Biol 380 and Chem 320.

Which learning outcomes to assess.

The learning outcomes that we have defined for the concentration are relatively concrete and deal directly with the concepts developed in the introductory courses and brought together in the core courses. How and whether students make connections between the general concepts learned in introductory courses and their application to biochemical systems is an area of concern, so we have decided to focus our efforts on assessing outcomes that depend on making those connections.

In particular, we want to assess our students ability to “apply the chemical concepts of thermodynamics and equilibria to biological systems”, their ability to utilize information and concepts learned in previous courses, especially general and organic chemistry, in order to “demonstrate an understanding of the kinetics and mechanisms of biological catalysis”, and their ability to place the “knowledge of fundamental metabolic cycles” into the broader context of biological systems attained in the introductory biology sequence.

Our first area of focus is the application of thermodynamic concepts to biological systems, in part because almost every one of the introductory courses addresses these concepts in one way or another. We will be likely to focus on this area for at least a few years, and to use the experience we gain to move forward with assessment of other outcomes.

First steps towards gathering and analyzing data.

We have only just begun the process of analyzing student work. During the Spring term this year, Joe Chihade chose a small set of exam questions and in-class work that related to thermodynamics from his Chem 320 course. Copies of this work have been made and are ready to be looked at, but since the work comes from a Sping term course, we have not yet had a chance to begin that process.

Rather than construct a rubric for assessing the work in the abstract, we will instead begin by reading through some samples and use our perceptions of those to guide the

rubric creation. This initial analysis should help us to reach a consensus on what specific features in the work signify that a student is achieving the learning outcome. Once a rubric or set of rubrics is created, at least two of us will use them to assess the student work we have on hand. Our goals here will be to identify areas where students are in general doing well and areas where they are not.

Timelines.

We would like to complete our initial round of analysis by the end of the summer or early in the Fall term, so that appropriate work from Biol 380 might be included in next year's analysis.

Our plan for the next year or two will follow this pattern:

- Collect appropriate student work from Biol 380 and Chem 320 during the academic year.
- Refine our rubrics in light of the work that has been collected and our impressions from the previous year, with an eye on arriving at a set of general rubrics that can be applied to all the work that has been collected thus far.
- Use these rubrics to analyze student work.
- Identify general strengths and weaknesses in the student work.
- Meet in the late summer or early fall to discuss results obtained thus far and strategies for moving forward, both in terms of our assessments and in terms of curricular changes.

We anticipate that it will take at least two passes through this pattern before we will be satisfied with our understanding of this particular learning outcome. Depending on what curricular changes, if any, we decide to implement, we may continue to assess this particular learning outcome longer, to determine the effects of those changes.

Assuming that we are satisfied with the mechanics of this process, we would then repeat it in assessing other learning outcomes.

Other opportunities.

As with many institutions around the country, the American Society for Biochemistry and Molecular Biology (ASBMB) has begun to focus on assessment. One area of particular interest is the work of Jennifer Loertscher and Vicky Minderhout at Seattle University. As part of an NSF funded project, they have developed a set of questions that can be used in a pre-test/post-test manner to assess student understanding of a core set of biochemical concepts. We hope to take advantage of their careful work in constructing and validating these questions as we continue our own assessment efforts.