1. Number and name of the course being assessed:

CHEM 109 “Biochemistry for Health Science and Biotechnology”

2. List all the Course SLOs from the Course Outline of Record:

| SLO #1   | Perform calculations including unit conversions, density, dosages, concentrations, dilutions, and pH. |
| SLO #2   | Use the Periodic Table of Elements to predict physical and chemical properties of elements and compounds. |
| SLO #3   | Compare and contrast principles of chemistry, including endothermic (endergonic) and exothermic (exergonic) processes, kinetic and potential energy; polar and nonpolar molecules; soluble and insoluble solutions; osmosis and diffusion; acids, bases, and buffers; DNA replication and transcription, and RNA translation. |
| SLO #4   | Demonstrate correct laboratory techniques, including making solutions, performing dilutions, spectrophotometry, chromatography, and filtration; obey safety rules at all times. |
| SLO #5   | Identify the following functional groups when they appear in an organic structure: alkene, alkyne, alcohol, ether, aldehyde, ketone, carboxylic acid, ester, amine, amide, and aromatic rings. |
| SLO #6   | Identify the structures of carbohydrates, lipids, proteins, enzymes, and nucleic acids and their roles in living cells. |
| SLO #7   | Analyze the role of ATP in the energetics of a cell; describe the major catabolic pathways in the production of ATP including calculations of ATP yield. |

3. If you have had any dialogue about the Course SLOs amongst faculty who teach this course, please describe it here (leave blank if there has been no specific dialogue):

The SLO’s are discussed twice a semester at regular meetings. This course uses a text book which is used to teach all three topics: General Chemistry, Organic Chemistry, and Biochemistry. The last chapter applies the principles from all three areas to cell metabolism. Since the last chapter is one of the major focuses of the course (SLO #7), the faculty must therefore emphasize examples taken from biology. In our meetings the faculty strategize how biological examples can be taught earlier in the course and how cell molecular principles can be made understandable to the beginning student.

It is important to realize that this course is normally the student’s first exposure to biochemistry and metabolic processes. Originally the health science students were not offered many biological examples and therefore they learned little or no practical applications. Biochemistry was typically a class that was denied to health science students, since traditionally one must complete two years of college chemistry before taking biochemistry. This course was developed so that health science and biotech students would gain a very basic introduction to some quite sophisticated principles, with the understanding that they would see these topics again when they take physiology, microbiology, etc. So the faculty try to introduce the topics, even while realizing the student would not fully master them in depth until a future class.

4. List the SLO(s) you are assessing in this particular instance:
General Education --

Here is the **Area I Natural Sciences Student Learning Outcome**: Upon receipt of an associate degree from Ohlone College, a student will be able to:

Analyze and apply concepts of biological and/or physical science obtained through the scientific method.

Chemistry Technology and Preparatory Program SLO’s

SLO #1 -- Apply Federal safety regulations, Industry Best Practices and skills in safety in chemical hygiene to the professional laboratory.

SLO #2 -- Students will demonstrate proficiency in lab protocols and instrumentation. Students will apply principles of proper laboratory safety and record keeping.

Course SLOs for CHEM 109

SLO #1 Perform calculations including unit conversions, density, dosages, concentrations, dilutions, and pH.

SLO #2 Use the Periodic Table of Elements to predict physical and chemical properties of elements and compounds.

SLO #5 Identify the following functional groups when they appear in an organic structure: alkene, alkyne, alcohol, ether, aldehyde, ketone, carboxylic acid, ester, amine, amide, and aromatic rings.

SLO #7 Analyze the role of ATP in the energetics of a cell; describe the major catabolic pathways in the production of ATP including calculations of ATP yield.

5. **Describe the assessment strategy or tool that addresses the SLO(s):**

The faculty administered three exams. Key questions pertaining to the SLOs were embedded in the exams. The same questions were asked of all sections – a sample of the data is shown (see attachment “CHEM 109 Data Spring 2012”)

NOTE: Try to use assessment strategies you are already using to evaluate student work as part of your grading system. Examples: Rubrics for Evaluating Projects or Assignments, Portfolio Evaluation, Culminating Projects, Final Exams, Writing Assignments, Performance Assessment, Department Testing, Pre and Post Tests, Vendor or Industry Certification Examinations, Indirect Assessments (Student Surveys, Focus Group Discussions, Interviews), or others....

6. **Describe how the criteria or standards in this assessment tool link to the SLO(s) being assessed:**

The student must possess perfect mastery of the SLO to receive full credit. They may receive partial credit if their mastery is not perfect.

7. **By looking holistically at the results from all students, describe your findings:**

Areas of concern are GE SLO and Course SLOs #2, #5, and #7 (refer to #4 above)
8. Describe faculty dialogue (if any) involved in the assessment process:

The faculty are concerned that students did so poorly in these areas. It appears that students had trouble applying concepts of biological and/or physical science obtained through the scientific method.

One possible explanation is that there was data from only 15 students (from one class out of the five classes taught) used to assess these areas. When a larger population of students was used as in the case of course SLO #1, and Program SLO #1 and #2, then the scores were much higher.

Another possible explanation is that the nature of an introductory course like CHEM 109 would logically give students only an overview. These students are only first starting to form their very earliest awareness of chemical principles, to be later strengthened in future courses. Therefore perhaps it is not too disturbing that students have not yet become proficient in the high level concepts.

9. Based on an analysis of your findings and dialogue, describe revisions (if any) in curriculum or teaching strategies implemented to promote student success:

The course has been entirely taught by part time instructors up until now. They are highly dedicated, but the nature of part time work has a fragmenting effect because they are often at other schools and cannot be as available to the students. The Dean of Science decided to assign leadership to one of full time instructor who is actively teaching the CHEM 109 course. In the past it was led by an instructor not involved in the actual teaching of this class and therefore perhaps less tuned into the challenges. We expect that this change may lead to more effective ways to grapple with the challenges, even though 5 of the 6 sections will still be taught by part time instructors.

10. After the improvements are implemented, describe the results:

Too soon to tell