Office of Academic Program Assessment, Office of Academic Affairs
The 2012-2013 ANNUAL ASSESSMENT REPORT TEMPLATE

All annual assessment reports should be submitted by the academic unit (College/Department/Program) to the College Dean for review and onward transmittal to Academic Affairs. Reports are due in Academic Affairs no later than **July 1 each year** in electronic format.

Please directly answer the following questions and make sure the answers to each question are written in a way that is easy for the general public and for the students, faculty, staff, and administrators **to understand and to use**. To ensure that the various readers have enough information to **evaluate all parts of the report** -- the learning outcomes, the methods/data, the criteria/standards of performance, the interpretations, and the conclusions -- please make sure you provide explicit information including how you have selected your sample (e.g. students or their work) and how you have analyzed and interpreted the data. There is no specific length expectation, although conciseness should be the goal.

1. As a result of last year's assessment effort, have you implemented **any changes for your assessment including learning outcomes, assessment plan, assessment tools (methods, rubrics, curriculum map, or key assignment etc.), and/or the university baccalaureate learning goals?**
a. If so, what are those changes? How did you implement those changes?
b. How do you know if these changes have achieved the desired results?
c. If no, why not?

We have not implemented changes in our program assessment but we are planning to do so in the near future. These changes will extend and/or modify features of our existing program assessment.

2. As a result of last year's assessment effort, have you implemented **any other changes at the department, the college or the university, including advising, co-curriculum, budgeting and planning?**
a. If so, what are those changes? How did you implement those changes?
b. How do you know if these changes have achieved the desired results?
c. If no, why not?

Although not directly folded into our two program assessment tools, the department did make significant progress on revising student evaluations (which are at least 20 years old, probably older). We expect to adopt new student evaluations in 2013-2014, with full implementation by 2014-2015.

3. What **PROGRAM** (not course) learning outcome(s) have you assessed this academic year?

Assessment occurs regularly in courses that either administer an ACS exam or require a capstone poster project, as indicated in the table. Courses that include these elements are offered every year.

Learning Outcome	Measurement tool	Evaluation
A. Laboratory Knowledge and Skills		
1. the basic analytical and technical skills to work effectively in the various fields of chemistry	Capstone project[1]	Multiple faculty evaluation during department poster session
2. the ability to perform accurate quantitative measurements with an understanding of the theory and	Capstone project	Multiple faculty evaluation

use of contemporary chemical instrumentation, interpret experimental results, perform calculations on these results and draw reasonable, accurate conclusions.		during department poster session
3. the ability to synthesize, separate and characterize compounds using published reactions, protocols, standard laboratory equipment, and modern instrumentation.	Not assessed at program level	N/A
4. the ability to use information technology tools such as the Internet and computer-based literature searches as well as printed literature resources to locate and retrieve scientific information needed for laboratory or theoretical work.	Capstone project	Multiple faculty evaluation during department poster session
5. the ability to present scientific and technical information resulting from laboratory experimentation in both written and oral formats.	Capstone project	Multiple faculty evaluation during department poster session
6. knowledge and understanding of the issues of safety regulations in the use of chemicals in their laboratory work.	Not assessed at program level	N/A
B. Computer, Library and Information Skills		
1. the ability to make effective use of the library and other information resources in chemistry, including the primary literature, tabulated data, and secondary sources such as the Internet.	Capstone project	Multiple faculty evaluation during department poster session
2. the ability to make effective use of computers in chemistry applications using standard and chemistry specific software packages.	Capstone project	Multiple faculty evaluation during department poster session
3.the ability to perform and interpret simple molecular modeling or chemical computations using standard software	Not assessed at program level	N/A
C. Oral and Written Communication Skills in Chemistry		
1. adequate skills in technical writing and oral presentations.	Capstone project	Multiple faculty evaluation during department poster session
2. the ability to communicate scientific information in oral and written formats to both scientists and nonscientists.	Capstone project	Multiple faculty evaluation during department poster session
D.Quantitative Reasoning Skills		

1. ability to accurately collect and interpret numerical data.	Capstone project	Multiple faculty evaluation during department poster session
2.ability to solve problems competently using extrapolation, approximation, precision, accuracy, rational estimation and statistical validity.	Capstone project	Multiple faculty evaluation during department poster session
3.proficiency in the scientific method (formulating hypotheses and arriving at appropriate answers and conclusions)	Capstone project	Multiple faculty evaluation during department poster session
E. Knowledge of Chemical Principles and Facts		
1.a working knowledge of chemical principles appropriate to a chemistry degree program to include thermodynamics, equilibrium, kinetics, quantum mechanics, structures of materials, reactivities of substances, synthesis, isolation and identification of compounds.	ACS Standardized Exam[2]	Comparison to national scores
2. a mastery of a broad set of factual chemical knowledge concerning the properties of substances, molecules, and atoms.	ACS Standardized Exam	Comparison to national scores

[1]Capstone projects occur in Chem 110L, 125, 133, 141, 164. Students in our five degree paths will take at least one of these courses in completing the requirements of the degree.
[2]ACS exams are administered in 110, 124, and 160B. Students in our five degree paths will take at least one of these courses in completing the requirements of the degree.

4. What method(s)/measure(s) have you used to collect the data?

The department uses two tools for program assessment, capstone laboratory research projects and standardized American Chemical Society exams.

5. What are the criteria and/or standards of performance for the program learning outcome?

Capstone projects: A 10 question poster rubric is used to evaluate capstone poster projects, shown below.

Overall the student's presentation shows that the student (for questions 1-9, SD = 1, D = 2, A = 4, SA = 5, NA = 3)

1. demonstrates effective organization of their poster (shows effectively the problem and how problem was attacked and solved)
2. demonstrates effective use of graphs and other visual aids
3. uses effective writing (good grammar, spelling, coherent writing, clear exposition)
4. shows an ability to use instrumentation useful in solving or doing problem
5. collected reasonable data useful in solving or doing the problem
6. uses literature properly in presentation

7. supports their generalizations and conclusions with adequate and sound evidence

8. uses technical vocabulary correctly

9. demonstrates effective learning of several laboratory skills

10. Overall impression of the poster presentation. Please rate your overall impression

1 (poor) 2 (fair) 3 (average) 4 (good) 5 (outstanding)

ACS exam scores. Student performance is compared to national norms.

6. What data have you collected? What are the results and findings, including the percentage of students who meet each standard?

a. In what areas are students doing well and achieving the expectations?
b. In what areas do students need improvement?

We have collected faculty evaluations of capstone projects and ACS exam scores.

Summary of capstone project data 2012-2013

Question #	110L Inorganic Chem Lab	125 Advanced Organic Chem Lab	133 Chemical Instrumentation	141 Physical Chem Lab	164 Advanced Biochem Lab
1	4.7	4.2	5	4.8	4.0
2	4.8	4.0	5	4.8	4.0
3	4.4	4.3	5	4.4	3.5
4	4.8	4.5	5	4.7	4.5
5	4.9	4.5	5	4.6	4.0
6	4.5	2.8	5	4.3	4.0
7	4.7	4.3	5	4.6	3.5
8	4.8	4.2	5	4.4	4.0
9	4.9	4.3	3	4.7	4.0
10	**4.6**	**3.9**	**4**	**4.4**	**2.8**
Average	**4.7**	**4.1**	**4.7**	**4.6**	**3.8**

Comments on capstone projects.

The capstone projects require students to demonstrate proficiency in all of the learning outcomes listed above. This year's capstone project evaluations were lower, compared to last year, for two courses, Chem 125 (advanced organic) and Chem 164 (advanced biochemistry). A lower score in these two courses has been observed before and we have attributed it to the fact that most students taking 110L, 133 or 141 have already had 125 and are therefore completing a second capstone experience. With the exception of Chem 164, the average scores in each class were above 4/5, indicating that students are demonstrating the proficiencies we expect them to demonstrate. The "overall impression" score (Q10) for Chem 164 was quite low and not consistent with the rankings in the other questions. It is not clear why Q10 departs from the others. We will address this if the trend continues.

Summary of ACS exam data for 2012-2013

Section	Number of students	Average Score	Percentile	National Average
CHEM 124 - ORGANIC CHEMISTRY				
F 2012 - sec 1	42	39	NA = not available	37 (Form 2012, still being complied)
F 2012 - sec 2	55	36	NA	
S 2013 - sec 1	62	39	NA	
S 2013 - sec 2	61	33	NA	
CHEM 110 - INORGANIC CHEMISTRY				
F2012	10	35	61	32 (Form 2009)
CHEM 160B - BIOCHEMISTRY				
S2013	48	34	57	32.9 (Form 2008)

Comments on ACS exam data.

Area-specific ACS exams, which mainly address Learning Outcomes D and E, are administered in three courses. This ensures that every student in our program will take at least one ACS exam before graduation. Performance on the exams this year is not significantly different from previous years with the average score being either at or slightly above the national average score. In previous years, the Biochemistry exam score has been compared to various student attributes such as whether or not a student took other UD courses in chemistry or biology, or did research, etc. We have also analyzed exam performance by question. Neither of these analyses was completed by the instructor in time for this report but past years have produced some consistent (and interesting) information, documented in previous reports.

7. As a result of this year's assessment effort, do you anticipate or propose any changes for your program (e.g. structures, content, or learning outcomes)?

a. If so, what changes do you anticipate? How do you plan to implement those changes?

b. How do you know if these changes will achieve the desired results?

It is my goal to revise our assessment process as follows:

1. *Redefine program learning outcomes. I believe these can be streamlined from what they are now They also need to be rewritten in accordance with campus baccalaureate learning goals (this task will not be hard, as I already started this reframing in last year's IPP documents)..*
2. *Revise the capstone poster rubric to better elicit specific performance data and align the rubric with revised learning outcomes.*
3. *Apply the exam analysis being used to evaluate the biochemistry ACS exam to the other two (organic and inorganic) exams.*
4. *Design and implement a mechanism to elicit more program-specific (vs departmental) performance data.*

8. Which program learning outcome(s) do you plan to assess next year? How?

Because our assessment tools capture all of our learning goals (and I don't expect this to change after revisions), we will assess all of the program learning outcomes.