

Chemistry Department
Student Assessment Plan (updated May 2014)

The academic program of the Hendrix College Chemistry Department is designed to help students become life-long, creative problem solvers using chemistry. The curriculum has been developed to help students to:

1. acquire the fact-based knowledge necessary to understand chemistry as citizens and practice it as scientists,
2. design and execute laboratory experiments,
3. develop the critical thinking skills necessary to assess and assemble facts and data,
4. work effectively individually and in groups,
5. communicate chemistry effectively in written and oral forms, and
6. assess the ethical implications of their work and its impact on our society and environment.

These learning goals are thoroughly integrated into the curriculum as demonstrated by the assessment audit of the department's courses in Table I (see last page).

Assessment and Data Collection

In keeping with our educational mission, the Chemistry Department carefully assesses the effectiveness of our programs. We have to meet both internal and external standards as we provide an undergraduate degree certified by our professional accreditation body, the American Chemical Society (ACS). The ACS accreditation of the Chemistry Department is on a five year cycle. The guidelines for program approval and student certification can be found on the ACS web site at <http://tinyurl.com/3q8quxt>.

Formal Data Collection:

The quality of our majors is the primary focus of the department's formal assessment efforts. The quality of our seniors is tracked by collection of the data found in Table II. This data is collected and maintained by the department chair. These measures include direct student assessment data:

- an externally designed exam (the Diagnostic of Undergraduate Chemical Knowledge, DUCK) tests our students' knowledge in comparison to what is expected of chemistry majors across the USA.

Table II Data Assessing the Quality of Senior Majors

	Quality of Majors
<u>Direct</u>	DUCK
	Senior Capstone Papers
	Grades from the Senior Seminars
	Senior Independent Research Papers
	List of National Presentations
	Professional Plans of Recent Graduates
<u>Indirect</u>	SALG ¹

1. SALG-Student Assessment of Learning Gains (SALG) adapted from work by Elaine Seymour
<http://www.wcer.wisc.edu/salgains/instructor/>

- copies of senior capstone papers and the grades for the associated senior seminars. These internal measures are discussed yearly by the faculty as we set the threshold for Honors and the departmental senior awards.
- copies of senior research papers, and
- a list of the professional plans of recent graduates.

Indirect assessment measures include a SALG (Student Assessment of Learning Gains) given in the spring to all seniors. This survey is intended to gauge the students' perception of their chemistry education at Hendrix.

Informal Assessment Data:

A number of assessments are used informally throughout the curriculum to insure consistency between faculty in multiple-section courses as well as testing our courses against national norms. These efforts, listed against the courses, include:

- General Chemistry (CHEM 110&120): The laboratory assessment includes a common laboratory experience which includes a laboratory practical, laboratory final and a student survey. The lecture sections use a common final in both semesters. The final used for the second semester is a national standard exam provided by the ACS.
- Organic Chemistry (CHEM 240&250): a common laboratory experience and a common course final in both semesters Organic Chemistry. The final used for the second semester is a national standard exam provided by the ACS.

Most of the upper level courses use the appropriate national standardized exam provided by the ACS as part of the course final. At present these include Physical Chemistry: Quantum Mechanics and Spectroscopy (CHEM 310), Physical Chemistry: Thermodynamics and Chemical Kinetics (CHEM 320), Advanced Inorganic (CHEM 340), and Advanced Analytical Chemistry (CHEM350). Biological Chemistry expects to use a new ACS final starting in the fall of 2013. Although these data are important parts of our assessment work, they are reviewed and maintained informally.

Assessment Audit: Departmental Learning Goals versus Individual Course Goal

This chart uses a 3 point scale to indicate the correlation between the departmental learning goals and individual courses:

N/A 1 2 3
 Not Applicable Slightly Important Moderately Important Very Important

Departmental Learning Goals: Courses:	Acquire fact-based knowledge	Execute Exp'ts Design Exp'ts	Develop critical thinking skills to assess and assemble facts & data	Work effectively in groups	Communicate chemistry effectively	Assess the ethics of work
Chem 100 Concepts	3	N/A	2	1	3	3
Chem 101 Chem of Envir.	3	2 1	3	3	3	3
Chem 101 Lab	1	3 1	3	3	1	1
Chem 110 & 120 Gen Chem	3	N/A	2	1	1	1
Gen Chem Lab	2	2 1	3	2	2	1
Chem 150 Adv. Gen Chem	3	N/A	2	1	1	1
Chem 150 Lab	2	2 1	3	2	2	1
Chem 240 & 250 Organic	3	N/A	3	N/A	1	2
Organic Lab	3	3 1	3	2	2	3
Chem 280 Env. Analysis	3	NA 3	3	2	3	3
Env. Anal. Lab	2	3 3	3	3	2	1
Chem 310 & 320 P-Chem	3	N/A	3	1	3	1
ATC Lab	2	3 3	3	3	3	2
Chem 320 lab	3	3 1	3	3	2	1
Chem 330 Biochem.	3	3 3	3	2	2	2
Biochem Lab	3	3 1	3	3	2	1
Chem 335 Adv BioChem	3	N/A	2	1	1	1
Chem 340 Adv. Inorg.	3	N/A	3	1	2	2
Chem 350 Adv. Anal.	3	N/A 1	3	2	3	2
Chem 410 Adv. P-Chem	3	2 2	3	1	2	1
Chem 450 Fac. Spon. Res.	2	3 3	3	2	3	3