4/06

ASSESSMENT PLAN FOR THE INDIANA UNIVERSITY KOKOMO BACHELOR OF ARTS DEGREE IN CHEMISTRY

I. Program's mission

The Bachelor of Arts degree in Chemistry is one of four degrees currently offered within the Department of Natural, Information, and Mathematical Sciences (NIMS). This degree was approved by the Indiana Commission for Higher Education in 1990, but not funded by the University until 2001. In Spring 2004 the department awarded its first Chemistry degree to an IU Kokomo graduate.

Mission Statement: The Bachelor of Arts degree in Chemistry is designed to provide students with the background needed for science-related industrial and academic positions, for entry into chemistry graduate programs or professional programs (for example: medical school, dental school, law school) and, coupled with the appropriate education courses, to prepare students to teach high school chemistry.

The Chemistry degree mission is directly tied to the IU Kokomo mission statement: "...to meet educational needs of north central Indiana..." and to the mission of the IU Kokomo Division of Arts and Sciences, in which the Department of Natural, Information, and Mathematical Sciences is housed. Particularly relevant in the Division's mission is: To deliver "a liberal arts education that combines broad exposure to the insights and methods of the principal academic disciplines with focused study in one or more areas. .... A liberal arts education emphasizes the ability to reason clearly, to extract the essential significance of large bodies of information, to apply general principles in new contexts, to communicate effectively, and to be sensitive to human creativity and morality."

II. Program goals and student learning outcomes

A. To demonstrate achievement of the Chemistry degree mission described in I. above, students earning a Bachelor of Arts degree in Chemistry will demonstrate:

1. Knowledge and understanding of theoretical basis for chemistry;
2. The ability to work effectively in the laboratory;
3. The ability to apply quantitative reasoning skills and critical thinking to problem solving;
4. The ability to communicate in the scientific tradition

B. The outcomes and components associated with the program goals are organized below.

Goal I: Students earning a Bachelor of Arts degree in Chemistry will demonstrate knowledge and understanding of the theoretical basis for chemistry.

Student learning outcomes: Students can:

A. Connect observations with prior information

Components:

1. Prediction of chemical reaction products
   Performance criteria: Correct/partially correct/incorrect
2. Identification of chemical reaction products
   Performance criteria: Correct/partially correct/incorrect

B. Explain the physical and chemical properties of substances based on an understanding of atomic and molecular structure.

Components:

1. Explanation of physical properties
   Performance criteria: Accurate & detailed/accurate but lacking some detail/inaccurate

2. Explanation of chemical properties
   Performance criteria: Accurate & detailed/accurate but lacking some detail/inaccurate

C. Perform quantitative calculations using experimental data.
   Components:
   1. Selection of an appropriate theoretical relationship/equation for data analysis.
      Performance criteria: Correct/partially correct/incorrect
   2. Completion of quantitative calculations
      Performance criteria: Correct/partially correct/incorrect
   3. Explanation of the significance and/or validity of the results.
      Performance criteria: Correct/partially correct/incorrect

Goal II: Students earning a Bachelor of Arts degree in Chemistry will demonstrate the ability to work effectively in the laboratory.

Student learning outcomes:

A. Demonstrate the understanding and ability to carry out laboratory procedures effectively and safely.
   Components:
   1. Explanation of the purpose of the steps in a laboratory procedure.
      Performance criteria: Correct & detailed/partially correct/incorrect
   2. Use of standard laboratory equipment and instrumentation properly and safely.
      Performance criteria: Correct and efficient/correct but inefficient/incorrect

B. Collect, analyze, and draw relevant conclusions from experimental data.
   Components:
   1. Collection and organization of relevant data.
      Performance criteria: Complete and organized/complete but disorganized/incomplete or missing
   2. Analyze experimental data appropriately.
      Performance criteria: Correct/partially correct/incorrect
   3. Interpretation of processed data.
      Performance criteria: Correct/partially correct/incorrect or missing
   4. Identification of experimental errors.
      Performance criteria: Correct/partially correct/incorrect or missing

C. Design procedures appropriate to the goal of an investigation.
   Components:
   1. Selection of a suitable experimental approach.
      Performance criteria: Effective and efficient/ effective but inefficient/ ineffective
   2. Modification of the approach to optimize the experimental outcome.
      Performance criteria: Effective/ineffective

Goal III: Students earning a Bachelor of Arts degree in Chemistry will demonstrate the ability to apply quantitative reasoning skills and critical thinking to problem solving

Student learning outcomes:

A. Organize relevant information for analysis
   Components:
   1. Identification of critical data elements necessary to understand the problem
      Performance criteria: Correct/partially correct/incorrect
   2. Identification of applicable theories and/or mathematical relationships
      Performance criteria: Correct/partially correct/incorrect

B. Calculate quantitative values and/or formulate an explanation of observations
Components:
1. Application of theories to illustrate how observations can be understood
Performance criteria: Correct/partially correct/incorrect
2. Application of equations to determine mathematical values with appropriate significant figures and units
Performance criteria: Correct/partially correct/incorrect

C. Draw conclusions from quantitative values and/or experimental observations
Components:
1. Correlation of quantitative results to chemical and/or physical properties of the system
Performance criteria: Correct and complete/correct but incomplete/incorrect
2. Description and assessment of the significance of the conclusions
Performance criteria: Correct and complete/correct but incomplete/incorrect

Goal IV: Students earning a Bachelor of Arts degree in Chemistry will demonstrate the ability to communicate in the scientific tradition.

Student learning outcomes: Students can:
A. Write effective laboratory reports.
Components:
1. Utilization of scientific terminology.
Performance criteria: Correct/partially correct/incorrect
2. Data analysis.
Performance criteria: Correct and complete/mostly correct and complete/incorrect
3. Explanation of conclusions.
Performance criteria: Clear, concise, and organized/clear but not concise/unclear
4. Utilization of acceptable English.
Performance criteria: Correct/partially correct/incorrect

B. Present written and oral summaries of scientific literature.
Components:
1. Identification of relevant scientific literature.
Performance criteria: Efficient and effective/partially effective/ineffective
2. Location of relevant scientific literature.
Performance criteria: Efficient and effective/partially effective/ineffective
3. Citation of sources.
Performance criteria: Correct/partially correct/incorrect
4. Interpretation of the work of others.
Performance criteria: Correct/partially correct/incorrect
5. Presentation to an audience.
Performance criteria: Clear, coherent, and organized/partially clear and coherent/unclear

III. Curriculum map (see following page)
Note: "Intro" indicates students are introduced, and "enfor" indicates that a concept or skill is enforced.

Goal/Outcome/ Component	CHEM-C 105 (3 cr) General Chem I	CHEM-C 106 (3 cr) General Chem II	CHEM-C 125 (2 cr/) Gen Chem Lab I	CHEM-C 126 (2 cr) Gen Chem Lab II	CHEM-C 210 (3 cr) Intro Analytical	CHEM-C 211 (2 cr) Intro Anal. Lab	CHEM-C 310 (3 cr) Instrumental Anal	CHEM-C 311 (2 cr) Instrumental Lab	CHEM-C 341 (3 cr) Organic Lecture I	CHEM-C 342 (3 cr) Organic Lecture II	CHEM-C 343 (2 cr) Organic Lab I	CHEM-C 344 (2 cr) Organic Lab II	CHEM-C 357 (5 cr) Green Chemistry	CHEM-C 361 (3 cr) Physical Chem	CHEM-C 400 (1 cr) Chem Information	CHEM-C 409 (variable cr) Research	CHEM-C 430 (3 cr) Inorganic Chem	CHEM-C 443 (3 cr) Org Spectroscopy	CHEM-C 483 (3 cr) Biochemistry
Goal I, A-1			Intro	Enfor	Enfor				Intro	Enfor	Intro	Enfor	Intro					Intro	Enfor
A-2	Intro		Intro	Enfor					Intro	Enfor	Intro	Enfor	Intro				Enfor	Intro	Enfor
B-1	Intro	Enfor	Intro	Enfor	Enfor	Enfor					Intro	Enfor		Enfor			Enfor	Intro	
Goal II, A-1			Intro	Enfor		Enfor	Intro	Enfor			Intro	Enfor	Intro					Intro	
A-2			Intro	Enfor		Enfor		Intro			Intro	Enfor	Intro					Intro	
B-1			Intro	Enfor		Enfor		Intro			Intro	Enfor	Intro					Intro	
B-2			Intro	Enfor		Enfor		Intro			Intro	Enfor	Intro					Intro	
B-3			Intro	Enfor		Enfor		Intro			Intro	Enfor	Intro					Intro	
B-4			Intro	Enfor		Enfor		Intro			Intro	Enfor	Intro					Intro	
C-1		Intro				Intro						Intro	Intro					Intro	
C-2						Intro						Intro	Intro					Intro	
Goal III, A-1	Intro	Enfor	Intro	Enfor	Enfor	Enfor	Intro	Enfor	Intro	Enfor	Intro	Enfor	Intro					Intro	
A-2	Intro	Enfor	Intro	Enfor	Enfor	Enfor	Intro	Enfor	Intro	Enfor	Intro	Enfor	Intro					Intro	
B-1	Intro	Enfor	Intro	Enfor	Enfor	Enfor			Intro	Enfor	Intro	Enfor	Intro	Enfor				Intro	Enfor
B-2	Intro	Enfor	Intro	Enfor	Enfor	Enfor					Intro	Enfor	Intro	Enfor				Intro	
C-1	Intro	Enfor	Intro	Enfor	Enfor	Enfor	Intro				Intro	Enfor	Intro	Enfor				Intro	
C-2			Intro	Enfor	Enfor	Intro	Intro		Intro	Enfor	Intro	Enfor	Intro	Enfor				Intro	
Goal IV, A-1			Intro	Enfor		Enfor			Intro	Enfor	Intro	Enfor	Intro		Intro			Intro	
A-2	Intro	Enfor	Intro	Enfor		Enfor			Intro	Enfor	Intro	Enfor	Intro	Enfor	Intro			Intro	Enfor
A-3	Intro	Enfor	Intro	Enfor		Enfor			Intro	Enfor	Intro	Enfor	Intro	Enfor				Intro	
B-1		Intro								Intro		Intro	Intro	Enfor	Intro			Intro	
B-2		Intro								Intro		Intro	Intro	Enfor	Intro			Intro	
B-3										Intro		Intro	Intro	Enfor	Intro			Intro	
B-4		Intro											Intro	Enfor	Intro			Intro	

B. Because we are only now offering all the courses chemistry majors require, we have not had the opportunity to carry through with some aspects of our assessment plan. Most notably, we will have to determine whether or not the Educational Testing Service Major Field Test in Chemistry provides an appropriate way to establish the overall chemical knowledge of our majors.

C. With the exception of our abilities to give examinations we hope will reflect student learning in our various classes, few, if any, of us are well-versed in the language of and/or the formalized practice of assessment. For this reason, we will solicit the ongoing support of those on campus who can help us see our way through the assessment jungle.