1. Number and name of the course being assessed:

CHEM 102 "Preparation for General Chemistry"
This course serves as a prerequisite for CHEM 101A General Chemistry.

2. Course SLOs from the Course Outline of Record:

1. Solve problems using dimensional analysis and applying significant figures rules.
2. Write chemical formulas with proper nomenclature
3. Write chemical equations, and solve stoichiometric problems
4. Apply in solving problems the laws governing gases, liquids and solids
5. Analyze chemical problems mathematically including percentage error and yield and display in graphic form
6. Recognize the fundamental principles of chemistry, including atomic theory, chemical bonding and molecular structure

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):

Three instructors teach CHEM 102 currently: B. Spencer, B. Symmank, and Y. Niccolls. We discuss the course SLO's frequently. We all administer the same assessment exam, which is called Lab Practical Exam #2. It is administered near the end of the semester.

4. List the SLO(s) you are assessing in this particular instance.

All SLO's listed below except for course SLO #1 were tested. The Program SLO's and the GE (Natural Science) SLO's were also tested.

Below are the CHEM 102 course SLO's
Solve problems using dimensional analysis and applying significant figures rules.
2. Write chemical formulas with proper nomenclature -- tested in question 11
3. Write chemical equations, and solve stoichiometric problems -- tested in questions 14 and 18
4. Apply in solving problems the laws governing gases, liquids and solids -- tested in question 18
5. Analyze chemical problems mathematically including percentage error and yield and display in graphic form -- tested in question 17
6. Recognize the fundamental principles of chemistry, including atomic theory, chemical bonding and molecular structure -- tested in questions 12 and 16

Below are the Program SLO's
1. Apply Federal safety regulations, Industry Best Practices and skills in safety in chemical hygiene to the professional laboratory.
2. Students will demonstrate proficiency in lab protocols and instrumentation.
3. Students will apply principles of proper laboratory safety and record keeping.
Below is the GE SLO

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

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

   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….

   The Assessment Tool is the Lab Practical Test given near the end of the course. It contains 18 questions. The first 10 questions are concerned with safety in the lab. The others are more in-depth questions which test various SLO's. Some of the questions require students to perform hands-on protocols in the laboratory, such as dilution of a stock solution, using a Spectrophotometer, and reading various instruments for the purpose of measurement.

   Please see attachments.

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

   The SLO's being assessed pertain to competencies taught in CHEM 102.

   The Lab Practical Test #2 focuses on competencies which include:

   2. Write chemical formulas with proper nomenclature -- tested in question 11
   3. Write chemical equations, and solve stoichiometric problems -- tested in questions 14 and 18
   4. Apply in solving problems the laws governing gases, liquids and solids -- tested in question 18
   5. Analyze chemical problems mathematically including percentage error and yield and display in graphic form -- tested in question 17
   6. Recognize the fundamental principles of chemistry, including atomic theory, chemical bonding and molecular structure -- tested in questions 12 and 16

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

   Results from the Fall 2011 exam:

   We feel that the students performed very well on Program SLO's. Students demonstrate good knowledge of safe lab practices. This reflects at least rudimentary mastery of the GE (Natural Science) SLO. However, we are concerned to see how poorly students performed on activity where they must plot data to create a calibration curve; they must then use a Spectrophotometer to measure the Absorbance of their unknown.

   From their calibration curve only some students were able to accurately determine the concentration of their unknown. This part of the test pertains to both the Program SLO #2, SLO #5, and the GE SLO for Natural Science. We feel that this part of the test was certainly the hardest part for students and some did not demonstrate mastery here. This part of the test was perhaps a bit too advanced for students in an introductory course. Even though their average score on this part was low (65%), this gives a misleading impression. Certainly it helps students to be gently exposed to an advanced skill, but one would not expect them to have acquired a high level of mastery yet.

   Students were able to read and record measurements with proper sig figs. This shows mastery of SLO #6. Students did fairly well in the use of stoichiometric analysis (SLOs 1 and 3). Students showed fair progress on nomenclature which pertains to SLO 2.
In one part of the exam, students must predict the products of reactions. They must write balanced chemical equations including state symbols after each product (i.e. (s), (l), (g), or (aq)). Pertains to course SLOs #3 and #4.

Students who have successfully completed CHEM 102 (grade C or better) demonstrate good level of mastery of the SLO's. Some students are quite masterful while others are less confident of the skills. The population of students who take CHEM 102 is quite diverse --- some of them have already taken one or more years of chemistry in their high school, whereas others have never had any chemistry before coming to Ohlone College. Certainly the higher level intellectual skills are involved in analysis of data, and not surprisingly this was the weakest area. On the other hand, routine protocols where students follow prescribed steps (for example, measurements or writing chemical equations without a great deal of analysis) is the area where students' performance is strongest.

8. Describe faculty dialogue (if any) involved in the assessment process:

Below are recommendations
* There should be a dimensional analysis question b/c SLO #1 is not being tested
* There should be an SLO which targets safety and hands-on competence in the lab
* SLO #5 is the area which needs improvement most urgently

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 instructors will modify their methods of instruction to increase student success on the GE SLO #2 and course SLO #5. They will introduce the use of the Spectrometer in advance. They will break down the skills into smaller steps, so students are less confused. Instructors will devote two entire lab periods to teaching the "capstone" experiment which combines many steps together:
* performing a dilution,
* the use of the Spectrophotometer
* creation of a calibration curve
* using the curve for finding the concentration of an unknown solution.

This is the most advanced activity for the course -- frankly it is more appropriate for a CHEM 101. By exposing to demanding multistep tasks which require thoughtful analysis, this will give students skills and confidence which will help them succeed in CHEM 101A.

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

(Too soon to tell)