

CHEMISTRY DEPARTMENT PHYSICAL SCIENCE DEPARTMENT ASSESSMENT SUMMARY

I. **Discipline mission statement**

The mission of the chemistry department, which is housed within the physical science department, is to provide learning-centered chemical education to students. The chemistry department strives to educate traditional and non-traditional students who intend to pursue further educational or career opportunities about chemical principles in a dynamic, supportive, learning-centered environment. The chemistry department is committed to integrating appropriate technology, modern instrumentation, traditional and contemporary pedagogical approaches, and assessment of student achievement into classes in an attempt to create an environment that engages students in classroom activities that facilitate learning for students of all learning styles.

II. **Intended learning outcomes**

After successfully completing any chemistry course (including the lecture and laboratory components) at Arapahoe Community College, a student will:

1. Demonstrate mastery of competencies identified by the competency-based syllabus for that specific course.
2. Acquire the ability to analyze data, consider problems, and propose scientifically reasonable and acceptable solutions to these problems.
3. Acquire the ability to use chemical apparatus, instrumentation and equipment properly and safely.
4. Demonstrate mastery of the approach and rationale of the scientific method and be able to apply these principles to solve problems.
5. Demonstrate the ability to read and write about scientific literature that is relevant and appropriate to a specific course.

The chemistry department will assess outcomes #1, 5 during AY 2002-2003.

III. **Outcome assessed**

Outcome #1 was assessed via the American Chemical Society (ACS) conceptual chemistry exam in CHE 112 – General college chemistry II. This exam assessed student understanding of (1) states of matter (2) atomic structure and theory (3) stoichiometry and thermochemistry (4) molecular structure and bonding (5) solutions (6) equilibrium and acid-base chemistry (7) kinetics (8) thermodynamics was measured.

Benchmark for the ACS exam:

The class average on the exam should be the same or higher than the national average

Outcome #5 was assessed via Calibrated Peer Review (CPR) in CHE 111 and CHE 112.

Benchmark for CPR assignments:

25% of the students in the course will be ranked at a RCI 5-6. 75% of the students will be ranked at a RCI 4-6. (RCI = Reviewer Competency Index.)

IV. Assessment Methods

1. The ACS conceptual exam is a nationally normed, standardized exam that was administered in CHE 112 – General College Chemistry II in April, 2003. The exam was administered during regular class time.
2. The ACS exam is protected by copyright and may not be reproduced. Please contact Christine Gaudinski, 303.797.5749, if you would like to review a copy of the ACS exam.
3. Calibrated Peer Review (CPR) is an internet-based program that enables students to write about scientific topics. The program exposes students to the concept of peer review. "Peer review" is the method by which scientists review new research before it is published in a journal. This was an embedded assessment; all students enrolled in CHE 111 and CHE 112 were required to complete two CPR assignments during the course. Please contact Christine Gaudinski, 303.797.5749, if you would like more information about CPR.

V. Summary of Assessment Results

ACS Chemistry Exam Results – April, 2003 2001 General Chemistry Conceptual Exam

Number of students who participated in the exam = 21

Overall performance on the ACS exam by ACC students is about the same as the national average. Students reached the established benchmark for the ACS exam.

The following table illustrates how the students who took this exam preformed on each section of the ACS exam. Each section is linked to a competency listed on the competency based syllabi for CHE 111 and CHE 112.

Level of Performance/ Topic	Above the national average	Same as the national average	Below the national average
1. States of matter	X		
2. Atomic structure and theory		X	
3. Stoichiometry and thermochemistry	X		
4. Molecular structure and bonding		X	
5. Solutions	X		
6. Equilibrium and acid-base chemistry		X	
7. Kinetics	X		
8. Thermodynamics		X	
9. Electrochemistry and redox chemistry			X

Summary of results from CHE 111/CHE 112 CPR assignments:

% of students scoring a RCI* of	0	1	2	3	4	5	6
CHE 111 - Assignment #1	11	5	0	3	40	35	6
CHE 111 - Assignment #2	6	4	0	6	8	44	31
CHE 112 - Assignment #1	11	4	0	11	26	48	0
CHE 112 - Assignment #2	4	2	0	4	17	43	13

*RCI is "Reviewer Competency Index

The students in both CHE 111 and CHE 112 exceeded the established benchmark for the CPR portion of the assessment.

VI. Use of Results

1. As mentioned above, benchmarks for both areas of assessment were met.
2. These results will be shared with all faculty members who teach CHE 111/112.
3. The chemistry department will continue to use the ACS exam to assess student performance in the CHE 111/112 sequence.
4. The following changes will be introduced in future assessments:
 - a) Spend more time electrochemistry and redox chemistry, in both CHE 111 and CHE 112.
 - b) The ACS exam will be used as a common final in all sections of CHE 112.
5. The chemistry department will continue to use CPR as a way to teach students about scientific writing and the peer review process.