

**Assessment Plan**  
**Updated 2/21/2014**

**B.A./B.S. in CHEMISTRY**  
**School of Natural Science**  
**College of Natural Health and Applied Science**  
**Kean University**

**Mission:**

The mission of the Chemistry Department, in support of and aligned with the missions of the University and College, is to offer major programs for those students wishing to concentrate their undergraduate studies in the field of chemistry. A program certified by the Committee on Professional Training of the American Chemical Society (ACS) is offered for those students wishing to undertake graduate study in chemistry, enter professional schools or who wish to seek employment as chemists upon graduation. Our courses allow students to engage in new and current technologies and to develop research skills through our undergraduate research program.

The Department of Chemistry recognizes its obligation to guide its students to think analytically, critically and creatively through qualitative and quantitative reasoning in our discipline-based courses. The five basic Chemistry subdisciplines are introduced and reinforced with an integrated approach of laboratory, in silico, and classroom learning. By the end of the program, students will have a firm integrated understanding of basic chemical principles as demonstrated through a primary literature review, written comprehensive thesis and scientifically accurate presentation.

**Assessment Process:**

Chemistry Assessment Plan is based on the ACS accreditation standard. It utilizes nationally administered ACS examinations at the end of multi semester courses in all sub-disciplines. These include General Chemistry, Organic Chemistry, Inorganic Chemistry, Analytical Chemistry, Biochemistry, and Physical Chemistry. The plan will be updated as Chemistry program applies for continuation of its ACS accreditation every 5 years.

Chemistry students have five (5) core courses to take as part of the requirements for the major. These 5 core courses provide a sound backbone of the discipline regarding the research and theoretical aspects of Chemistry as well as the various areas of study within this field. As such, these core courses are the primary vehicle for assessing the knowledge of our students. Beyond the core courses, students take at least three (3) other elective courses and it is likely that no two (or very few) majors take the exact same grouping of courses. Therefore, the faculty has agreed to center our assessment on the core knowledge of Chemistry within the five core courses.

Each core course has some of the assessment tools such as exams, research and scientific writing assignments, primary literature analysis, group work products, etc., as

part of the evaluation process and the program has used results of assessment for making improvements to program practices aimed at increasing student learning.

Beginning Fall 2012, the culminating assignment done in the Capstone Course, has been identified as a direct measure for assessing attainment of our program Student Learning Outcomes. In this course, assessment data are collected from an assignment that requires students to provide the evidence of meeting program goals. Each semester, composite data from scored student assignments will be collected and analyzed to address areas of program strengths and weaknesses and to inform our decisions ultimately resulting in program improvements. In addition, a systematic process for gathering data utilizing an indirect measure, the Graduating Student Survey, was established. Data from the student survey will also help inform our decisions regarding program improvement to increase student learning.

**Program Student Learning Outcomes (SLOs) – as aligned with KU SLOs derived from the Institutional Mission\* and GE SLOs.\*\* (Data from Direct and Indirect Measures collected each semester in the Capstone Course or a designated, end-of-program course.)**

*Students who graduate with a BA/BS in CHEMISTRY should be able to:*

**SLO1:** Demonstrate a firm understanding of basic chemical principles as demonstrated by the reviewing of the primary literature and dictated by the American Chemical Society. (KU 1, 4) (GE K1, S3, S4, S5, GEV5)

**Direct Measure:**

1. Departmental and ACS scores to show mastery of concepts and consistency throughout the sections.
2. CHEM 4908: Research paper scored with rubric to demonstrate achievement of program goals.

**Indirect Measure:** Graduating Senior Survey

**SLO2:** Analyze multiple sources of data to synthesize scientific conclusions. (KU 1, 4) (GE K1, S3, S4, S5)

**Direct Measure:**

1. CHEM 2491 Term Paper with same basic (applied at a less rigorous level) rubrics as the CHEM 4908
2. CHEM 4908: Research paper scored with rubric to demonstrate achievement of program goals.

**Indirect Measure:** Graduating Senior Survey

**SLO3:** Articulate the importance of chemical issues in the context of its impact on society. (KU 1, 3, 4) (GE K1, S1, S2, S3, S4, S5)

**Direct Measure:**

1. CHEM 3383: The students will have to show real world application in the “Heat Capacity Ratio”

2. CHEM 4908: Research paper scored with rubric to demonstrate achievement of program goals.

**Indirect Measure:** Graduating Senior Survey

**SLO4:** Report and present chemical issues with modern technology in correct scientific format. (KU 1, 4) (GE K3, S1, S2, S5)

**Direct Measure:**

1. CHEM 2491: Students will present their research paper to the class using the GE and departmental rubrics.
2. CHEM 4908: Presentation of Research thesis scored with rubric to demonstrate achievement of program goals.

**Indirect Measure:** Graduating Senior Survey

**\* KU Student Outcomes: *Kean University graduates should be able to:***

1. Think critically, creatively and globally;
2. Adapt to changing social, economic, and technological environments;
3. Serve as active and contributing members of their communities; and
4. Advance their knowledge in the traditional disciplines (GE) and enhance their skills in professional areas (Prof. programs)

**\*\*General Education Student Learning Outcomes**

*Student Learning Outcomes – Knowledge: Students will demonstrate proficiency in knowledge and content by:*

- (K1) applying the scientific method to understand natural concepts and processes;
- (K2) evaluating major theories and concepts in social sciences;
- (K3) relating historical references to literature; and
- (K4) evaluating major theories and concepts in the fine arts.

*Student Learning Outcomes – Skills: Students will demonstrate the skills necessary to:*

- (S1) write to communicate and clarify learning ;
- (S2) communicate effectively through speech;
- (S3) solve problems using quantitative reasoning;
- (S4) think critically about concepts in multiple disciplines; and
- (S5) show information literacy.

*Student Learning Outcomes – Values: Students will exhibit a set of values that demonstrates:*

- (GEV1) personal responsibility ;
- (GEV2) ethical and social responsibility
- (GEV3) social and civic engagement
- (GEV4) respect for diverse cultures and perspectives
- (GEV5) life-long learning