Program Outcomes Assessment

BA/BS in Chemistry

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General Information (Program Outcomes Assessment)

Standing Requirements

Mission Statement

The Department of Chemistry and Physics provides comprehensive, student-centered education leading to Bachelors degrees in chemistry and physics. Students gain knowledge and problem-solving skills through rigorous lecture and laboratory course work as well as through challenging independent research experiences. We are committed to preparing students to pursue careers as scientists, engineers, teachers, and health professionals. We contribute to the scientific literacy of students in other disciplines through our general education courses. Faculty advance knowledge through their own research and provide service to the University and scientific communities, as well as to the public.

Outcomes Library

BA/BS in Chemistry Outcome Set

Outcome #1 Fundamental Concepts

Students pursuing a baccalaureate degree in chemistry will exhibit a sound grasp of fundamental concepts in the discipline.

Outcome	Mapping
Outcome #1	No Mapping

Outcome #2 Problem solving

Students pursuing a baccalaureate degree in chemistry will be able to employ problem solving skills together with scientific models and mathematical techniques to explain and predict behavior of chemical systems.

Outcome	Mapping
Outcome #2	**Foundational Studies:** 2. Critically evaluate the ideas of others.

Outcome #3 Laboratory Procedures

Students pursuing a baccalaureate degree in chemistry will be able to carry out basic laboratory procedures demonstrating appropriate use of instrumentation, quantitative measurement, and data analysis.

Outcome	Mapping
Outcome #3	**Foundational Studies:** IIIa. Quantitative Literacy

Outcome #4 Communication

Students pursuing a baccalaureate degree in chemistry will be able to demonstrate professional communication skills.

Outcome	Mapping
Outcome #4	**Foundational Studies:** 10. Express themselves effectively, professionally, and persuasively both orally and in writing.

Curriculum Map

Active Curriculum Maps

Chemistry Curriculum Map (See appendix)
Alignment Set: BA/BS in Chemistry Outcome Set
Created: 03/10/2010 1:48:02 pm CST
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Communication of Outcomes

The Chair of the Department will summarize or ask the program review committee to summarize the program review findings at a Departmental Meeting near the end of the Spring Semester.

Archive (This area is to be used for archiving pre-TaskStream assessment data and for current documents.)

Archive

File Attachments:

1. **Chemistry** (See appendix)
   Student Outcomes Assessment Plan Rubric - January 2004
2. **Chemistry** (See appendix)
   Assessment Summary

2009-2010 Assessment Cycle

Assessment Plan

Outcomes and Measures

BA/BS in Chemistry Outcome Set

Outcome #3 Laboratory Procedures

Students pursuing a baccalaureate degree in chemistry will be able to carry out basic laboratory procedures demonstrating appropriate use of instrumentation, quantitative measurement, and data analysis.

Outcome #3

Measure: Laboratory Skills
Direct - Other

Details/Description: At least two faculty members who teach one or more of the following courses--Chem 351L, 352L, 321, 340, 355, 421, 461L, and 462L--will meet with the committee to assist in completing the "laboratory procedures rubric" (see "Supporting Attachments" below).

Target: 100% of the categories in the rubric will be rated at least satisfactory. A satisfactory rating in a category means that at least 80% of the students are rated satisfactory or better in that category.

Implementation Plan (timeline):
By October 1 (odd-numbered years): at least two faculty members are recruited to participate and are given a copy of the rubric.
By December 15: the meeting is held and the results are transmitted to TaskStream.

Responsible Individual(s): Rich Kjonaas

Supporting Attachments:

LaboratoryProceduresRubric-201X-201Y.doc (Microsoft Word) (See appendix)

Outcome #4 Communication

Students pursuing a baccalaureate degree in chemistry will be able to demonstrate professional communication skills.

Outcome #4

Measure: Oral Communication
Direct - Other

Details/Description: Faculty members will make direct observation of student presentations in Chem 400 and at professional meetings. These observations will be followed by a roundtable discussion by those making the observations.

Target: Observers will agree that at least 80% of the graduating chemistry majors have oral communication skills that are at least satisfactory.

Implementation Plan (timeline):
By February 1 (even-numbered years): all chemistry faculty who either teach Chem 400 or who have students who will be presenting papers are reminded to be prepared to evaluate students' oral presentation skills.
By May 1: the meeting is held and the results are transmitted to TaskStream.

Responsible Individual(s): Rich Kjonaas

Measure: Written Communication
Direct - Other

Details/Description: The Assessment Committee will ask selected faculty members to submit

representative samples of student writing from lab reports, exams, or other assignments, from upper level courses. This will be followed by a roundtable discussion of the committee and these faculty members.

Target: At least 80% of the chemistry majors in these courses will exhibit written communication skills appropriate for that level.

Implementation Plan (timeline):
By October 1 (odd-numbered years): at least two faculty members are recruited to participate.
By December 1: copies of samples are submitted to the committee, and the meeting is scheduled.
By December 15: the meeting is held and the results are transmitted to TaskStream.

Responsible Individual(s): Rich Kjonaas

Assessment Findings

Finding per Measure

BA/BS in Chemistry Outcome Set

Outcome #3 Laboratory Procedures

Students pursuing a baccalaureate degree in chemistry will be able to carry out basic laboratory procedures demonstrating appropriate use of instrumentation, quantitative measurement, and data analysis.

Outcome #3

Measure: Laboratory Skills
Direct - Other

Details/Description: At least two faculty members who teach one or more of the following courses--Chem 351L, 352L, 321, 340, 355, 421, 461L, and 462L--will meet with the committee to assist in completing the "laboratory procedures rubric" (see "Supporting Attachments" below).

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Implementation Plan (timeline):
By October 1 (odd-numbered years): at least two faculty members are recruited to participate and are given a copy of the rubric.
By December 15: the meeting is held and the results are transmitted to TaskStream.

Responsible Individual(s): Rich Kjonaas

Supporting Attachments:

LaboratoryProceduresRubric-201X-201Y.doc (Microsoft Word) (See appendix)

Findings for Laboratory Skills

Summary of Findings: ok

Results: Target Achievement: Met

Recommendations : none this year

Reflections/Notes :

Substantiating Evidence:

LaboratoryProceduresRubric-2009-2010.doc (Microsoft Word) (See appendix)

Outcome #4 Communication

Students pursuing a baccalaureate degree in chemistry will be able to demonstrate professional communication skills.

Outcome #4

Measure: Oral Communication
Direct - Other

Details/Description: Faculty members will make direct observation of student presentations in Chem 400 and at professional meetings. These observations will be followed by a roundtable discussion by those making the observations.

Target: Observers will agree that at least 80% of the graduating chemistry majors have oral communication skills that are at least satisfactory.

Implementation Plan (timeline):
By February 1 (even-numbered years): all chemistry faculty who either teach Chem 400 or who have students who will be presenting papers are reminded to be prepared to evaluate students' oral presentation skills.
By May 1: the meeting is held and the results are transmitted to TaskStream.

Responsible Individual(s): Rich Kjonaas

Findings for Oral Communication

Summary of Findings: A "Communication Skills" assessment meeting was held on April 1, 2010. In attendance were R. Fitch, W. Flurkey, J. Inlow, R. Kjonaas, L. Rosenhein, and S. Wolf. The participants agreed that when students make presentations at the Indiana Academy of Science and the American Chemical Society as well as in our SURE Program, their performance is generally quite good. The Chem 400 instructor (J. Allen) could not be present, but he sent a 250 word document which provided some insight into how he is teaching the course, how the students respond to the course requirements, and his assessment of their performance. Overall, the group agreed that by the time students graduate from the chemistry program, they have reasonably good oral communication skills, but there is always room for improvement, especially in their ability to use technical jargon associated with the field.

Results: Target Achievement: Met

Recommendations : In order to provide additional oral presentation opportunities for students, the course Chem 300 is proposed. It could be modeled after Chem 400. It would require attendance at seminars by visiting speakers, as well as short presentations by students. Seminars may serve as models of how to present information to an audience, and the presentations allow students to develop their own presentation skills. Chem 300, while not required, would count as an advanced elective.

Reflections/Notes :

Substantiating Evidence:

Chemistry 400 Student Communication-1 (2).doc (Microsoft Word) (See appendix)

These Findings are associated with the following Actions:

Oral and Written Communication Skills
(Action Plan; 2009-2010 Assessment Cycle)

Measure: Written Communication
Direct - Other

Details/Description: The Assessment Committee will ask selected faculty members to submit representative samples of student writing from lab reports, exams, or other assignments, from upper level courses. This will be followed by a roundtable discussion of the committee and these faculty members.

Target: At least 80% of the chemistry majors in these courses will exhibit written communication skills appropriate for that level.

Implementation Plan (timeline):
By October 1 (odd-numbered years): at least two faculty members are recruited to participate.
By December 1: copies of samples are submitted to the committee, and the meeting is scheduled.
By December 15: the meeting is held and the results are transmitted to TaskStream.

Responsible Individual(s): Rich Kjonaas

Findings for Written Communication

Summary of Findings: A "Communication Skills" assessment meeting was held on April 1, 2010. In attendance were R. Fitch, W. Flurkey, J. Inlow, R. Kjonaas, L. Rosenhein, and S. Wolf. The group agreed that there was some room for improvement in the students' written communication skills. It was concluded that rather than add some new requirement, faculty in all major courses should look for opportunities to incorporate some additional writing and provide more feedback to stduents. At the same time, however, it was recognized that we must control our grading workloads.

Results: Target Achievement: Not Met

Recommendations : Faculty who teach courses for chemisry majors should look for opportunities to incorporate some additional writing and provide more feedback to stduents.

Reflections/Notes :

These Findings are associated with the following Actions:

Oral and Written Communication Skills
(Action Plan; 2009-2010 Assessment Cycle)

Overall Recommendations

No text specified

Overall Reflection

No text specified

Action Plan

Actions

BA/BS in Chemistry Outcome Set

Outcome #3 Laboratory Procedures

Students pursuing a baccalaureate degree in chemistry will be able to carry out basic laboratory procedures demonstrating appropriate use of instrumentation, quantitative measurement, and data analysis.

Outcome #3 *No actions specified*

Outcome #4 Communication

Students pursuing a baccalaureate degree in chemistry will be able to demonstrate professional communication skills.

Outcome #4

Action: Oral and Written Communication Skills

This Action is associated with the following Findings

Findings for Oral Communication
(Assessment Plan and Assessment Findings; 2009-2010 Assessment Cycle)

Summary of Findings: A "Communication Skills" assessment meeting was held on April 1, 2010. In attendance were R. Fitch, W. Flurkey, J. Inlow, R. Kjonaas, L. Rosenhein, and S. Wolf.
The participants agreed that when students make presentations at the Indiana Academy of Science and the American Chemical Society as well as in our SURE Program, their performance is generally quite good. The Chem 400 instructor (J. Allen) could not be present, but he sent a 250 word document which provided some insight into how he is teaching the course, how the students respond to the course requirements, and his assessment of their performance. Overall, the group agreed that by the time students graduate from the chemistry program, they have reasonably good oral communication skills, but there is always room for improvement, especially in their

ability to use technical jargon associated with the field.

Findings for Written Communication
(Assessment Plan and Assessment Findings; 2009-2010 Assessment Cycle)

Summary of Findings: A "Communication Skills" assessment meeting was held on April 1, 2010. In attendance were R. Fitch, W. Flurkey, J. Inlow, R. Kjonaas, L. Rosenhein, and S. Wolf. The group agreed that there was some room for improvement in the students' written communication skills. It was concluded that rather than add some new requirement, faculty in all major courses should look for opportunities to incorporate some additional writing and provide more feedback to stduents. At the same time, however, it was recognized that we must control our grading workloads.

Action Details: (1) In an e-mail Assessment Report to chemistry faculty, ask that those teaching courses for chemistry majors renew their efforts to look for opportunities to incorporate some additional writing and provide more feedback to students.
(2) Develop Chem 300 course and submit documents to the CAS FAC.

Implementation Plan (timeline): (1) early summer 2010: send e-mail Assessment Report to chemistry faculty (2) early summer 2010: submit documents to CAS FAC

Key/Responsible Personnel: (1) Rich Kjonaas (2) Chair of Chemistry Curriculum Committee (Jennifer Inlow)

Measures: none

Resource Allocations: NA

Priority: Medium

Status Report

Action Statuses

BA/BS in Chemistry Outcome Set

Outcome #3 Laboratory Procedures

Students pursuing a baccalaureate degree in chemistry will be able to carry out basic laboratory procedures demonstrating appropriate use of instrumentation, quantitative measurement, and data analysis.

Outcome #3 *No actions specified*

Outcome #4 Communication

Students pursuing a baccalaureate degree in chemistry will be able to demonstrate professional communication skills.

Outcome #4

Action: Oral and Written Communication Skills

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(2) Develop Chem 300 course and submit documents to the CAS FAC.

Implementation Plan (timeline): (1) early summer 2010: send e-mail Assessment Report to chemistry faculty (2) early summer 2010: submit documents to CAS FAC

Key/Responsible Personnel: (1) Rich Kjonaas (2) Chair of Chemistry Curriculum Committee (Jennifer Inlow)

Measures: none

Resource Allocations: NA

Priority: Medium

Status for Oral and Written Communication Skills

Current Status: Completed

Resource Allocation(s) Status: NA

Next Steps/Additional Information: The Chem 300 course is now in place and has been taught one semester.

Status Summary

No text specified

Summary of Next Steps

No text specified

2010-2011 Assessment Cycle

Assessment Plan

Outcomes and Measures

BA/BS in Chemistry Outcome Set

Outcome #1 Fundamental Concepts

Students pursuing a baccalaureate degree in chemistry will exhibit a sound grasp of fundamental concepts in the discipline.

Outcome #1

Measure: Fundamental Concepts
Direct - Exam

Details/Description: All chemistry majors will take the Major Field Test in chemistry near the end of their senior year, and the Assessment Committee will discuss the results.

Target: The class as a whole will score at or above the 50th percentile in each of the four areas (physical, organic, inorganic, and analytical) as well as in the two assessment indicator areas (biochemistry and critical thinking), and except for an occasional student, no one will be below the 33rd percentile in any area.

Implementation Plan (timeline): By April 1 (each year): the Chem 400 instructor will administer the exam to all of the students in the course (all senior chemistry majors).
During odd-numbered years: within a week of receiving the results from ETS, the Department Chairperson will transmit the results along with the results from the previous year (an even numbered year) to the committee who will meet within a week to discuss the results of those two years.

Responsible Individual(s): Rich Kjonaas

Outcome #2 Problem solving

Students pursuing a baccalaureate degree in chemistry will be able to employ problem solving skills together with scientific models and mathematical techniques to explain and predict behavior of chemical systems.

Outcome #2

Measure: Problem Solving Skills
Direct - Other

Details/Description: At least two faculty members who teach one or more of the following courses--Chem 321, 352, 421, and 461--will meet with the committee and, with the aid of graded exams or homework, will assist in completing the "Problem Solving Skills Rubric" (see "Supporting Attachments" below).

Target: Essentially all of the categories in the rubric will be rated at least "Fair" with most of them rated "Good" or better.

Implementation Plan (timeline): By October 1 (even-numbered years): at least two faculty members are recruited, are given a copy of the rubric, and are asked to assemble a collection of copies of graded exams or homework assignments.
By December 15: the meeting is held and the results are transmitted to TaskStream.

Responsible Individual(s): Rich Kjonaas

Assessment Findings

Finding per Measure

BA/BS in Chemistry Outcome Set

Outcome #1 Fundamental Concepts

Students pursuing a baccalaureate degree in chemistry will exhibit a sound grasp of fundamental concepts in the discipline.

Outcome #1

Measure: Fundamental Concepts
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During odd-numbered years: within a week of receiving the results from ETS, the Department Chairperson will transmit the results along with the results from the previous year (an even numbered year) to the committee who will meet within a week to discuss the results of those two years.

Responsible Individual(s): Rich Kjonaas

Findings for Fundamental Concepts

Summary of Findings: For this two-year assessment period (2010-2011), the total test average was the 53rd percentile. Other results (percentile) were Physical-53, Organic 53, Inorganic-35, Analytical 48, Biochemistry-60, and Critical Thinking 40. (See "Substantiating Evidence below.)

Results: Target Achievement: Not Met

Recommendations : (1) Add an inorganic chemistry course to the core curriculum.
(2) Take no action based on the 48th percentile average score in Analytical because the deficiency is very small.
(3) Wait another assessment cycle to take action on the 40 percentile score for Critical Thinking because this seems to be a simple two-year slump when compared to the entire ten years that the Test has been given.

Reflections/Notes : Actually, the curriculum committee had already begun action on adding an inorganic chemistry course to the core curriculum because these results are consistent with those of previous years and these previous year results were common knowledge among the faculty in the Department. This is the first time that these Major Field Test results were part of a formal assessment program.

Substantiating Evidence:

Major Field Test Results Table.pdf (Adobe Acrobat Document) (See appendix)

Outcome #2 Problem solving

Students pursuing a baccalaureate degree in chemistry will be able to employ problem solving skills together with scientific models and mathematical techniques to explain and predict behavior of chemical systems.

Outcome #2

Measure: Problem Solving Skills
Direct - Other

Details/Description: At least two faculty members who teach one or more of the following courses--Chem 321, 352, 421, and 461--will meet with the committee and, with the aid of graded exams or homework, will assist in completing the "Problem Solving Skills Rubric" (see "Supporting Attachments" below).

Target: Essentially all of the categories in the rubric will be rated at least "Fair" with most of them rated "Good" or better.

Implementation Plan (timeline): By October 1 (even-numbered years): at least two faculty

members are recruited, are given a copy of the rubric, and are asked to assemble a collection of copies of graded exams or homework assignments.
By December 15: the meeting is held and the results are transmitted to TaskStream.

Responsible Individual(s): Rich Kjonaas

Findings for Problem Solving Skills

Summary of Findings: Three faculty members met with the committee. Each presented data copies of exams, homework, and quizzes to support their comments. Five of the seven categories in the rubric were addressed this year, and the data can be seen in the attachment. Although there are some entries in the "Not Acceptable" column, they represent either one out of eleven students in Chem 461, or they represent a very specific task in Chem 431.

Results: Target Achievement: Met

Recommendations : None warranted at this time.

Reflections/Notes :

Substantiating Evidence:

Assessment Rubric-ProbSolv2.docx (Word Document (Open XML)) (See appendix)

Overall Recommendations

No text specified

Overall Reflection

No text specified

Action Plan

Actions

BA/BS in Chemistry Outcome Set

Outcome #1 Fundamental Concepts

Students pursuing a baccalaureate degree in chemistry will exhibit a sound grasp of fundamental concepts in the discipline.

Outcome #1

Action: Addition of an Inorganic Course to Chemistry Curriculum Core

This Action is associated with the following Findings

No supporting Findings have been linked to this Action.

Action Details: An inorganic chemistry course suitable for students in any of the chemistry tracks will be added to the core curriculum, and will therefore be a required course for all chemistry majors no matter which track they are in. The course will be a redesign and renumbering of the existing Chem 440. The new number will be 341 and will normally be taken in the spring of the junior year.

Implementation Plan (timeline): To be done immediately.

Key/Responsible Personnel: Jennifer Inlow, Chair of the Curriculum Committee.

Measures: none

Resource Allocations: none

Priority: High

Outcome #2 Problem solving

Students pursuing a baccalaureate degree in chemistry will be able to employ problem solving skills together with scientific models and mathematical techniques to explain and predict behavior of chemical systems.

Outcome #2

Action: No action warranted at this time.

This Action is associated with the following Findings
No supporting Findings have been linked to this Action.

Action Details: No action warranted at this time.

Implementation Plan (timeline): No action warranted at this time.

Key/Responsible Personnel:

Measures:

Resource Allocations:

Priority:

Status Report

Action Statuses

BA/BS in Chemistry Outcome Set

Outcome #1 Fundamental Concepts

Students pursuing a baccalaureate degree in chemistry will exhibit a sound grasp of fundamental concepts in the discipline.

Outcome #1

Action: Addition of an Inorganic Course to Chemistry Curriculum Core

Action Details: An inorganic chemistry course suitable for students in any of the chemistry tracks will be added to the core curriculum, and will therefore be a required course for all chemistry majors no matter which track they are in. The course will be a redesign and renumbering of the existing Chem 440. The new number will be 341 and will normally be taken in the spring of the junior year.

Implementation Plan (timeline): To be done immediately.

Key/Responsible Personnel: Jennifer Inlow, Chair of the Curriculum Committee.

Measures: none

Resource Allocations: none

Priority: High

Status for Addition of an Inorganic Course to Chemistry Curriculum Core

Current Status: Completed

Resource Allocation(s) Status:

Next Steps/Additional Information: The course will be taught for the first time in the Spring of 2012.

Substantiating Evidence:

Chem341.doc (Microsoft Word) (See appendix)

Outcome #2 Problem solving

Students pursuing a baccalaureate degree in chemistry will be able to employ problem solving skills together with scientific models and mathematical techniques to explain and predict behavior of chemical systems.

Outcome #2

Action: No action warranted at this time.

Action Details: No action warranted at this time.

Implementation Plan (timeline): No action warranted at this time.

Key/Responsible Personnel:

Measures:

Resource Allocations:

Priority:

Status for No action warranted at this time.

No Status Added

Status Summary

No text specified

Summary of Next Steps

No text specified

2011-2012 Assessment Cycle

Assessment Plan

Outcomes and Measures

BA/BS in Chemistry Outcome Set

Outcome #3 Laboratory Procedures

Students pursuing a baccalaureate degree in chemistry will be able to carry out basic laboratory procedures demonstrating appropriate use of instrumentation, quantitative measurement, and data analysis.

Outcome #3

Measure: Laboratory Skills
Direct - Other

Details/Description: At least two faculty members who teach one or more of the following courses--Chem 351L, 352L, 321, 340, 355, 421, 461L, and 462L--will meet with the committee to assist in completing the "laboratory procedures rubric" (see "Supporting Attachments" below).

Target: 100% of the categories in the rubric will be rated at least satisfactory. A satisfactory rating in a category means that at least 80% of the students are rated satisfactory or better in that category.

Implementation Plan (timeline): By October 1 (odd-numbered years): at least two faculty members are recruited to participate and are given a copy of the rubric.
By December 15: the meeting is held and the results are transmitted to TaskStream.

Responsible Individual(s): Larry Rosenhein

Supporting Attachments:

LaboratoryProceduresRubric-201X-201Y.doc (Microsoft Word) (See appendix)

Outcome #4 Communication

Students pursuing a baccalaureate degree in chemistry will be able to demonstrate professional communication skills.

Outcome #4

Measure: Oral Communication
Direct - Other

Details/Description: Faculty members will make direct observation of student presentations in Chem 400 and at professional meetings. These observations will be followed by a roundtable discussion by those making the observations.

Target: Observers will agree that at least 80% of the graduating chemistry majors have oral communication skills that are at least satisfactory.

Implementation Plan (timeline): By February 1 (even-numbered years): all chemistry faculty who either teach Chem 400 or who have students who will be presenting papers are reminded to be prepared to evaluate students' oral presentation skills.
By May 1: the meeting is held and the results are transmitted to TaskStream.

Responsible Individual(s): Larry Rosenhein

Measure: Written Communication
Direct - Other

Details/Description: The Assessment Committee will ask selected faculty members to submit representative samples of student writing from lab reports, exams, or other assignments, from upper level courses. This will be followed by a roundtable discussion of the committee and these

faculty members.

Target: At least 80% of the chemistry majors in these courses will exhibit written communication skills appropriate for that level.

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By December 15: the meeting is held and the results are transmitted to TaskStream.

Responsible Individual(s): Larry Rosenhein

Assessment Findings

Finding per Measure

BA/BS in Chemistry Outcome Set

Outcome #3 Laboratory Procedures

Students pursuing a baccalaureate degree in chemistry will be able to carry out basic laboratory procedures demonstrating appropriate use of instrumentation, quantitative measurement, and data analysis.

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Measure: Laboratory Skills
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Implementation Plan (timeline): By October 1 (odd-numbered years): at least two faculty members are recruited to participate and are given a copy of the rubric.
By December 15: the meeting is held and the results are transmitted to TaskStream.

Responsible Individual(s): Larry Rosenhein

Supporting Attachments:

LaboratoryProceduresRubric-201X-201Y.doc (Microsoft Word) (See appendix)

Findings for Laboratory Skills

Summary of Findings: The Assessment Committee met on Mar. 22 to review a compilation of responses to the Laboratory Skills rubric from instructors of Chem 355, 431L, 340 and 321L. As in the previous assessment of this outcome, there was a consensus that our majors are exposed to a wide range of experimental techniques, involving considerable laboratory class time, and are able to demonstrate their competence in performing operations and interpreting results. These results were further discussed in a meeting of the whole Chemistry faculty on Apr. 26.

Results: Target Achievement: Met

Recommendations : No particular changes are indicated by this review. However, a factor that enters into our plans for the future is a recent five-year program review by the American Chemical Society, which approves our curriculum for "ACS Certified" degrees. They have asked that more instrumental work, particularly gas chromatography, be included in the Analytical Chemistry course (321/L). The instructor of this course is making plans to modify the course (and of necessity the Instrumental Analysis course as well) in order to comply with this recommendation.

Reflections/Notes :

Substantiating Evidence:

LaboratoryProceduresRubric-2011-2012 (Microsoft Word) (See appendix)
Summary of objectives for Outcome 3, with average rating by course instructors and specific examples of course details relevant to the objectives.

Outcome #4 Communication

Students pursuing a baccalaureate degree in chemistry will be able to demonstrate professional communication skills.

Outcome #4

Measure: Oral Communication

Direct - Other

Details/Description: Faculty members will make direct observation of student presentations in Chem 400 and at professional meetings. These observations will be followed by a roundtable discussion by those making the observations.

Target: Observers will agree that at least 80% of the graduating chemistry majors have oral communication skills that are at least satisfactory.

Implementation Plan (timeline): By February 1 (even-numbered years): all chemistry faculty who either teach Chem 400 or who have students who will be presenting papers are reminded to be prepared to evaluate students' oral presentation skills.
By May 1: the meeting is held and the results are transmitted to TaskStream.

Responsible Individual(s): Larry Rosenhein

Findings for Oral Communication

Summary of Findings: The Assessment Committee and the faculty as a whole discussed the oral communication skills of our students based on presentations at local and national poster sessions and in Chemistry 400 and in the new course Chem 300. There was a consensus that most of our students are proficient in oral communication in their field.

Results: Target Achievement: Met

Recommendations :

Reflections/Notes : Five students (four of them Chemistry majors) enrolled in Chem 300 in Fall 2011, the first time this course was offered. The course was created in part in response to the previous Outcome 4 assessment. It requires students to attend seminars with visiting speakers, which provides a model for presentation skills, and to make some short presentations of their own. Students also write an abstract for each presentation so writing skills are also developed here.

Measure: Written Communication

Direct - Other

Details/Description: The Assessment Committee will ask selected faculty members to submit representative samples of student writing from lab reports, exams, or other assignments, from upper level courses. This will be followed by a roundtable discussion of the committee and these faculty members.

Target: At least 80% of the chemistry majors in these courses will exhibit written communication skills appropriate for that level.

Implementation Plan (timeline): By October 1 (odd-numbered years): at least two faculty members are recruited to participate.
By December 1: copies of samples are submitted to the committee, and the meeting is scheduled.
By December 15: the meeting is held and the results are transmitted to TaskStream.

Responsible Individual(s): Larry Rosenhein

Findings for Written Communication

Summary of Findings: The Assessment Committee met on Mar. 22 to discuss Outcome 4 by a "focus group" approach. Lab reports from several upper-level courses were reviewed and the quality of student writing in general was discussed. It was felt that some of our students are still

not writing at the level we would like to see: this includes more than grammar, but in judgment about what to include in various contexts.

Results: Target Achievement: Not Met

Recommendations : The recommendation in the previous cycle was that faculty should attempt to include more writing in their courses where possible. We are now suggesting a more specific approach, in which lab reports (and possibly other writing where appropriate) will be given a grade for the chemistry content, and a separate grade for the quality of the writing. This should increase student awareness of the importance of the written portions of their work, and will enable instructors to communicate directly to students their evaluation of the writing. (Not just English usage is included in written communication: this also refers to table formatting and other presentation issues.) There was agreement to inaugurate this in a couple of upper-level courses in 2012-13, and an evaluation will occur before promoting this for other of our courses.

Reflections/Notes :

Overall Recommendations

No text specified

Overall Reflection

No text specified

Action Plan

Actions

BA/BS in Chemistry Outcome Set

Outcome #3 Laboratory Procedures

Students pursuing a baccalaureate degree in chemistry will be able to carry out basic laboratory procedures demonstrating appropriate use of instrumentation, quantitative measurement, and data analysis.

Outcome #3 *No actions specified*

Outcome #4 Communication

Students pursuing a baccalaureate degree in chemistry will be able to demonstrate professional communication skills.

Outcome #4

Action: Oral and Written Communication Skills

This Action is associated with the following Findings

No supporting Findings have been linked to this Action.

Action Details: (1) In an e-mail Assessment Report to chemistry faculty, ask that those teaching courses for chemistry majors renew their efforts to look for opportunities to incorporate some additional writing and provide more feedback to students.
(2) Develop Chem 300 course and submit documents to the CAS FAC.

Implementation Plan (timeline): (1) early summer 2010: send e-mail Assessment Report to chemistry faculty (2) early summer 2010: submit documents to CAS FAC

Key/Responsible Personnel: (1) Rich Kjonaas (2) Chair of Chemistry Curriculum Committee (Jennifer Inlow)

Measures: none

Resource Allocations: NA

Priority: Medium

Action: Oral and Written Communication Skills

This Action is associated with the following Findings
No supporting Findings have been linked to this Action.

Action Details: Professors Flurkey and Wolf will be asked to give the dual grades on at least some lab reports in Chem 431L and 421L in Fall 2012, and to report on the success of this approach to the Assessment Committee at the end of the semester.

Implementation Plan (timeline):

Key/Responsible Personnel:

Measures: none

Resource Allocations: NA

Priority: Medium

Status Report

Action Statuses

BA/BS in Chemistry Outcome Set

Outcome #3 Laboratory Procedures

Students pursuing a baccalaureate degree in chemistry will be able to carry out basic laboratory procedures demonstrating appropriate use of instrumentation, quantitative measurement, and data analysis.

Outcome #3 *No actions specified*

Outcome #4 Communication

Students pursuing a baccalaureate degree in chemistry will be able to demonstrate professional communication skills.

Outcome #4

Action: Oral and Written Communication Skills

Action Details: (1) In an e-mail Assessment Report to chemistry faculty, ask that those teaching courses for chemistry majors renew their efforts to look for opportunities to incorporate some additional writing and provide more feedback to students.
(2) Develop Chem 300 course and submit documents to the CAS FAC.

Implementation Plan (timeline): (1) early summer 2010: send e-mail Assessment Report to chemistry faculty (2) early summer 2010: submit documents to CAS FAC

Key/Responsible Personnel: (1) Rich Kjonaas (2) Chair of Chemistry Curriculum Committee (Jennifer Inlow)

Measures: none

Resource Allocations: NA

Priority: Medium

Status for Oral and Written Communication Skills

No Status Added

Action: Oral and Written Communication Skills

Action Details: Professors Flurkey and Wolf will be asked to give the dual grades on at least some lab reports in Chem 431L and 421L in Fall 2012, and to report on the success of this approach to the Assessment Committee at the end of the semester.

Implementation Plan (timeline):

Key/Responsible Personnel:

Measures: none

Resource Allocations: NA

Priority: Medium

Status for Oral and Written Communication Skills

No Status Added

Status Summary

No text specified

Summary of Next Steps

No text specified

2012-2013 Assessment Cycle

Assessment Plan

Outcomes and Measures

BA/BS in Chemistry Outcome Set

Outcome #1 Fundamental Concepts

Students pursuing a baccalaureate degree in chemistry will exhibit a sound grasp of fundamental concepts in the discipline.

Outcome #1

Measure: Fundamental Concepts
Direct - Exam

Details/Description: All chemistry majors will take the Major Field Test in chemistry near the end of their senior year, and the Assessment Committee will discuss the results.

Target: The class as a whole will score at or above the 50th percentile in each of the four areas (physical, organic, inorganic, and analytical) as well as in the two assessment indicator areas (biochemistry and critical thinking), and except for an occasional student, no one will be below the 33rd percentile in any area.

Implementation Plan (timeline): By April 1 (each year): the Chem 405 instructor will administer the exam to all of the students in the course (all senior chemistry majors).
During odd-numbered years: within a week of receiving the results from ETS, the Department Chairperson will transmit the results along with the results from the previous year (an even numbered year) to the committee who will meet within a week to discuss the results of those two years.

Responsible Individual(s): Larry Rosenhein

Outcome #2 Problem solving

Students pursuing a baccalaureate degree in chemistry will be able to employ problem solving skills together with scientific models and mathematical techniques to explain and predict behavior of chemical systems.

Outcome #2

Measure: Problem Solving Skills
Direct - Other

Details/Description: At least two faculty members who teach one or more of the following courses--Chem 321, 352, 421, and 461--will meet with the committee and, with the aid of graded exams or homework, will assist in completing the "Problem Solving Skills Rubric" (see "Supporting Attachments" below).

Target: Essentially all of the categories in the rubric will be rated at least "Fair" with most of them rated "Good" or better.

Implementation Plan (timeline): By October 1 (even-numbered years): at least two faculty members are recruited, are given a copy of the rubric, and are asked to assemble a collection of copies of graded exams or homework assignments.
By December 15: the meeting is held and the results are transmitted to TaskStream.

Responsible Individual(s): Larry Rosenhein

Assessment Findings

Finding per Measure

BA/BS in Chemistry Outcome Set

Outcome #1 Fundamental Concepts

Students pursuing a baccalaureate degree in chemistry will exhibit a sound grasp of fundamental concepts in the discipline.

Outcome #1

Measure: Fundamental Concepts
Direct - Exam

Details/Description: All chemistry majors will take the Major Field Test in chemistry near the end of their senior year, and the Assessment Committee will discuss the results.

Target: The class as a whole will score at or above the 50th percentile in each of the four areas (physical, organic, inorganic, and analytical) as well as in the two assessment indicator areas (biochemistry and critical thinking), and except for an occasional student, no one will be below the 33rd percentile in any area.

Implementation Plan (timeline): By April 1 (each year): the Chem 405 instructor will administer the exam to all of the students in the course (all senior chemistry majors).
During odd-numbered years: within a week of receiving the results from ETS, the Department Chairperson will transmit the results along with the results from the previous year (an even numbered year) to the committee who will meet within a week to discuss the results of those two years.

Responsible Individual(s): Larry Rosenhein

Findings for Fundamental Concepts

Summary of Findings: The Chemistry Major Field Test was administered to both the Class of 2012 and 2013. Scores on this test vary considerably from year to year at ISU. In 2012 the total score placed our students in the 80th percentile of institutions taking this test; in 2013 our students were in the 30th percentile, which is unacceptable. However, averaging the two years gives a result of approximately 55th percentile, which meets our criterion for this outcome. Results in individual areas also vary, and reflect the general trend over the last two years. The average of the last two years is at last 50th percentile in each area.

Results: Target Achievement: Met

Recommendations :

Reflections/Notes : Scores on the inorganic chemistry section increased dramatically in each of the last two years compared to recent results. This is undoubtedly due to the institution of a descriptive inorganic chemistry course as a requirement for all students, whereas a more advanced inorganic course had previously been required for ACS-concentration students only. This course was first offered in the Spring of 2012

Substantiating Evidence:

MFT results 2013-1.pdf (Adobe Acrobat Document) (See appendix)
MFT results 2013-2.pdf (Adobe Acrobat Document) (See appendix)

Outcome #2 Problem solving

Students pursuing a baccalaureate degree in chemistry will be able to employ problem solving skills together with scientific models and mathematical techniques to explain and predict behavior of chemical systems.

Outcome #2

Measure: Problem Solving Skills
Direct - Other

Details/Description: At least two faculty members who teach one or more of the following courses--Chem 321, 352, 421, and 461--will meet with the committee and, with the aid of graded exams or homework, will assist in completing the "Problem Solving Skills Rubric" (see "Supporting Attachments" below).

Target: Essentially all of the categories in the rubric will be rated at least "Fair" with most of them rated "Good" or better.

Implementation Plan (timeline): By October 1 (even-numbered years): at least two faculty

members are recruited, are given a copy of the rubric, and are asked to assemble a collection of copies of graded exams or homework assignments.
By December 15: the meeting is held and the results are transmitted to TaskStream.

Responsible Individual(s): Larry Rosenhein

Findings for Problem Solving Skills

Summary of Findings: Selected faculty met with the Assessment Committee on Apr. 11, 2013 to discuss this outcome. Data was collected from three courses: Chem 355, 432, and 461 to help quantify instructors' judgment of the problem-solving abilities of students in upper-level courses within the major. The results are tabulated in the attached file. The target criterion (of all students having at least "fair" problem-solving skills, was met, with one exception in Chem 355.

Results: Target Achievement: Met

Recommendations :

Reflections/Notes : Not all outcomes were assessed. We should try to get some data on problem solving in Chem 341. Chem 355 may not be the best place to assess since not all majors take this course now. We can ask that Chem 352 instructors use their final exams to glean some information on the fourth and fifth goals on this list. Also, Chem 431 rather than 432 should be targeted for assessment since all majors are in this course.

Substantiating Evidence:

Assessment_Rubric-ProbSolv2013.docx (Word Document (Open XML)) (See appendix)

Overall Recommendations

No text specified

Overall Reflection

No text specified

Action Plan

Actions

BA/BS in Chemistry Outcome Set

Outcome #1 Fundamental Concepts

Students pursuing a baccalaureate degree in chemistry will exhibit a sound grasp of fundamental concepts in the discipline.

Outcome #1

Action: Addition of an Inorganic Course to Chemistry Curriculum Core

This Action is associated with the following Findings

No supporting Findings have been linked to this Action.

Action Details: No action is warranted.

Implementation Plan (timeline):

Key/Responsible Personnel: Larry Rosenhein, Chair of the Curriculum Committee.

Measures: none

Resource Allocations: none

Priority: High

Outcome #2 Problem solving

Students pursuing a baccalaureate degree in chemistry will be able to employ problem solving skills together with scientific models and mathematical techniques to explain and predict behavior of chemical systems.

Outcome #2

Action: Problem solving data

This Action is associated with the following Findings

No supporting Findings have been linked to this Action.

Action Details: We should look for more concrete ways to assess problem solving, and to broaden the outcomes we are measuring. Refer to Reflections/notes from the Findings in this cycle.

Implementation Plan (timeline): By Fall 2014, which begins the next Outcome 2 assessment cycle.

Key/Responsible Personnel: Larry Rosenhein

Measures:

Resource Allocations:

Priority: Medium

Status Report

Action Statuses

BA/BS in Chemistry Outcome Set

Outcome #1 Fundamental Concepts

Students pursuing a baccalaureate degree in chemistry will exhibit a sound grasp of fundamental concepts in the discipline.

Outcome #1

Action: Addition of an Inorganic Course to Chemistry Curriculum Core

Action Details: No action is warranted.

Implementation Plan (timeline):

Key/Responsible Personnel: Larry Rosenhein, Chair of the Curriculum Committee.

Measures: none

Resource Allocations: none

Priority: High

Status for Addition of an Inorganic Course to Chemistry Curriculum Core

Current Status: Completed

Resource Allocation(s) Status:

Next Steps/Additional Information: This course was initiated in the spring of 2012. MFT results reported in 2014 indicated a good deal of improvement in scores on the inorganic section so it appears that this has been a successful modification of the curriculum. Note that recently the MFT exam has been given in the fall semester, and in the future, inorganic scores may not be reflective of the inorganic knowledge for students who wait until their senior year to take this course.

Outcome #2 Problem solving

Students pursuing a baccalaureate degree in chemistry will be able to employ problem solving skills together with scientific models and mathematical techniques to explain and predict behavior of chemical systems.

Outcome #2

Action: Problem solving data

Action Details: We should look for more concrete ways to assess problem solving, and to broaden the outcomes we are measuring. Refer to Reflections/notes from the Findings in this cycle.

Implementation Plan (timeline): By Fall 2014, which begins the next Outcome 2 assessment cycle.

Key/Responsible Personnel: Larry Rosenhein

Measures:

Resource Allocations:

Priority: Medium

Status for Problem solving data

Current Status: Completed

Resource Allocation(s) Status:

Next Steps/Additional Information: The target for problem-solving skills was met in this assessment, so no specific remediation was necessary. There was a suggestion to obtain information about these skills through a greater range of courses and we are attempting to do that in the current (2014-15) cycle.

Status Summary

No text specified

Summary of Next Steps

No text specified

2013-2014 Assessment Cycle

Assessment Plan

Outcomes and Measures

BA/BS in Chemistry Outcome Set

Outcome #3 Laboratory Procedures

Students pursuing a baccalaureate degree in chemistry will be able to carry out basic laboratory procedures demonstrating appropriate use of instrumentation, quantitative measurement, and data analysis.

Outcome #3

Measure: Laboratory Skills
Direct - Other

Details/Description: At least two faculty members who teach one or more of the following courses--Chem 351L, 352L, 321, 340, 355, 421, 461L, and 462L--will meet with the committee to assist in completing the "laboratory procedures rubric" (see "Supporting Attachments" below).

Target: 100% of the categories in the rubric will be rated at least satisfactory. A satisfactory rating in a category means that at least 80% of the students are rated satisfactory or better in that category.

Implementation Plan (timeline): By October 1 (odd-numbered years): at least two faculty members are recruited to participate and are given a copy of the rubric.
By December 15: the meeting is held and the results are transmitted to TaskStream.

Responsible Individual(s): Larry Rosenhein

Supporting Attachments:

LaboratoryProceduresRubric-201X-201Y.doc (Microsoft Word) (See appendix)

Outcome #4 Communication

Students pursuing a baccalaureate degree in chemistry will be able to demonstrate professional communication skills.

Outcome #4

Measure: Oral Communication
Direct - Other

Details/Description: Faculty members will make direct observation of student presentations in Chem 405 and at professional meetings. These observations will be followed by a roundtable discussion by those making the observations.

Target: Observers will agree that at least 80% of the graduating chemistry majors have oral communication skills that are at least satisfactory.

Implementation Plan (timeline): By February 1 (even-numbered years): all chemistry faculty who either teach Chem 405 or who have students who will be presenting papers are reminded to be prepared to evaluate students' oral presentation skills.
By May 1: the meeting is held and the results are transmitted to TaskStream.

Responsible Individual(s): Larry Rosenhein

Measure: Written Communication
Direct - Other

Details/Description: The Assessment Committee will ask selected faculty members to submit representative samples of student writing from lab reports, exams, or other assignments, from upper level courses. This will be followed by a roundtable discussion of the committee and these

faculty members.

Target: At least 80% of the chemistry majors in these courses will exhibit written communication skills appropriate for that level.

Implementation Plan (timeline): By October 1 (odd-numbered years): at least two faculty members are recruited to participate.
By December 1: copies of samples are submitted to the committee, and the meeting is scheduled.
By December 15: the meeting is held and the results are transmitted to TaskStream.

Responsible Individual(s): Larry Rosenhein

Assessment Findings

Finding per Measure

BA/BS in Chemistry Outcome Set

Outcome #3 Laboratory Procedures

Students pursuing a baccalaureate degree in chemistry will be able to carry out basic laboratory procedures demonstrating appropriate use of instrumentation, quantitative measurement, and data analysis.

Outcome #3

Measure: Laboratory Skills
Direct - Other

Details/Description: At least two faculty members who teach one or more of the following courses--Chem 351L, 352L, 321, 340, 355, 421, 461L, and 462L--will meet with the committee to assist in completing the "laboratory procedures rubric" (see "Supporting Attachments" below).

Target: 100% of the categories in the rubric will be rated at least satisfactory. A satisfactory rating in a category means that at least 80% of the students are rated satisfactory or better in that category.

Implementation Plan (timeline): By October 1 (odd-numbered years): at least two faculty members are recruited to participate and are given a copy of the rubric.
By December 15: the meeting is held and the results are transmitted to TaskStream.

Responsible Individual(s): Larry Rosenhein

Supporting Attachments:

LaboratoryProceduresRubric-201X-201Y.doc (Microsoft Word) (See appendix)

Findings for Laboratory Skills

Summary of Findings: Faculty in various courses were asked to rate students according to the rubric for this outcome, including specific examples of procedures that students accomplish in their courses. One student was rated less than "good" in Chem 355, but overall the findings indicate that students are learning laboratory techniques well.

Results: Target Achievement: Met

Recommendations : Possibly attempt to judge certain important techniques more comprehensively for a more quantitative result in this outcome.

Reflections/Notes :

Substantiating Evidence:

LaboratoryProceduresRubric-2013-2014.doc (Microsoft Word) (See appendix)

Outcome #4 Communication

Students pursuing a baccalaureate degree in chemistry will be able to demonstrate professional communication skills.

Outcome #4

Measure: Oral Communication
Direct - Other

Details/Description: Faculty members will make direct observation of student presentations in Chem 405 and at professional meetings. These observations will be followed by a roundtable discussion by those making the observations.

Target: Observers will agree that at least 80% of the graduating chemistry majors have oral communication skills that are at least satisfactory.

Implementation Plan (timeline): By February 1 (even-numbered years): all chemistry faculty who either teach Chem 405 or who have students who will be presenting papers are reminded to be prepared to evaluate students' oral presentation skills.
By May 1: the meeting is held and the results are transmitted to TaskStream.

Responsible Individual(s): Larry Rosenhein

Findings for Oral Communication

Summary of Findings: Faculty met as a whole in the spring '14 semester for a focus group to evaluate communication skills of students during the past year. Based on class work (such as Chem 405), and poster presentations many students make as part of delivering research results or project results (such as in Chem 340), students are judged as a whole to have satisfactory oral communication skills.

Results: Target Achievement: Met

Recommendations : Continue to monitor oral communication components of course work and other presentations.

Reflections/Notes :

Measure: Written Communication
Direct - Other

Details/Description: The Assessment Committee will ask selected faculty members to submit representative samples of student writing from lab reports, exams, or other assignments, from upper level courses. This will be followed by a roundtable discussion of the committee and these faculty members.

Target: At least 80% of the chemistry majors in these courses will exhibit written communication skills appropriate for that level.

Implementation Plan (timeline): By October 1 (odd-numbered years): at least two faculty members are recruited to participate.
By December 1: copies of samples are submitted to the committee, and the meeting is scheduled.
By December 15: the meeting is held and the results are transmitted to TaskStream.

Responsible Individual(s): Larry Rosenhein

Findings for Written Communication

Summary of Findings: The faculty met as a whole to discuss communication skills of our students during the past year in a focus-group format. For some courses, a recommendation from the previous cycle was implemented: in some laboratory courses, the report grades were divided into a "content" component and a "writing" component. For instance in Chem 431, writing was assigned 15% of the grade. In Chem 340, it was 25% of the grade. Sample reports from each course were collected. In 431, the writing component averaged 13-14. In Chem 340, the writing component, assigned as a letter grade, ranged from B-A. In Chem 405, in which students must submit brief abstracts for oral presentations they are to give, the instructor was satisfied with the quality.

Results: Target Achievement: Met

Recommendations : Continue the experiment of separate grades for writing in some laboratory courses.

Reflections/Notes : In the last cycle, a similar focus group, with less hard data, decided that

there were deficiencies in our students' writing. The consensus this year was more positive, while still allowing that more work could be needed. It is possible that explicitly assigning grades for the writing on reports had the effect of directing students' attention to that aspect of the report and resulted in improvement.

Overall Recommendations

No text specified

Overall Reflection

No text specified

Action Plan

Actions

BA/BS in Chemistry Outcome Set

Outcome #3 Laboratory Procedures

Students pursuing a baccalaureate degree in chemistry will be able to carry out basic laboratory procedures demonstrating appropriate use of instrumentation, quantitative measurement, and data analysis.

Outcome #3 *No actions specified*

Outcome #4 Communication

Students pursuing a baccalaureate degree in chemistry will be able to demonstrate professional communication skills.

Outcome #4

Action: Oral and Written Communication Skills

This Action is associated with the following Findings
No supporting Findings have been linked to this Action.

Action Details: (1) In an e-mail Assessment Report to chemistry faculty, ask that those teaching courses for chemistry majors renew their efforts to look for opportunities to incorporate some additional writing and provide more feedback to students.
(2) Develop Chem 300 course and submit documents to the CAS FAC.

Implementation Plan (timeline): (1) early summer 2010: send e-mail Assessment Report to chemistry faculty (2) early summer 2010: submit documents to CAS FAC

Key/Responsible Personnel: (1) Rich Kjonaas (2) Chair of Chemistry Curriculum Committee (Jennifer Inlow)

Measures: none

Resource Allocations: NA

Priority: Medium

Action: Oral and Written Communication Skills

This Action is associated with the following Findings
No supporting Findings have been linked to this Action.

Action Details: Professors Flurkey and Wolf will be asked to give the dual grades on at least some lab reports in Chem 431L and 421L in Fall 2012, and to report on the success of this approach to the Assessment Committee at the end of the semester.

Implementation Plan (timeline):

Key/Responsible Personnel:

Measures: none

Resource Allocations: NA

Priority: Medium

Status Report

Action Statuses

BA/BS in Chemistry Outcome Set

Outcome #3 Laboratory Procedures

Students pursuing a baccalaureate degree in chemistry will be able to carry out basic laboratory procedures demonstrating appropriate use of instrumentation, quantitative measurement, and data analysis.

Outcome #3 *No actions specified*

Outcome #4 Communication

Students pursuing a baccalaureate degree in chemistry will be able to demonstrate professional communication skills.

Outcome #4

Action: Oral and Written Communication Skills

Action Details: (1) In an e-mail Assessment Report to chemistry faculty, ask that those teaching courses for chemistry majors renew their efforts to look for opportunities to incorporate some additional writing and provide more feedback to students.
(2) Develop Chem 300 course and submit documents to the CAS FAC.

Implementation Plan (timeline): (1) early summer 2010: send e-mail Assessment Report to chemistry faculty (2) early summer 2010: submit documents to CAS FAC

Key/Responsible Personnel: (1) Rich Kjonaas (2) Chair of Chemistry Curriculum Committee (Jennifer Inlow)

Measures: none

Resource Allocations: NA

Priority: Medium

Status for Oral and Written Communication Skills

Current Status: In Progress

Resource Allocation(s) Status:

Next Steps/Additional Information: We are continuing to collect samples of writing and in some cases grade specifically on writing in selected courses. The results will be discussed in the

2015-16 assessment review.

Action: Oral and Written Communication Skills

Action Details: Professors Flurkey and Wolf will be asked to give the dual grades on at least some lab reports in Chem 431L and 421L in Fall 2012, and to report on the success of this approach to the Assessment Committee at the end of the semester.

Implementation Plan (timeline):

Key/Responsible Personnel:

Measures: none

Resource Allocations: NA

Priority: Medium

Status for Oral and Written Communication Skills

No Status Added

Status Summary

No text specified

Summary of Next Steps

No text specified

2014-2015 Assessment Cycle

Assessment Plan

Outcomes and Measures

BA/BS in Chemistry Outcome Set

Outcome #1 Fundamental Concepts

Students pursuing a baccalaureate degree in chemistry will exhibit a sound grasp of fundamental concepts in the discipline.

Outcome #1

Measure: Fundamental Concepts
Direct - Exam

Details/Description: All chemistry majors will take the Major Field Test in chemistry in their senior year, and the Assessment Committee will discuss the results.

Target: The class as a whole will score at or above the 50th percentile in each of the four areas (physical, organic, inorganic, and analytical) as well as in the two assessment indicator areas (biochemistry and critical thinking), and except for an occasional student, no one will be below the 33rd percentile in any area.

Implementation Plan (timeline): By Dec. 1 (each year): the Chem 405 instructor will administer the exam to all of the students in the course (all senior chemistry majors).
During odd-numbered years: within a week of receiving the results from ETS, the Department Chairperson will transmit the results along with the results from the previous year (an even numbered year) to the committee who will meet within a week to discuss the results of those two years.

Responsible Individual(s): Larry Rosenhein

Outcome #2 Problem solving

Students pursuing a baccalaureate degree in chemistry will be able to employ problem solving skills together with scientific models and mathematical techniques to explain and predict behavior of chemical systems.

Outcome #2

Measure: Problem Solving Skills
Direct - Other

Details/Description: At least two faculty members who teach one or more of the following courses--Chem 321, 352, 421, and 461--will meet with the committee and, with the aid of graded exams or homework, will assist in completing the "Problem Solving Skills Rubric" (see "Supporting Attachments" below).

Target: Essentially all of the categories in the rubric will be rated at least "Fair" with most of them rated "Good" or better.

Implementation Plan (timeline): By October 1 (even-numbered years): at least two faculty members are recruited, are given a copy of the rubric, and are asked to assemble a collection of copies of graded exams or homework assignments.
By December 15: the meeting is held and the results are transmitted to TaskStream.

Responsible Individual(s): Larry Rosenhein

Supporting Attachments:

Assessment_Rubric-ProbSolv2 blank.docx (Word Document (Open XML)) (See appendix)

Assessment Findings

Finding per Measure

BA/BS in Chemistry Outcome Set

Outcome #1 Fundamental Concepts

Students pursuing a baccalaureate degree in chemistry will exhibit a sound grasp of fundamental concepts in the discipline.

Outcome #1

Measure: Fundamental Concepts
Direct - Exam

Details/Description: All chemistry majors will take the Major Field Test in chemistry in their senior year, and the Assessment Committee will discuss the results.

Target: The class as a whole will score at or above the 50th percentile in each of the four areas (physical, organic, inorganic, and analytical) as well as in the two assessment indicator areas (biochemistry and critical thinking), and except for an occasional student, no one will be below the 33rd percentile in any area.

Implementation Plan (timeline): By Dec. 1 (each year): the Chem 405 instructor will administer the exam to all of the students in the course (all senior chemistry majors).
During odd-numbered years: within a week of receiving the results from ETS, the Department Chairperson will transmit the results along with the results from the previous year (an even numbered year) to the committee who will meet within a week to discuss the results of those two years.

Responsible Individual(s): Larry Rosenhein

Findings for Fundamental Concepts

Summary of Findings: Our students' scores fluctuate from year to year, undoubtedly due to differences in class composition. However, the mean of the scores stays above the 50th percentile, as expected for our targets.

Results: Target Achievement: Met

Recommendations : We will continue to administer the MFT test and closely watch the scores.

Reflections/Notes : There is still room for improvement, but probably any changes in pedagogic methods are vastly outweighed by the inherent abilities of the students.

Substantiating Evidence:

- MFT comparative data 2014.pdf (Adobe Acrobat Document) (See appendix)
- MFT ISU results 2014-15.pdf (Adobe Acrobat Document) (See appendix)
- MFT result summary 2015 (Excel Workbook (Open XML)) (See appendix)

Outcome #2 Problem solving

Students pursuing a baccalaureate degree in chemistry will be able to employ problem solving skills together with scientific models and mathematical techniques to explain and predict behavior of chemical systems.

Outcome #2

Measure: Problem Solving Skills
Direct - Other

Details/Description: At least two faculty members who teach one or more of the following courses--Chem 321, 352, 421, and 461--will meet with the committee and, with the aid of graded exams or homework, will assist in completing the "Problem Solving Skills Rubric" (see "Supporting Attachments" below).

Target: Essentially all of the categories in the rubric will be rated at least "Fair" with most of them rated "Good" or better.

Implementation Plan (timeline): By October 1 (even-numbered years): at least two faculty members are recruited, are given a copy of the rubric, and are asked to assemble a collection of copies of graded exams or homework assignments.

By December 15: the meeting is held and the results are transmitted to TaskStream.

Responsible Individual(s): Larry Rosenhein

Supporting Attachments:

Assessment_Rubric-ProbSolv2 blank.docx (Word Document (Open XML)) (See appendix)

Findings for Problem Solving Skills

Summary of Findings: Information about problem-solving ability was collected from a variety of courses. There is a concern that there are too many cases where the ability of individual students was deemed Not Acceptable. The information is summarized on an accompanying document, and specific information about tested items for some courses is also uploaded. In the organic chemistry areas, the instructor rated the students as good problem-solvers in general, although this was the least quantitative area that was measured.

Results: Target Achievement: Not Met

Recommendations : The consensus upon discussion at a faculty meeting was that we may have a class of students who are unusually challenged by problem-solving, and that we should look for a longer-term pattern before recommending changes in our courses. However, R. Noll has said he may introduce individual presentations of homework problem solutions as a way to begin classes in physical chemistry.

Reflections/Notes : It is surprising that we seem to be getting better results on content knowledge as judged by the MFT results than on our problem-solving. This is even more striking considering that the MFT exam was not part of a student's grade, while the measures used to assess problem-solving were from labs reports or lecture exams. It is possible that the specific measures used to judge this ability were too limited and/or too demanding to serve as a true representation of where our students really are. I think that a more uniform approach across classes might yield more meaningful results. Possibly each class could consider an end-of semester section on an exam or final that consisted of: (1) a straightforward (but non-trivial) question that all students should be expected to answer correctly, and (2) a more demanding question that might separate out students in terms of abilities. Only a failure to answer (1) successfully would be deemed as Not Acceptable in this outcome category.

Substantiating Evidence:

Assessment_Rubric-ProbSolv2 2014-15.docx (Word Document (Open XML)) (See appendix)

Problem solving criteria 461, 321 2015.pdf (Adobe Acrobat Document) (See appendix)

Overall Recommendations

No text specified

Overall Reflection

No text specified

Action Plan

Status Report

2015-2016 Assessment Cycle

Assessment Plan

Assessment Findings

Action Plan

Actions

BA/BS in Chemistry Outcome Set

Outcome #3 Laboratory Procedures

Students pursuing a baccalaureate degree in chemistry will be able to carry out basic laboratory procedures demonstrating appropriate use of instrumentation, quantitative measurement, and data analysis.

Outcome #3 *No actions specified*

Outcome #4 Communication

Students pursuing a baccalaureate degree in chemistry will be able to demonstrate professional communication skills.

Outcome #4

Action: Oral and Written Communication Skills

This Action is associated with the following Findings
No supporting Findings have been linked to this Action.

Action Details: (1) In an e-mail Assessment Report to chemistry faculty, ask that those teaching courses for chemistry majors renew their efforts to look for opportunities to incorporate some additional writing and provide more feedback to students.

Implementation Plan (timeline): Collect information about lab techniques and writing during this academic year and summarize results in the spring.

Key/Responsible Personnel: L. Rosenhein

Measures: none

Resource Allocations: NA

Priority: Medium

Action: Oral and Written Communication Skills

This Action is associated with the following Findings
No supporting Findings have been linked to this Action.

Action Details: Professors Inlow, Rosenhein and perhaps others will be asked to give the dual grades on at least some lab reports in Chem 431L and 340 in Fall 2015, and to report on the success of this approach to the Assessment Committee at the end of the semester.

Implementation Plan (timeline):

Key/Responsible Personnel:

Measures: none

Resource Allocations: NA

Priority: Medium

Status Report

Action Statuses

BA/BS in Chemistry Outcome Set

Outcome #3 Laboratory Procedures

Students pursuing a baccalaureate degree in chemistry will be able to carry out basic laboratory procedures demonstrating appropriate use of instrumentation, quantitative measurement, and data analysis.

Outcome #3 *No actions specified*

Outcome #4 Communication

Students pursuing a baccalaureate degree in chemistry will be able to demonstrate professional communication skills.

Outcome #4

Action: Oral and Written Communication Skills

Action Details: (1) In an e-mail Assessment Report to chemistry faculty, ask that those teaching courses for chemistry majors renew their efforts to look for opportunities to incorporate some additional writing and provide more feedback to students.

Implementation Plan (timeline): Collect information about lab techniques and writing during this academic year and summarize results in the spring.

Key/Responsible Personnel: L. Rosenhein

Measures: none

Resource Allocations: NA

Priority: Medium

Status for Oral and Written Communication Skills

No Status Added

Action: Oral and Written Communication Skills

Action Details: Professors Inlow, Rosenhein and perhaps others will be asked to give the dual grades on at least some lab reports in Chem 431L and 340 in Fall 2015, and to report on the success of this approach to the Assessment Committee at the end of the semester.

Implementation Plan (timeline):

Key/Responsible Personnel:

Measures: none

Resource Allocations: NA

Priority: Medium

Status for Oral and Written Communication Skills

No Status Added

Status Summary

No text specified

Summary of Next Steps

No text specified

2016-2017 Assessment Cycle

- **Assessment Plan**
- **Assessment Findings**
- **Action Plan**
- **Status Report**

2017-2018 Assessment Cycle

- **Assessment Plan**
- **Assessment Findings**
- **Action Plan**
- **Status Report**

2018-2019 Assessment Cycle

- **Assessment Plan**
- **Assessment Findings**
- **Action Plan**
- **Status Report**

2019-2020 Assessment Cycle

- **Assessment Plan**
- **Assessment Findings**
- **Action Plan**
- **Status Report**

Appendix

A. **Chemistry Curriculum Map** (Curriculum Map)
B. **Chemistry** (Adobe Acrobat Document)
C. **Chemistry** (Adobe Acrobat Document)
D. **LaboratoryProceduresRubric-201X-201Y.doc** (Microsoft Word)
E. **Chemistry 400 Student Communication-1 (2).doc** (Microsoft Word)
F. **LaboratoryProceduresRubric-2009-2010.doc** (Microsoft Word)
G. **LaboratoryProceduresRubric-201X-201Y.doc** (Microsoft Word)
H. **Assessment Rubric-ProbSolv2.docx** (Word Document (Open XML))
I. **Major Field Test Results Table.pdf** (Adobe Acrobat Document)
J. **Chem341.doc** (Microsoft Word)
K. **LaboratoryProceduresRubric-201X-201Y.doc** (Microsoft Word)
L. **LaboratoryProceduresRubric-2011-2012** (Microsoft Word)
M. **LaboratoryProceduresRubric-201X-201Y.doc** (Microsoft Word)
N. **Assessment_Rubric-ProbSolv2013.docx** (Word Document (Open XML))
O. **MFT results 2013-1.pdf** (Adobe Acrobat Document)
P. **MFT results 2013-2.pdf** (Adobe Acrobat Document)
Q. **LaboratoryProceduresRubric-201X-201Y.doc** (Microsoft Word)
R. **LaboratoryProceduresRubric-2013-2014.doc** (Microsoft Word)
S. **Assessment_Rubric-ProbSolv2 blank.docx** (Word Document (Open XML))
T. **LaboratoryProceduresRubric-201X-201Y.doc** (Microsoft Word)
U. **Assessment_Rubric-ProbSolv2 2014-15.docx** (Word Document (Open XML))
V. **MFT comparative data 2014.pdf** (Adobe Acrobat Document)
W. **MFT ISU results 2014-15.pdf** (Adobe Acrobat Document)
X. **MFT result summary 2015** (Excel Workbook (Open XML))
Y. **Problem solving criteria 461, 321 2015.pdf** (Adobe Acrobat Document)

College: CAS Department: CHEM
Major: Chemistry Degree: AB/BS

If **Program Elimination** is pending you need not complete the form.)

	Question	Type of Answer	From Available Info	Answer
By March 1	Nationally Accredited	Y/N		Y? (certified, not accredited)
		Organization		American Chemical Society
	Student Learning Outcomes Clearly Articulated	Y/N	E. Robbins Fall 07 Survey Answer:N	N
		File (or source of information)		
	Students Know their Learning Outcomes	Y/N		N
		File		
	Program Actively Using Student Learning Outcomes	Y/N		Y
	Does Assessment Plan Exist?	Y/N	E. Robbins Fall 07 Survey Answer:Y	Y
		When Was It Adopted?		December 2001
		File/copy		copy in departmental files
By May 15	Data Actively Collected & CBE	Data Ever Collected?	E. Robbins Fall 07 Survey Answer:N	
		Data Recently/ Actively Collected?	E. Robbins Fall 07 Survey Answer:N	
		Evidence		
	Data Systematically Analyzed & CBE	Data Analyzed?	E. Robbins Fall 07 Survey Answer:N	
		Evidence		
	Analysis Discussed in Depts & CBE	Analysis Discussed?	E. Robbins Fall 07 Survey Answer:N	
		Evidence		
	Analysis Impacts Curriculum for Pgm & CBE	Any Changes to Pgm Curriculum Since 2000	E. Robbins Fall 07 Survey Answer:N	
		Were changes as a result of SLO, Data, Analysis?		
		Evidence		
	Assessment Plan Adjustments Discussed &CBE	Has the Assessment Plan been modified since 2001		
		Were changes as a result of SLO, Data, Analysis?		
		Evidence		
	Adjustments Implemented & CBE	Has the adjusted plan been implemented		
		Evidence		

Completed by: Eric Glendening

Jan 2004

Student Outcomes Assessment Plan Rubric COPY

Undergraduate Program

Department: _Chemistry_____ Major: BA/BS_____

The student outcomes assessment plan	3 Proficient	2 Satisfactory	1 Unsatis.	COMMENTS
1. clearly articulates intended student outcomes/achievement			X	No information provided
2. outlines appropriate assessment tools that will lead to strong inferences on student achievement		X		Concentrates on student evaluation of faculty teaching effectiveness: these are thoughtfully designed. Little on evaluating student learning until now, but new Senior Seminar will "assess cumulative student learning in the subdisciplines." Standardized exams are contemplated.
3. measures student achievement at various stages of the academic program		X		Mainly finishing students except for SIR's
4. demonstrates commitment to using assessment data to modify program	X			Improvements to staffing assignments, curriculum and course structure.

OVERALL ASSESSMENT (Jan. 2002)

___**Developed Plan**: The plan meets nearly all of the criteria in a proficient manner; remaining criteria are labeled as satisfactory; no criteria are labeled as unsatisfactory

X__ Emerging Plan: The plan has a spread of criteria labeled across all three levels; on average, criteria appear to be clustered in the middle as satisfactory

___**Undeveloped Plan:** The plan has nearly all criteria labeled as unsatisfactory; remaining criteria are labeled as satisfactory

COMMENT: Assessment has depended mainly on student satisfaction surveys for each course, and on surveys of graduating seniors and alumni for evaluation of the full program. The department has been exemplary in administering these, making them important in annual performance reviews, and using the data to change staffing assignments and help faculty improve their teaching. The dept recognizes the need to evaluate student learning itself in ways other than grades: the new Senior Seminar and a contemplated standardized exam are promising tools. Although the intended student learning outcomes may be obvious from the curriculum, stating these major goals explicitly would provide a useful structure for the Plan. The dept supports a student chapter of the American Chemical Society, which undoubtedly enhances learning and the probability of career success; this activity perhaps deserves a higher profile in the overall assessment plan.

Department of Chemistry
Student Outcomes Assessment Plans
December, 2001

At the present time, the Chemistry Department's student outcomes assessment activities consists of four components: (1) course student satisfaction surveys, (2) graduating seniors' exit questionnaires, (3) students' immediate post-graduation positions or plans, and (4) two levels of alumni questionnaires.

The Chemistry Department continually seeks to improve the quality of its instruction and general student learning effectiveness and the quality of the teaching/learning environment. We strive to reach these objectives (particularly lecture/lab learning effectiveness), in part, through the use of 'student satisfaction' questionnaires (attached). This comprehensive survey is conducted each semester for all sections of all lecture and laboratory courses for all faculty. The multidimensional nature of the information obtained (e.g., multidimentional bargraphs and transcribed student comments) from this instrument helps each instructor of our lecture and laboratory courses make improvements in course-delivery mechanics and/or course content. An important purpose of this questionnaire is to help faculty members achieve maximal communication effectiveness with their students.

The Department of Chemistry has used these questionnaires continually for the past 21 semesters to help the faculty assess its teaching quality and relative effectiveness in all lecture and laboratory courses. The results of these evaluations are used in conjunction with other information (e.g. course exams and syllabi, where appropriate, and, in some instances, peer visitations) to improve the quality and appropriateness of the course content, as well as its delivery. Because of the relatively high frequency of these course evaluations, we have been able to use the results of the questionnaires to carry out continuous improvements in the lecture and laboratory courses that we offer. Although we recognize the limitations that are associated with these questionnaires, we feel that they are very practical, requiring little or no faculty time, are relatively unobtrusive, and provide meaningful information about the quality of the undergraduate experience both in the lecture room and the laboratory.

These 'student satisfaction' questionnaires provide very useful feedback to the instructors and the department chair. The results of the questionnaires are rendered in an

efficiently interpreted, multidimensional, color-coded bargraph. Students' hand-written comments are also transcribed verbatim. This information is made available to each faculty member at the very end of the semester in which the questionnaires are administered.[1] During the annual Spring Semester performance review meetings, the department chair discusses with each faculty member the results of these questionnaires, along with other teaching-related information and concerns. As a result of these discussions, continual improvements can be made, and usually are, to the lecture and laboratory courses. This component of our assessment activity has had, we believe, a direct and positive effect on student outcomes that associated with those courses, as well as the overall chemistry major curriculum.

In addition to this instrument, the Department uses the results of graduating senior and alumni questionnaires to assess the effectiveness of its program. The feedback provided by these inquiries, we believe, has a direct impact on student outcomes because the information thus obtained has continuously brought about improvements, ranging from staffing assignments and teaching methods, to curriculum and course structure. These improvements have been applied to lecture and laboratory courses throughout the curriculum, from our introductory 'general education' courses to advanced courses for chemistry majors.

The results of the graduating senior questionnaires (copy attached) are reviewed by the Department Curriculum Committee and the department chair, with respect to determining what changes should be made in the course structure and quality of the chemistry program and other aspects of the undergraduate's experience in the Department. These exit questionnaires will be given to graduating seniors during the last week of the Spring Semester, 2002. The results will reviewed by the department chair and the curriculum committee in detail during the Fall Semester, 2002.

Similarly, we obtain feedback from recently-graduated alumni through an alumni questionnaire (copy attached) about their educational preparation in our program, and we carefully examine these results with an eye toward making appropriate improvements in our program. During the Spring Semester, 2002, we will send alumni questionnaires to students

[1] According to Department policy all lecture questionnaires are conducted during the next-to-the-last week of the semester, and laboratory questionnaires during week before that.

who graduated in 1999 and 2000. The results of these surveys will be reviewed by the department chair and the curriculum committee during the Fall Semester, 2002.

Another, new assessment-related activity is that we will offer CHEM 400 (Senior Seminar in Chemistry) for the first time to seniors in the Spring Semester, 2002. This required course will provide a means for us to assess cumulative student learning in the subdisciplines. We are contemplating administering standardized exams in one or more chemistry subdisciplines (or in overall chemistry content) to determine how our students compare with national norms. This information will be carefully analyzed to see if we need to change course content and/or instructional methods. We will attempt to examine whether a correlation exists between student achievement and various input metrics, such as SAT scores, high school graduation class rank, etc.

Indiana State University
Department of Chemistry
Student Opinion Survey of LECTURE Course

(To be conducted during the next-to-the-last week of classes)

Semester_____ Year_____

Course Number_____ Instructor_____

This questionnaire is important to you, other students, the instructor and the Chemistry Department. Please circle the response that you feel is appropriate.

SA=strongly agree; A=agree; N=neutral; D=disagree; SD=strongly disagree

SA A N D SD 1. The instructor came to class well prepared.

SA A N D SD 2. The instructor presented material clearly.

SA A N D SD 3. The instructor was enthusiastic about teaching this course.

SA A N D SD 4. The instructor made appropriate use of class time.

SA A N D SD 5. The instructor was concerned and eager to help.

SA A N D SD 6. I knew what was expected of me in this course.

SA A N D SD 7. The exams were representative of the material covered in the course.

SA A N D SD 8. The exams were fairly graded.

SA A N D SD 9. Feedback on tests was prompt and indicated clearly my standing.

10. The amount of work required for the course was:

far too much **too much** **about right** **too little** **far too little**

11. Overall, I would rate the instructor as:

excellent **good** **adequate** **poor** **very poor**

Your written comments are especially valuable to us. Please answer the questions below and provide any other comments that you wish to make. *If you need more space, use the back of this questionnaire.*

1. What did you particularly like about this lecture course and/or instructor?

2. What did you not like about this course and/or instructor?

3. What should the instructor do to improve the course and his/her teaching effectiveness?

Indiana State University
Department of Chemistry
Student Opinion Survey of LABORATORY Course

(To be conducted two weeks before lab checkout)

Semester_____ Year_____

Course Number_____ Instructor_____

This questionnaire is important to you, other students, the instructor and the Chemistry Department. Please circle the response that you feel is appropriate.

SA=strongly agree; A=agree; N=neutral; D=disagree; SD=strongly disagree

SA A N D SD 1. The instructor was well prepared for the lab sessions.

SA A N D SD 2. The pre-lab lectures were appropriate.

SA A N D SD 3. The instructor was enthusiastic about teaching this course.

SA A N D SD 4. The instructor was helpful to me during lab.

SA A N D SD 5. The instructor made me aware of safety considerations.

SA A N D SD 6. I knew what was expected of me in this lab course.

SA A N D SD 7. The lab was run in an organized manner.

SA A N D SD 8. The lab reports were fairly graded.

SA A N D SD 9. Feedback on grades was prompt and indicated clearly my standing.

10. The amount of work required for the course was:

far too much **too much** **about right** **too little** **far too little**

11. Overall, I would rate the instructor as:

excellent **good** **adequate** **poor** **very poor**

Your written comments are especially valuable to us. Please answer the questions below and provide any other comments that you wish to make. *If you need more space, use the back of this questionnaire.*

1. What did you particularly like about this lab course and/or instructor?

2. What did you not like about this lab course and/or instructor?

3. What should the instructor do to improve the lab course and his/her teaching effectiveness?

COPY

March 15,2001

Dear ISU Chemistry Graduate:

I would like to ask for your help in connection with our self-assessment activities. We are continuously trying to improve the quality of our Program, and one of the components of our attempts is to ask for the opinions and guidance of our graduates. With all the advantages of hindsight, you are in a position to help us identity and see things that are important components in our developmental plans. Of course the beneficiaries of your advice and suggestions, and our attempts to incorporate these ideas in our program and practices, are the undergraduates who will follow your footsteps as holders of the B.S. degree in chemistry from Indiana State University.

The enclosed questionnaire is designed to provide us with salient information about your experiences here and your suggestions for improvement. It should only take you a few minutes to complete this questionnaire. For convenience, I am including a postage-paid, addressed envelope.

Since it is important for us to keep in touch with you, please be sure to give us your current address. Please also feel free to contact us at any time through e-mail or our Web home pages (not yet fully developed). These Internet addresses are:

e-mail: a-halpern@indstate.edu

Web site: http:/carbon.indstate.edu/chem (*Note: there is no www*)

With very best regards and best wishes, I am

Yours very truly,

Arthur M. Halpern
Professor and Chairman

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