

Program Outcomes Assessment

BA/BS in Biology with Specialization in Medical Laboratory Science

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General Information (Program Outcomes Assessment)

Standing Requirements

Mission Statement

The mission of the Biology Major with Specialization in Medical Laboratory Science Program (BS) is to prepare students for entrance in their senior year to a clinical training program. The clinical year is offered by hospitals affiliated with Indiana State University; courses are taught by affiliate faculty. The program culmination is marked by taking the national registry exam for Medical Laboratory Scientists, sponsored by the American Society for Clinical Pathologists. Medical Laboratory Scientists are highly trained healthcare professionals who perform chemical, microbiological, hematological, immunological, and microscopic studies on fluids and exudates of the human body. They play a critical role in the diagnosis and care of patients in hospitals, clinics, and physician's offices. They are hired by hospitals, clinics, research facilities, military and government health facilities. This program meets the mission of the University by offering experiential learning and community engagement.

Outcomes Library

BA/BS in Biology with Specialization in Medical Laboratory Science- Updated Feb 2015

Goal 1: Content

Outcome	Mapping
SLO1: Students will describe the chemical and molecular processes fundamental to living cells.	No Mapping
SLO2: Students will describe the fundamental cellular and molecular basis of genetics.	No Mapping
SLO3: Students will describe the fundamentals of innate and adaptive immunity.	No Mapping
SLO4: Students will describe the fundamental physiological processes of the human body.	No Mapping

Goal 2: Method

Outcome	Mapping
SLO5: Students will apply the quantitative methods, instrumentation, and data analysis to explore living systems.	No Mapping
SLO6: Students will evaluate and interpret the outcomes of quantitative methods, instrumentation and data analysis.	No Mapping

Goal 3: Communication

Outcome	Mapping
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SLO7: Students will demonstrate professional communication skills No Mapping

Replaced - BA/BS in Biology with Specialization in Medical Laboratory Science Outcome Set

1: Develop knowledge of core content

Develop knowledge and understanding of core content in biology

Outcome	Mapping
SLO1: Describe the chemical and molecular processes fundamental to living organisms.	No Mapping
SLO2: Describe and illustrate the fundamental structure and processes of prokaryote and eukaryote cells.	No Mapping
SLO3: Explain and illustrate how the growth and behavior of organisms are activated and regulated Explain and illustrate how the growth and behavior of organisms are activated and regulated through the expression of genetic information in context.	No Mapping
SLO4: Describe the fundamentals of innate and adaptive immunity.	No Mapping
SLO5: Explain and illustrate how the normal physiology of the human body functions to maintain homeostasis.	No Mapping

2: Develop core competencies in scientific inquiry

Outcome	Mapping
SLO6: Apply the process of science to understand biological phenomena.	No Mapping
SLO7: Evaluate the outcomes of scientific experiments	Foundational Studies: 2. Critically evaluate the ideas of others.

3: Develop an Ethical Approach to One's Profession

Develop an Ethical Approach to One's Profession

Outcome	Mapping
SLO8: Explain ethical implications of decisions and actions.	No Mapping

Curriculum Map

Active Curriculum Maps

Biology Content (See appendix)

Alignment Set: BA/BS in Biology with Specialization in Medical Laboratory Science- Updated Feb 2015

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Communication of Outcomes

Final outcomes will be included in a report to the Assessment Office and posted on our Departmental website at the appropriate Undergraduate programs link.

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

Archive

File Attachments:

1. **Biology_Assessment_Timeline_Sept2010.pdf** (See appendix)
-

2011-2012 Assessment Cycle

Assessment Plan

Outcomes and Measures

Replaced - BA/BS in Biology with Specialization in Medical Laboratory Science Outcome Set

1: Develop knowledge of core content

Develop knowledge and understanding of core content in biology

SLO1: Describe the chemical and molecular processes fundamental to living organisms.

▼ **Measure:** Exam
Direct - Exam

Details/Description: Used an online assessment tool to test student ability to recall important facts from chemistry and apply them to solve chemistry problems.

Design of Assessment Tool: Chemistry 105 Final Exams from the years 2009, 2010, and 2011 were used as source material for questions. Selection of question types was based on three factors. First, question types that were repeated across all three exams were viewed as critical knowledge and were chosen (ex. naming of compounds and ions). Second, question types that appeared critical to understanding of biology were chosen (ex. redox reactions). Third, questions that required skills that might be used in a biology research lab were chosen (ex. calculating dilutions from stock solutions).

Some question types had to be modified to fit the Qualtrics format that would be used to deliver the assessment. For example, it would have been ideal for students to show their work or draw a chemical structure for some question types. However, given the online format, the questions had to be modified, for example, to answer only or multiple choice.

The assessment was limited to 17 questions to limit the time necessary to complete. Some questions were multipart, for a total of 30 answers entered. Also, a shorter assessment was chosen to avoid discouraging or deterring students from completing it, since no grade credit incentive was given for the assessment.

A "Helpful Information" sheet was made based on that given with the Chemistry 105 finals containing information such as a Periodic Table of the Elements and important equations. The sheet was made as a PDF and sent in an email to the students.

Delivery of the Assessment: The assessment was made as a survey using Qualtrics software. An email containing a description of the assessment and link to the assessment was sent via Qualtrics to 29 MLS majors (11 freshmen, 5 sophomores, 6 juniors, and 7 seniors). One of the freshman students had not yet completed CHEM 105. A second email contained the helpful information sheet. The only incentive for completing the assessment was a promise to send students their scores.


Students were given about 10 days to complete the assessment, and were sent a reminder after one week. After the initial due date, 12 students had looked at the assessment, but only eight had completed it. A third email was sent, encouraging the students to take the assessment and extending the due date another week. By May 5, a total of 9 students (31%) had completed the Assessment (3 freshmen, 1 sophomore, 3 juniors, and 2 seniors).

Target:

Implementation Plan (timeline): Students were given about 10 days to complete the assessment, and were sent a reminder after one week. After the initial due date, 12 students had looked at the assessment, but only eight had completed it. A third email was sent, encouraging the students to take the assessment and extending the due date another week. By May 5, a total of 9 students (31%) had completed the Assessment (3 freshmen, 1 sophomore, 3 juniors, and 2 seniors).

Responsible Individual(s):

Supporting Attachments:

 Chemistry assessment for MLS concentration_sample.pdf (Adobe Acrobat Document) (See

Assessment Findings

Finding per Measure

Replaced - BA/BS in Biology with Specialization in Medical Laboratory Science Outcome Set

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Develop knowledge and understanding of core content in biology

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Responsible Individual(s):

Supporting Attachments:

 Chemistry assessment for MLS concentration_sample.pdf (Adobe Acrobat Document) (See appendix)

Findings for Exam

Summary of Findings: There was variation across questions in the percent of student who provided the correct answer (Table 3 in attached report). Of the 30 questions, 11 were answered correctly by fewer than 50% of the students, 10 were answered correctly by 50-67% of the students, and 8 were answered correctly by more than 67% of the students answered correctly. One question was answered correctly by all students.

Individual student scores ranged from 17-80% (Figure 1 in attached report), with an average of 50.1% and a median of 50%. One student scored less than 40%, four students scored between 40 and 50%, inclusive, and three students scored between 60 and 70%, and one student scored 80%. The one student who scored 17% had not yet completed CHEM 105 at the time of the assessment. Without this student, the average rose to 54% and the median to 50.8%.


Results: Target Achievement: Not Met

Recommendations :

Reflections/Notes : The significance of these results is difficult to establish, given the low response rate to the survey. For the students responding, average performance on the test seems a bit low, especially given that five of the eight students who had completed CHEM 105 earned A's. This lower-than-expected performance may be attributed to the low stakes of the assessment. It may also be due to students forgetting concepts they do not use regularly.

Some questions were answered correctly by a very small proportion of students ($\leq 33\%$). Some of these questions (e.g., the ideal gas law question) do not seem particularly difficult.

Substantiating Evidence:

 Biology Assessment Report 2011-12.pdf (Adobe Acrobat Document) (See appendix)

These Findings are associated with the following Actions:

Improve student mastery of concepts of chemical and molecular processes
(Action Plan; 2011-2012 Assessment Cycle)

Overall Recommendations

No text specified

Overall Reflection

No text specified

Action Plan

Actions

Replaced - BA/BS in Biology with Specialization in Medical Laboratory Science Outcome Set

1: Develop knowledge of core content

Develop knowledge and understanding of core content in biology

SLO1: Describe the chemical and molecular processes fundamental to living organisms.

▼ **Action:** Improve student mastery of concepts of chemical and molecular processes

This Action is associated with the following Findings

Findings for Exam

(Assessment Plan and Assessment Findings; 2011-2012 Assessment Cycle)

Summary of Findings: There was variation across questions in the percent of student who provided the correct answer (Table 3 in attached report). Of the 30 questions, 11 were answered correctly by fewer than 50% of the students, 10 were answered correctly by 50-67% of the

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Action Details: The Biology Department will work with the Chemistry Department to determine whether the performance of students for particular questions on the assessment parallels that of students in CHEM 105. If students perform substantially better in CHEM 105 on items for which students scored poorly in the assessment, which would indicate the forgetting of concepts, the Biology Department will explore ways to help students practice these concepts in biology courses (or in other chemistry courses). If the performance of students is similar between CHEM 105 and the assessment, the Biology Department will work with the Chemistry Department to see how mastery of these concepts in CHEM 105 might be improved.

Implementation Plan (timeline): 2012-13

Key/Responsible Personnel: Department chair

Measures:

Resource Allocations:

Priority: High

Status Report

Action Statuses

Replaced - BA/BS in Biology with Specialization in Medical Laboratory Science Outcome Set

1: Develop knowledge of core content

Develop knowledge and understanding of core content in biology

SLO1: Describe the chemical and molecular processes fundamental to living organisms.

▼ **Action:** Improve student mastery of concepts of chemical and molecular processes

Action Details: The Biology Department will work with the Chemistry Department to determine whether the performance of students for particular questions on the assessment parallels that of students in CHEM 105. If students perform substantially better in CHEM 105 on items for which students scored poorly in the assessment, which would indicate the forgetting of concepts, the Biology Department will explore ways to help students practice these concepts in biology courses (or in other chemistry courses). If the performance of students is similar between CHEM 105 and the assessment, the Biology Department will work with the Chemistry Department to see how mastery of these concepts in CHEM 105 might be improved.

Implementation Plan (timeline): 2012-13

Key/Responsible Personnel: Department chair

Measures:

Resource Allocations:

Priority: High

Status for Improve student mastery of concepts of chemical and molecular processes

No Status Added

Status Summary

No text specified

Summary of Next Steps

No text specified

2012-2013 Assessment Cycle

Assessment Plan

Outcomes and Measures

Replaced - BA/BS in Biology with Specialization in Medical Laboratory Science Outcome Set

2: Develop core competencies in scientific inquiry

SLO7: Evaluate the outcomes of scientific experiments

▼ **Measure:** Rubric on evaluating outcomes of scientific experiments
Direct - Student Artifact

Details/Description: Strategy:

1. Identify classes addressing this objective.
2. Develop a rubric to evaluate student performance on student artifacts produced in these classes.
3. Have faculty apply the rubric to student artifacts.
4. Analyze scores generated by application of rubric to student artifacts.

Target:

Implementation Plan (timeline): 2012-13

Responsible Individual(s): Department chair

Assessment Findings

Finding per Measure

Replaced - BA/BS in Biology with Specialization in Medical Laboratory Science Outcome Set

2: Develop core competencies in scientific inquiry

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Target:

Implementation Plan (timeline): 2012-13

Responsible Individual(s): Department chair

Findings for Rubric on evaluating outcomes of scientific experiments

No Findings Added

Overall Recommendations

No text specified

Overall Reflection

No text specified

Action Plan

Status Report

2013-2014 Assessment Cycle

Assessment Plan

Outcomes and Measures

Replaced - BA/BS in Biology with Specialization in Medical Laboratory Science Outcome Set

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1. Identify classes addressing this objective.
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3. Have faculty apply the rubric to student artifacts.
4. Analyze scores generated by application of rubric to student artifacts.

Target:

Implementation Plan (timeline): Data will be collected from papers submitted in Spring 2013 and Fall 2013. Data will be reported in Fall 2014 (by Dec. 1)

Responsible Individual(s): Department chair

Assessment Findings

Finding per Measure

Replaced - BA/BS in Biology with Specialization in Medical Laboratory Science Outcome Set

2: Develop core competencies in scientific inquiry

SLO7: Evaluate the outcomes of scientific experiments

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Target:

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Responsible Individual(s): Department chair

Findings for Rubric on evaluating outcomes of scientific experiments

No Findings Added

Overall Recommendations

No text specified

Overall Reflection

No text specified

📅 Action Plan

Actions

Action Plan

Outcome

Action Plan 2013-14

▼ Action: Biology Majors Exit exam

This Action is associated with the following Findings

No supporting Findings have been linked to this Action.

Action Details: Assess all the content SLOs by administering the ETS (Princeton, NJ) Biology Majors Exit Exam to juniors in Spring 2015. MLS students leave for their internships in July before their senior year and do not return to ISU. Therefore, the MLS juniors will be joining the Biology seniors for the Biology Major Exit exam to assess content areas. We will be submitting an assessment grant requesting funding to assist in this pilot effort (at a cost of about \$3,500)

Implementation Plan (timeline): 1 Dec 2014 - Action plan to use the Biology Majors Exit exam from Educational Testing Services, Princeton NJ.

1 May 2015 - Status report: Will indicate say how many juniors took the exam and the initial results.

1 Sept 2015 - Data findings: will show how the test results look across classes and will identify what we intend to do (change content in courses, etc)

1 Dec 2015 - Plan for how to change content of spring 2016 courses

1 May 2016 - Status Report: results of changing the 2016 spring courses

1 Sept 2016 - Data findings will show the change in outcomes (ETS test again, or ask a subset of those questions at the end of the semester in the classes we changed) for students in courses that were changed

1 Dec 2016 - Further action plan: for other classes or additions/modifications to revised classes

1 May 2017 - report out: Evaluate SLOs after revising content and teaching methods in classes in fall 2016

Key/Responsible Personnel: Kathleen Dannelly

Measures:

Resource Allocations: We will be submitting an assessment grant requesting funding to assist in this pilot effort (at a cost of about \$3,500)

Priority: Medium

Supporting Attachments:

📎 MLS Assessment Summary Report, Feb 2015 (Word Document (Open XML)) (See appendix)

Status Report

Action Statuses

Action Plan

Outcome

Action Plan 2013-14

▼ Action: Biology Majors Exit exam

Action Details: Assess all the content SLOs by administering the ETS (Princeton, NJ) Biology Majors Exit Exam to juniors in Spring 2015. MLS students leave for their internships in July before their senior year and do not return to ISU. Therefore, the MLS juniors will be joining the Biology seniors for the Biology Major Exit exam to assess content areas. We will be submitting an assessment grant requesting funding to assist in this pilot effort (at a cost of about \$3,500)

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1 May 2017 - report out: Evaluate SLOs after revising content and teaching methods in classes in fall 2016


Key/Responsible Personnel: Kathleen Dannelly

Measures:

Resource Allocations: We will be submitting an assessment grant requesting funding to assist in this pilot effort (at a cost of about \$3,500)

Priority: Medium

Supporting Attachments:

 MLS Assessment Summary Report, Feb 2015 (Word Document (Open XML)) (See appendix)

Status for Biology Majors Exit exam

No Status Added

Status Summary

No text specified

Summary of Next Steps


No text specified

2014-2015 Assessment Cycle

 **Assessment Plan**

 **Assessment Findings**

 **Action Plan**


 **Status Report**

2015-2016 Assessment Cycle

 **Assessment Plan**

 **Assessment Findings**

 **Action Plan**


 **Status Report**

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

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- A. **Biology Content** (Curriculum Map)
 - B. **Biology_Assessment_Timeline_Sept2010.pdf** (Adobe Acrobat Document)
 - C. **Chemistry assessment for MLS concentration_sample.pdf** (Adobe Acrobat Document)
 - D. **Biology Assessment Report 2011-12.pdf** (Adobe Acrobat Document)
 - E. **MLS Assessment Summary Report, Feb 2015** (Word Document (Open XML))
-

**Assessment Plan
Department of Biology
September 2010**

2010-2011

Locate and review current thinking on biology curricula at the undergraduate and graduate level (examine majors, nonmajors, and pre-professional training in the health-related fields).

Develop learning outcomes for all curricula. In some cases, this will involve more extensive development; in others, addition to, or modification of, existing outcomes, or in others (e.g., Foundational Studies courses), reinforcement of existing outcomes.

2011-2012

Fall: Revise curricula to explicitly address learning outcomes.

Spring: Seek approval for curricular changes. Develop research plan for assessment of new program.

2012-2013

If curricular approval has been granted, implement new curricula and begin assessment.

If approval is still ongoing, continue this process and implement curricular changes in 2013-2014.

2013-2014

Review assessment results from previous year and use the results to guide further curricular revision.