Course Outcomes Guide (COG)

Directions: Please complete this form to document your progress toward improving student learning. For each item, indicate your progress and your anticipated next steps. Thank you!

Course Title: CHM 103 **Date: June 2017**

Course Team: Veronica Stein, Chris Nelling

Expected Learning Outcomes

1. Apply quantitative thinking processes and reasoning skills to physical laws, stoichiometry, and atomic and molecular structure.
2. Communicate core course concepts in writing while using appropriate technology
3. Solve quantitative chemistry problems and demonstrate reasoning clearly and completely. Integrate multiple ideas in the problem solving process. Check results to make sure they are physically reasonable.
4. Collect, analyze, and evaluate empirical data to substantiate chemical concepts.
5. Access, process, analyze and synthesize scientific information.
6. Relate chemical concepts to real life scenarios

Assessment (How do or will students demonstrate achievement of each outcome? Please attach a copy of your assessment electronically.)

- MasteringChemistry, which is an online homework program, is used to assess applying quantitative thinking process and reasoning skills, solving quantitative chemistry problems and demonstrate reasoning clearly and completely.
- Exams, consisting of a combination of multiple-choice, short answer and problem solving questions, are given in the lecture and lab sections of the course. The exams access critical thinking skills and analyze and synthesis of scientific information.
- A Nationalized Final Exam written by the American Chemical Society (ACS) for the first semester of General Chemistry is used as the final exam for CHM 103.

Validation (What methods have you used or will you use to validate your assessment?)

We compare our students to the national average of the ACS exam. This exam covers material from chapters 1 through 10 in the *Chemistry, A Molecular Approach, 4th edition*, by Tro.

Results (What do your assessment data show? If you have not yet assessed student achievement of your learning outcomes, when is assessment planned?)

Our students typically achieve the mean or higher for the national ACS exam 70% of the time using the 2009 version of the exam.

CHM 103			
Semester	n	mean	
05/FA	51	33.7	
06/SP	13	36,5	
06/SU	5	56.4	
06/FA	42	42.5	
07/SP	21	37.6	
07/SU	7	42.57	
07/FA	53	38.21	
08/SP	19	40.05	
08/SU	7	43.29	
08/FA	54	42.67	
09/SP	25	39.08	
09/Su	11	38.73	
National 2002 version	2616 from 32 colleges	41.03	out of 70 questions

CHM 103			
Semester	n	mean	
09/FA	58	41.1	
10/SP	23	34.6	
10/SU	10	46.7	
10/FA	74	39.8	
11/SP	31	35.7	
11/SU	23	41.0	
11/FA	52	40.9	
12/SP	34	37.1	
12/SU	18	37.6	
12/FA	51	41.7	
13/SP	27	33.1	
13/SU	19	35.79	
13/FA	57	42.28	
14/SP	22	33.82	
14/SU	14	34.71	
14/FA	65	41.15	
15/SP	17	43.41	
15/SP	18	30.94	
15/SU	12	37.83	
15/FA	56	38.66	
16/SP	17	39.65	
16/SP	14	37.29	
16/SU	19	33.8	
16/FA	49	38.4	
National 2009 version	3827 from 34 colleges	37.13	out of 70 questions

CHM 103			
Semester	n	mean	
17/SP	11	33.3	
17/SP	21	27.8	
National 2015 version	7347 from 47 colleges	39.7	out of 70 questions

Follow-up (How have you used or how will you use the data to improve student learning?)

I made an Excel spreadsheet table for our adjuncts and me, which correlates the item analysis of the exam to chemistry concepts. Using this we can see which concepts we need to develop better curriculum (practice problems, labs, additional material) for students. For example, use flipped classroom methods for learning to identify the type of compound and then naming the compounds.

Budget Justification (What resources are necessary to improve student learning?)

ACS exams, version 2015, have been purchased.

Course: CHM 103 **SLOA Data** **Faculty Team: V Stein**

	SU 2009	FA 2009	SP 2010	SU 2010	FA 2010	SP 2011	SU 2011	FA 2011	SP 2012	SU 2012	FA 2012	SP 2013
# Active students	13	74	30	17	93	37	24	75	39	19	80	45
%W	7.7	9.5	13.3	23.5	10.8	8.1	0	17.3	10.3	0	26.3	4.4
*% walk-away Fs No final exam/grade = F	0	8.1	7.7	15.4	7.2	8.8	4.2	8.1	2.9		13.3	
% Success (A,B,C)	66.7	59.2	75.9	37.5	63.3	59.5	87.5	55.7	66.7	73.7	50.6	75.0
Mean Common Lab Practical Score												
Common Comprehensive Final Exam Score (70 questions)	38.7	41.1	34.6	46.7	39.8	35.7	41.0	40.9	37.1	37.6	41.7	34.06
Mean course grade	2.09	1.91	2.64	2.17	2.04	2.12	2.17	2.07	2.46	2.37	1.97	2.33
% Gen Ed Assessment Score											74.3	73.0
Item Analysis **Weakest Content Areas**												

*% Walk-away Fs = did not take the final exam and received a grade of F.

Course: CHM 103 **SLOA Data** **Faculty Team: V Stein**

	SU 2013	FA 2013	SP 2014	SU 2014	FA 2014	SP 2015	SU 2015	FA 2015	SP 2016	SU 2016	FA 2016	SP 2017
# Active students	22	72	29	17	80	58	15	59	41	22	71	36
%W	9.1	19.5	6.9	11.8	15.0	12.1	6.7	5.1	17.1	13.6	15.5	2.8
*% walk-away Fs No final exam/grade = F		1.4			1.1							
% Success (A,B,C)	68.2	55.6	50.0	56.3	61.0	58.9	73.3	61.0	61.0	68.2	56.5	58.3
Mean Common Lab Practical Score												
Common Comprehensive Final Exam Score (70 questions)	35.8	42.3	33.8	34.71	41.2	37.8	37.8	38.7	38.6	33.84	38.5	29.7
Mean course grade	2.75	2.17	1.85	2.57	2.12	2.06	2.62	2.11	2.21	2.26	1.90	1.97
% Gen Ed Assessment Score	77.4	86.1	75.9	78.3	63.8	75.3	83.3	83.0	80.6	75.3	77.3	76.3
Item Analysis **Weakest Content Areas**							***					

*% Walk-away Fs = did not take the final exam and received a grade of F.

Content Areas

**Summer 2015: Naming molecular compounds, visualizing chemical reactions, net ionic equations, oxidation numbers, formal charges, resonance.

Fall 2015: Naming molecular compounds, unit conversions, visualizing chemical reactions, solubility guidelines, isoelectronic series, bond angles, formal charges, bond energies and heats of reactions

Spring 2016: Naming molecular compounds, unit conversions, visualizing chemical reactions, solubility guidelines, mole ratios, net ionic equations, assumptions of an ideal gas, bond energies, quantum numbers, atomic masses, electron transitions, formal charges.