Program Outcomes Assessment

BA/BS in Biology

Created on: 08/24/2009 09:04:00 AM CST
Last Modified: 11/19/2015 12:07:56 PM CST

Table of Contents

General Information (Program Outcomes Assessment)

Standing Requirements

Mission Statement

The mission of the Department of Biology at Indiana State University is to nurture the academic potential of every student, advance knowledge through quality research, and serve the university and broader communities. Through experiential learning both within and outside the classroom, we motivate our students to become critically thinking, informed citizens with a heightened interest in science. Through one-on-one mentoring, we engage both undergraduate and graduate students in the excitement and challenge of original research. Through research and outreach education, we make valuable contributions at both local and national scales to the scientific community and the well-being of the general public.

Outcomes Library

BA/BS in Biology outcome set - revised 2015

1. Explain and illustrate the fundamental concepts of biology

Outcome	Mapping
1a. Explain and illustrate energy and matter in biology	No Mapping
1b. Explain and illustrate cells and genetics	No Mapping
1c. Explain and illustrate living organisms	No Mapping
1d. Explain and illustrate normal physiology of organisms	No Mapping
1e. Explain and illustrate growth and behavior of organisms	No Mapping
1f. Illustrate and examine relationships among organisms	No Mapping
1g. Explain biological phenomena using evolutionary theory	No Mapping

2. Quantitative reasoning, laboratory skills, analysis, and interpretation

Outcome	Mapping
2a. Use quantitative skills and reasoning	No Mapping
2b. Use modeling/simulations to understand biological processes	No Mapping
2c. Use appropriate equipment to solve biological problems	No Mapping

3. Scientific communication and literacy

Outcome	Mapping

3a. Recognize the interdisciplinary nature of science	No Mapping
3b. Communicate and collaborate effectively	No Mapping
3c. Recognize and explain the role of a biologist	No Mapping
3d. Recognize and act on ethical challenges in science	No Mapping

Goal 1: Develop knowledge and understanding of core content in biology

1: Illustrate and examine relationships among organisms

1: Illustrate and examine phylogenetic relationships among organisms, and characterize and differentiate the evolutionary processes that yield such relationships.

Outcome	Mapping
1.1: Apply concepts of natural selection and evolution Apply concepts of natural selection and evolution in understanding any aspect of biology, ranging from genes to speciation.	No Mapping
1.2: Map key events in biological evolution Map key events in biological evolution onto the broad phylogenetic tree of life.	No Mapping
1.3: Summarize biological information Summarize biological information in the context of phylogenetic trees.	No Mapping
1.4: Construct a basic phylogenetic tree Construct a basic phylogenetic tree from biological data.	No Mapping

2: Explain and illustrate cells

2: Explain and illustrate the basic structure and function of cells.

Outcome	Mapping
2.1: Explain cell functions. Explain how internal membranes and organelles contribute to cell functions.	No Mapping
2.2: Describe the molecular properties of cell membranes Describe the molecular properties of cell membranes, and relate these properties to the selective permeability of membranes.	No Mapping
2.3: Explain how cell size/shape affect nutient intake Explain how cell size and shape affect the overall rate of nutrient intake and the rate of waste elimination.	No Mapping
2.4: Explain how cells use energy to maintain homeostasis Explain how cellular molecules and organelles generate and utilize energy in cells to maintain homeostasis.	No Mapping
2.5: Explain the differences between cells Explain the differences between prokaryotic and eukaryotic cells with regard to macromolecules, membranes, and organelles, and evaluate the significance of these differences.	No Mapping
2.6: Explain mitotic and meiotic division Explain mitotic and meiotic division, and regulation of cell growth.	No Mapping

2.7: Explain and illustrate how cells respond Explain and illustrate how cells respond to their internal and external environments.	No Mapping

3: Explain and illustrate normal physiology of organisms

3: Explain and illustrate how the normal physiology of organisms functions in different taxa to maintain homeostasis in various environments.

Outcome	Mapping
3.1: Explain functional units Explain how functional units at different levels of biological organization permit diverse organisms to maintain relatively constant internal environments.	No Mapping
3.2: Explain how organisms sense and respond Explain how organisms sense and respond to their external environment.	No Mapping
3.3: Compare and contrast the differences in physiology Compare and contrast the differences in physiology among organisms, both within and between taxa, that allow them to cope with differences in their abiotic and biotic environments.	No Mapping

4: Explain and illustrate growth and behavior of organisims

4: Explain and illustrate how the growth and behavior of organisms are activated and regulated through the expression of genetic information in context.

Outcome	Mapping
4.1: Explain the relationship between phenotype and genotype Explain and illustrate the relationship between phenotype and genotype.	No Mapping
4.2: Explain various modes of genetic action Explain and illustrate the various modes of genetic action, including Mendelian genetics, quantitative genetics, and epigenetics.	No Mapping
4.3: Explain the applications of genomics Explain and illustrate the applications of genomics in science and society.	No Mapping
4.4: Explain how genetic information is stored and expressed Explain and illustrate how genetic information is stored and expressed.	No Mapping

5: Explain and illustrate energy and matter in biology

5: Explain and illustrate the pathways and transformations of energy and matter in biological systems.

Outcome	Mapping
5.1: Describe the structure and function of molecules Describe the structure and function of biological molecules, including carbohydrates, proteins, and lipids, that are involved in anabolic and catabolic processes in living organisms.	No Mapping
5.2: Describe pathways involved in photosynthesis. Describe the regulation of pathways involved in photosynthesis.	No Mapping
5.3: Describe pathways involved in cellular respiration Describe the regulation of pathways involved in cellular respiration and explain how these pathways utilize energy from carbohydrates, proteins, and lipids.	No Mapping
5.4: Explain how grow and reproduce	No Mapping

Explain how biological systems use free energy and nutrient availability to grow and reproduce.	
5.5: Predict how changes affect organisms Predict how changes in free energy and nutrient availability affect organisms, populations, and ecosystems.	No Mapping

6: Explain and illustrate living organisms

6: Explain and illustrate how living organisms are interconnected and interacting at multiple functional scales.

Outcome	Mapping
6.1: Interpret coevolutionary and symbiotic relationships Interpret coevolutionary and symbiotic relationships and illustrate mutualism, antagonism and commensalism.	No Mapping
6.2: Describe ecological interactions Examine and describe ecological interactions within and between populations and species, including competitive and exploitative relationships.	No Mapping
6.3: Describe generation & maintenance of biological divers Describe and explain the generation and maintenance of biological diversity, and its role in ecosystem function.	No Mapping

Goal 2: Develop core competencies in scientific inquiry

7: Apply science to understand biological phenomena

Apply the process of science to understand biological phenomena.

Outcome	Mapping
7.1: Review, summarize, and critique Review, summarize, and critique scientific literature relevant to a specific biological question.	**Foundational Studies:** 1. Locate, critically read, and evaluate information to solve problems.
7.2: Formulate a testable hypothesis Formulate a testable hypothesis, and design and perform a study to test it.	No Mapping
7.3: Analyze data to test a hypothesis Analyze data to address a question or test the hypothesis of a study.	**Foundational Studies:** IIIa. Quantitative Literacy
7.4: Reach defensible conclusions Reach defensible conclusions based on results of data analyses.	**Foundational Studies:** IIIa. Quantitative Literacy
7.5: Synthesize and integrate information Synthesize and integrate information to conceptualize and formulate ideas about biology.	No Mapping

8: Use quantitative skills and reasoning

Use quantitative skills and reasoning to solve biological problems.

Outcome	Mapping
8.1: Creating or expanding data sets for analysis. Use multiple biological databases as information sources for creating or expanding data sets for analysis.	No Mapping

8.2: Calculate appropriate indices needed to solve problems Calculate appropriate indices needed to solve biological problems.	No Mapping
8.3: Interpret appropriate statistical analyses Select, compute, and interpret appropriate statistical analyses for analyzing biological data.	**Foundational Studies:** IIIa. Quantitative Literacy

9: Use modeling/simulations to understand biological process

Use modeling and simulations to understand biological processes.

Outcome	Mapping
9.1: Describe the range of applications of specific models Describe the critical assumptions and range of application of specific models used to investigate biological processes.	No Mapping
9.2: Investigate the results of changing parameter values Investigate the results of changing parameter values, or initial or boundary conditions, or simplifying assumptions in models and simulations, and interpret the biological relevance of those results.	No Mapping
9.3: Gain a comprehensive understanding of biological proces Explain the value of combining models and simulations with empirical studies to gain a more comprehensive understanding of biological processes.	No Mapping

10: Use appropriate equipment to solve biological problems

Use appropriate equipment to solve biological problems.

Outcome	Mapping
10.1: Choose appropriate equipment to use in investigation Choose the appropriate equipment to use in a biological investigation.	No Mapping
10.2: Use proper equipment to gather valid data Use the proper equipment correctly to gather valid data for a biological investigation.	No Mapping

11: Recognize the interdisciplinary nature of science

Recognize the interdisciplinary nature of science and demonstrate the ability to connect biology with other disciplines.

Outcome	Mapping
11.1: Apply basic concepts of cognate courses to phenomena Apply basic concepts of cognate courses in chemistry, physics, and mathematics to biological phenomena.	No Mapping
11.2: Integrate key biological concepts Integrate key biological concepts across levels of biological organization.	No Mapping
11.3: Use tools and techniques from interdisciplinary work Use tools and techniques emerging from interdisciplinary work involving the combination of biology, computer science, and informatics.	No Mapping

12: Communicate and collaborate effectively

Communicate and collaborate effectively with other biologists and with scientists in other disciplines.

Outcome	Mapping
12.1: Use verbal and oral communication professionally Use both verbal and oral communication in a professional manner.	**Foundational Studies:** 10. Express themselves effectively, professionally, and persuasively both orally and in writing.
12.2: Evaluate/critique scientific writing and presentations Evaluate and critique scientific writing and presentations.	**Foundational Studies:** 2. Critically evaluate the ideas of others.
12.3: Work effectively with peer groups Work effectively with peer groups to accomplish a collaborative task, such as a lab report, group presentation, or analysis of data.	No Mapping

13: Recognize and explain the role of the biologist

Recognize and explain the role of the biologist in the world and society.

Outcome	Mapping
13.1: Explain how biological knowledge relates to technology, political issues, and society.	No Mapping
13.2: Explain the challenges that societal concerns present Explain the challenges that societal concerns present to science.	No Mapping

14: Students recognize and act on ethical challenges

Students recognize and act on ethical challenges that arise in their discipline.

Outcome	Mapping
14.1: Biological ethics of working with research subjects Describe and demonstrate the biological ethics of working with research subjects.	No Mapping
14.2: Explain the ethical implications Explain the ethical implications of biological issue for society.	No Mapping

Goal 3: Develop an understanding of career opportunities in biology

15: Develop a career plan

Develop a career plan.

Outcome	Mapping
15.1: Set a career goal Set a career goal with the help of biology faculty advisors and the Career Center.	No Mapping
15.2: Create a timeline of events Create a timeline of events, courses, and activities designed to prepare for a chosen career goal.	No Mapping
15.3: Explain connection between areas of biology and career Explain the connection between specific areas of biology and specific careers.	No Mapping

16: Use the resources at the Career Center to improve skills

Use the resources at the Career Center to improve career skills.

Outcome	Mapping
16.1: Discuss career plans and planning Discuss career plans and planning with a career counselor.	No Mapping
16.2: Participate in Career Center activities Participate in Career Center activities that prepare students for their likely careers.	No Mapping
16.3: Develop a resume Develop a resume.	No Mapping
16.4: Demonstrate the skills to network effectively Demonstrate the skills to network effectively.	No Mapping

Curriculum Map

Active Curriculum Maps

BA/BS in Biology (See appendix)
Alignment Set: BA/BS in Biology Outcome Set
Created: 11/30/2012 1:10:28 pm CST
Last Modified: 12/04/2012 8:19:56 am CST

Goal 1 (See appendix)
Alignment Set: Goal 1: Develop knowledge and understanding of core content in biology
Created: 12/04/2012 8:28:58 am CST
Last Modified: 12/04/2012 9:41:47 am CST

Communication of Outcomes

We will publish the outcomes on our web site.

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

Goal 2: Develop core competencies in scientific inquiry

7: Apply science to understand biological phenomena

Apply the process of science to understand biological phenomena.

7.2: Formulate a testable hypothesis

Formulate a testable hypothesis, and design and perform a study to test it.

Measure: Hypothesis
Direct - Student Artifact

Details/Description: Attached rubric will be used to evaluate hypotheses
Target:
Implementation Plan (timeline): Spring 2012
Responsible Individual(s): Department Chair
Supporting Attachments:
Hypothesis_rubric.pdf (Adobe Acrobat Document) (See appendix)

Measure: Study Design
Direct - Student Artifact

Details/Description: Attached rubric will be used to evaluate study design
Target:
Implementation Plan (timeline): Spring 2012
Responsible Individual(s): Department Chair
Supporting Attachments:
StudyDesign_rubric.pdf (Adobe Acrobat Document) (See appendix)

Measure: Study Execution
Direct - Student Artifact

Details/Description: Attached rubric will be used to evaluate study execution
Target:
Implementation Plan (timeline): Spring 2012
Responsible Individual(s): Department Chair
Supporting Attachments:
StudyExecution_rubric.pdf (Adobe Acrobat Document) (See appendix)

Assessment Findings

Finding per Measure

Goal 2: Develop core competencies in scientific inquiry

7: Apply science to understand biological phenomena

Apply the process of science to understand biological phenomena.

7.2: Formulate a testable hypothesis

Formulate a testable hypothesis, and design and perform a study to test it.

Measure: Hypothesis
Direct - Student Artifact

Details/Description: Attached rubric will be used to evaluate hypotheses

Target:

Implementation Plan (timeline): Spring 2012

Responsible Individual(s): Department Chair

Supporting Attachments:

Hypothesis_rubric.pdf (Adobe Acrobat Document) (See appendix)

Findings for Hypothesis

Summary of Findings: Bio 330. Paper Discussions. Students read a primary literature article, and were asked questions that required them to identify the hypothesis (hypotheses) being tested, methods used, results and conclusions.
Bio 427. Hypothesis-Testing Exercise. Undergraduates were given a set of instructor-generated research questions. Each student chose a question and worked with a graduate student (or the instructor) to generate a set of null and alternative hypotheses. Students constructed data sheets, went to a field site, and gathered data to test their hypothesis. They then analyzed the data and performed statistical analysis, and wrote reports of their findings.
Bio 450. Exam 2 Question. As part of a take-home exam, students were given a problem involving prey selection. They were asked to make two hypotheses to explain the data and design an experiment or experiment to differentiate between the two hypotheses.

Course Hypothesis clearly stated Hypothesis is testable
330 (N = 18)
Hypothesis clearly stated = 2.0

427L
(N = 5)
Hypothesis clearly stated = 3.4
Hypothesis is testable = 3.8

450
(N = 11)
Hypothesis clearly stated = 2.9

Results: Target Achievement: Met

Recommendations : Problems with the rubric: The rubric worked very well for evaluating assignments that required students to create their own hypotheses and experiments. However, for evaluation of lower cognitive levels (remember, understand, apply, analyze) the rubric fell short because of the way it was designed and the wording used. Two component areas were altered based on necessity. To both the Hypothesis area under component 1 and the Controls area under component 2, additional descriptors such as “Cannot define hypothesis/control” or “Can define and identify a hypothesis/control” were added. Some artifacts were scored based on how well the students were able to perform the maximum level of difficulty required of them. For example, on the Bio 374 Pet reports, students were required to follow protocols to perform experiments, but were not asked to adapt them to new situations. Therefore, the highest score possible on this artifact for the Study Execution component in the “Experiments” area, was an Intermediate 1 (numerical score of 2).

Reflections/Notes : Students increased significantly from 330 to the 400 level classes (427L and 450 combined) their proficiency in stating hypotheses clearly (Mann-Whitney test, $p = 0.004$)

Substantiating Evidence:

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

These Findings are associated with the following Actions:

course modification
(Action Plan; 2011-2012 Assessment Cycle)

Measure: Study Design
Direct - Student Artifact

Details/Description: Attached rubric will be used to evaluate study design

Target:

Implementation Plan (timeline): Spring 2012

Responsible Individual(s): Department Chair

Supporting Attachments:

StudyDesign_rubric.pdf (Adobe Acrobat Document) (See appendix)

Findings for Study Design

Summary of Findings: Bio 427. Hypothesis-Testing Exercise. Undergraduates were given a set of instructor-generated research questions. Each student chose a question and worked with a graduate student (or the instructor) to generate a set of null and alternative hypotheses. Students constructed data sheets, went to a field site, and gathered data to test their hypothesis. They then analyzed the data and performed statistical analysis, and wrote reports of their findings.
Bio 450. Exam 2 Question. As part of a take-home exam, students were given a problem involving prey selection. They were asked to make two hypotheses to explain the data and design an experiment or experiment to differentiate between the two hypotheses.

427L (N = 5):
Design addresses hypothesis = 3.8
Proper controls = 3.8
Will produce sufficient data = 3.2

450 (N = 11):
Design addresses hypothesis = 2.5
Proper controls = 2.4

Results: Target Achievement: Met

Recommendations : Problems with the rubric: The rubric worked very well for evaluating assignments that required students to create their own hypotheses and experiments. However, for evaluation of lower cognitive levels (remember, understand, apply, analyze) the rubric fell short because of the way it was designed and the wording used. Two component areas were altered based on necessity. To both the Hypothesis area under component 1 and the Controls area under component 2, additional descriptors such as “Cannot define hypothesis/control” or “Can define and identify a hypothesis/control” were added. Some artifacts were scored based on how well the students were able to perform the maximum level of difficulty required of them. For example, on the Bio 374 Pet reports, students were required to follow protocols to perform experiments, but were not asked to adapt them to new situations. Therefore, the highest score possible on this artifact for the Study Execution component in the “Experiments” area, was an Intermediate 1 (numerical score of 2).

Reflections/Notes : Sample sizes were not large enough to allow comparisons among 400-level courses.

Measure: Study Execution
Direct - Student Artifact

Details/Description: Attached rubric will be used to evaluate study execution

Target:

Implementation Plan (timeline): Spring 2012

Responsible Individual(s): Department Chair

Supporting Attachments:

StudyExecution_rubric.pdf (Adobe Acrobat Document) (See appendix)

Findings for Study Execution

Summary of Findings: Bio 102 Laboratory. Laboratory exercises. Laboratory exercises required students to follow a protocol to complete an experiment or exercise. Worksheets accompanying the exercises required students to record data and answer questions about the exercise, as well as to make hypotheses (again, frequently without using the term hypothesis) or draw conclusions. Bio 374 Laboratory. Pet Reports. Students were given an "unknown" bacterium and used a series of analytical tests to identify the genus and species. Students followed written laboratory protocols, and used a series of flow-charts in the lab manual and their results to identify their pet bacterium.
Bio 427. Hypothesis-Testing Exercise. Undergraduates were given a set of instructor-generated research questions. Each student chose a question and worked with a graduate student (or the instructor) to generate a set of null and alternative hypotheses. Students constructed data sheets, went to a field site, and gathered data to test their hypothesis. They then analyzed the data and performed statistical analysis, and wrote reports of their findings.Bio 450. Exam 2 Question. As part of a take-home exam, students were given a problem involving prey selection. They were asked to make two hypotheses to explain the data and design an experiment or experiment to differentiate between the two hypotheses.

102L:
Data recorded precisely = 2.1

374L:
Experiment conducted correctly = 2.0
Data recorded precisely = 2.6

427L:
Experiment conducted correctly = 4.0

Results: Target Achievement: Met

Recommendations : Problems with the rubric: The rubric worked very well for evaluating assignments that required students to create their own hypotheses and experiments. However, for evaluation of lower cognitive levels (remember, understand, apply, analyze) the rubric fell short because of the way it was designed and the wording used. Two component areas were altered based on necessity. To both the Hypothesis area under component 1 and the Controls area under component 2, additional descriptors such as "Cannot define hypothesis/control" or "Can define and identify a hypothesis/control" were added. Some artifacts were scored based on how well the students were able to perform the maximum level of difficulty required of them. For example, on the Bio 374 Pet reports, students were required to follow protocols to perform experiments, but were not asked to adapt them to new situations. Therefore, the highest score possible on this artifact for the Study Execution component in the "Experiments" area, was an Intermediate 1 (numerical score of 2).

Reflections/Notes : Students significantly increase from 102L to 374L their proficiency in recording data precisely (Mann-Whitney test, $p = 0.01$) and from 374L to 427L in conducting experiments correctly (Mann-Whitney test, $p = 0.0002$).

Students in the Biology B.S. appear to make significant gains in their ability to formulate a testable hypothesis and design and perform a study to test the hypothesis. The increase in ability from 374L to the 400-level courses may be an artifact of the exercise used in 374L, which limited student performance to a maximum numerical score of 2.0. The levels of mastery achieved in the 400 level courses seems appropriate for upper-division students.

Overall Recommendations

No text specified

Overall Reflection

No text specified

Action Plan

Actions

Goal 2: Develop core competencies in scientific inquiry

7: Apply science to understand biological phenomena

Apply the process of science to understand biological phenomena.

7.2: Formulate a testable hypothesis

Formulate a testable hypothesis, and design and perform a study to test it.

Action: course modification

This Action is associated with the following Findings

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

Summary of Findings: Bio 330. Paper Discussions. Students read a primary literature article, and were asked questions that required them to identify the hypothesis (hypotheses) being tested, methods used, results and conclusions.
Bio 427. Hypothesis-Testing Exercise. Undergraduates were given a set of instructor-generated research questions. Each student chose a question and worked with a graduate student (or the instructor) to generate a set of null and alternative hypotheses. Students constructed data sheets, went to a field site, and gathered data to test their hypothesis. They then analyzed the data and performed statistical analysis, and wrote reports of their findings.
Bio 450. Exam 2 Question. As part of a take-home exam, students were given a problem involving prey selection. They were asked to make two hypotheses to explain the data and design an experiment or experiment to differentiate between the two hypotheses.

Course Hypothesis clearly stated Hypothesis is testable
330 (N = 18)
Hypothesis clearly stated = 2.0

427L
(N = 5)
Hypothesis clearly stated = 3.4
Hypothesis is testable = 3.8

450
(N = 11)
Hypothesis clearly stated = 2.9

Action Details: The fact that many aspects of the objective tested were not addressed in 102L and 330 suggest that there may be a need to modify these courses so that they engage students in activities that address this objective. The department will examine this issue as part of its on-going revision of the B.S. curriculum.

Implementation Plan (timeline):

Key/Responsible Personnel:

Measures:

Resource Allocations:

Priority: High

Status Report

Action Statuses

Goal 2: Develop core competencies in scientific inquiry

7: Apply science to understand biological phenomena

Apply the process of science to understand biological phenomena.

7.2: Formulate a testable hypothesis

Formulate a testable hypothesis, and design and perform a study to test it.

Action: course modification

Action Details: The fact that many aspects of the objective tested were not addressed in 102L and 330 suggest that there may be a need to modify these courses so that they engage students in activities that address this objective. The department will examine this issue as part of its on-going revision of the B.S. curriculum.

Implementation Plan (timeline):

Key/Responsible Personnel:

Measures:

Resource Allocations:

Priority: High

Status for course modification

No Status Added

Status Summary

No text specified

Summary of Next Steps

No text specified

2012-2013 Assessment Cycle

Assessment Plan

Outcomes and Measures

Goal 2: Develop core competencies in scientific inquiry

7: Apply science to understand biological phenomena

Apply the process of science to understand biological phenomena.

7.1: Review, summarize, and critique

Review, summarize, and critique scientific literature relevant to a specific biological question.

Measure: Scientific literature rubric
Direct - Student Artifact

Details/Description: 1. Use current curricular map to 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

Goal 2: Develop core competencies in scientific inquiry

7: Apply science to understand biological phenomena

Apply the process of science to understand biological phenomena.

7.1: Review, summarize, and critique

Review, summarize, and critique scientific literature relevant to a specific biological question.

Measure: Scientific literature rubric
Direct - Student Artifact

Details/Description: 1. Use current curricular map to 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

Findings for Scientific literature rubric

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

Goal 2: Develop core competencies in scientific inquiry

7: Apply science to understand biological phenomena

Apply the process of science to understand biological phenomena.

7.1: Review, summarize, and critique

Review, summarize, and critique scientific literature relevant to a specific biological question.

Measure: Scientific literature rubric
Direct - Student Artifact

Details/Description: 1. Use current curricular map to 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): Data will collected from student 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

Goal 2: Develop core competencies in scientific inquiry

7: Apply science to understand biological phenomena

Apply the process of science to understand biological phenomena.

7.1: Review, summarize, and critique

Review, summarize, and critique scientific literature relevant to a specific biological question.

Measure: Scientific literature rubric
Direct - Student Artifact

Details/Description: 1. Use current curricular map to 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): Data will collected from student papers submitted in Spring 2013 and Fall 2013. Data will be reported in Fall 2014 (by Dec. 1)

Responsible Individual(s): Department chair

Findings for Scientific literature rubric

Summary of Findings: Findings delayed until next cycle

Recommendations :

Reflections/Notes :

Overall Recommendations

No text specified

Overall Reflection

No text specified

Action Plan

Actions

Action Plan

Outcome

Action Plan 2013-14

Action: Administer ETS 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 components of our SLOs by administering the ETS (Princeton, NJ) Biology Majors Exit Exam to seniors.

Implementation Plan (timeline): Spring 2015

SPECIFIC TIMELINE
1 Dec 2014 - Action plan to use the Biology Majors Exit exam from Educational Testing Services, Princeton NJ. This was communicated to Ruth at our faculty meeting, but not in writing. We also indicated we would submit the special funding request to support this assessment activity (purchasing the Exams).

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

1 Sept 2015 - Data findings: will be how the test results look across classes and Identify plan will be 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: how it went, changing the 2016 spring courses

1 Sept 2016 - Data findings will be 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 classes revised.

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

Key/Responsible Personnel:

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:

SLO Assessment Action Plan - January 2015 (Adobe Acrobat Document) (See appendix)

Action: Simplify and revise critical thinking, communication, and other elements of SLO plan

This Action is associated with the following Findings

No supporting Findings have been linked to this Action.

Action Details: Over the Spring 2015 and AY 15-16 we aim to simplify and revise the critical thinking, communication and other elements of our SLO Plan, which are not assessed by the Bio Majors Exit exam (which assesses content). For example, Dr. Cain indicated that some of our elements were co-curricular activities (e.g. using the Career center) and not necessarily curricular.

Implementation Plan (timeline): Spring 2015 and AY 15-16

Key/Responsible Personnel:

Measures:

Resource Allocations:

Priority: Medium

Status Report

Action Statuses

Action Plan

Outcome

Action Plan 2013-14

Action: Administer ETS Biology Majors Exit Exam

Action Details: Assess all the content components of our SLOs by administering the ETS (Princeton, NJ) Biology Majors Exit Exam to seniors.

Implementation Plan (timeline): Spring 2015

SPECIFIC TIMELINE
1 Dec 2014 - Action plan to use the Biology Majors Exit exam from Educational Testing Services, Princeton NJ. This was communicated to Ruth at our faculty meeting, but not in writing. We also indicated we would submit the special funding request to support this assessment activity (purchasing the Exams).

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

1 Sept 2015 - Data findings: will be how the test results look across classes and Identify plan will be 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: how it went, changing the 2016 spring courses

1 Sept 2016 - Data findings will be 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 classes revised.

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

Key/Responsible Personnel:

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:

SLO Assessment Action Plan - January 2015 (Adobe Acrobat Document) (See appendix)

Status for Administer ETS Biology Majors Exit Exam

No Status Added

Action: Simplify and revise critical thinking, communication, and other elements of SLO plan

Action Details: Over the Spring 2015 and AY 15-16 we aim to simplify and revise the critical thinking, communication and other elements of our SLO Plan, which are not assessed by the Bio Majors Exit exam (which assesses content). For example, Dr. Cain indicated that some of our elements were co-curricular activities (e.g. using the Career center) and not necessarily curricular.

Implementation Plan (timeline): Spring 2015 and AY 15-16

Key/Responsible Personnel:

Measures:

Resource Allocations:

Priority: Medium

Status for Simplify and revise critical thinking, communication, and other elements of SLO plan

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 Biology outcome set - revised 2015

1. Explain and illustrate the fundamental concepts of biology

1a. Explain and illustrate energy and matter in biology

Measure: ETS Biology Majors Test
Direct - Exam

Details/Description: ETS Test will be given during BIO 490+
Target: ≥ 80% correct in relevant subscore
Implementation Plan (timeline): Spring Semester Jr Year
Responsible Individual(s): Dept. of Biology Undergraduate Committee

1b. Explain and illustrate cells and genetics

Measure: ETS Biology Majors Test
Direct - Exam

Details/Description: ETS Test will be given during BIO 490+
Target: ≥ 80% correct in relevant subscore
Implementation Plan (timeline): Spring Semester Jr Year
Responsible Individual(s): Dept. of Biology Undergraduate Committee

1c. Explain and illustrate living organisms

Measure: ETS Biology Majors Test
Direct - Exam

Details/Description: ETS Test will be given during BIO 490+
Target: ≥ 80% correct in relevant subscore
Implementation Plan (timeline): Spring Semester Jr Year
Responsible Individual(s): Dept. of Biology Undergraduate Committee

1d. Explain and illustrate normal physiology of organisms

Measure: ETS Biology Majors Test
Direct - Exam

Details/Description: ETS Test will be given during BIO 490+
Target: ≥ 80% correct in relevant subscore
Implementation Plan (timeline): Spring Semester Jr Year
Responsible Individual(s): Dept. of Biology Undergraduate Committee

Assessment Findings

Finding per Measure

BA/BS in Biology outcome set - revised 2015

1. Explain and illustrate the fundamental concepts of biology

1a. Explain and illustrate energy and matter in biology

Measure: ETS Biology Majors Test
Direct - Exam

Details/Description: ETS Test will be given during BIO 490+
Target: ≥ 80% correct in relevant subscore
Implementation Plan (timeline): Spring Semester Jr Year
Responsible Individual(s): Dept. of Biology Undergraduate Committee

Findings for ETS Biology Majors Test

Summary of Findings: Findings delayed until next cycle
Recommendations :
Reflections/Notes :

1b. Explain and illustrate cells and genetics

Measure: ETS Biology Majors Test
Direct - Exam

Details/Description: ETS Test will be given during BIO 490+
Target: ≥ 80% correct in relevant subscore
Implementation Plan (timeline): Spring Semester Jr Year
Responsible Individual(s): Dept. of Biology Undergraduate Committee

Findings for ETS Biology Majors Test

Summary of Findings: Findings delayed until next cycle
Recommendations :
Reflections/Notes :

1c. Explain and illustrate living organisms

Measure: ETS Biology Majors Test
Direct - Exam

Details/Description: ETS Test will be given during BIO 490+
Target: ≥ 80% correct in relevant subscore
Implementation Plan (timeline): Spring Semester Jr Year
Responsible Individual(s): Dept. of Biology Undergraduate Committee

Findings for ETS Biology Majors Test

Summary of Findings: Findings delayed until next cycle
Recommendations :
Reflections/Notes :

1d. Explain and illustrate normal physiology of organisms

Measure: ETS Biology Majors Test
Direct - Exam

Details/Description: ETS Test will be given during BIO 490+
Target: ≥ 80% correct in relevant subscore
Implementation Plan (timeline): Spring Semester Jr Year
Responsible Individual(s): Dept. of Biology Undergraduate Committee

Findings for ETS Biology Majors Test

Summary of Findings: Findings delayed until next cycle
Recommendations :
Reflections/Notes :

Overall Recommendations

No text specified

Overall Reflection

No text specified

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

A. **BA/BS in Biology** (Curriculum Map)
B. **Goal 1** (Curriculum Map)
C. **Biology_Assessment_Timeline_ Sept2010.pdf** (Adobe Acrobat Document)
D. **Hypothesis and Study Design Assessment Rubric.pdf** (Adobe Acrobat Document)
E. **Hypothesis and Study Design Assessment Rubric.pdf** (Adobe Acrobat Document)
F. **Hypothesis_rubric.pdf** (Adobe Acrobat Document)
G. **StudyDesign_rubric.pdf** (Adobe Acrobat Document)
H. **StudyExecution_rubric.pdf** (Adobe Acrobat Document)
I. **Biology Assessment Report 2011-12.pdf** (Adobe Acrobat Document)
J. **SLO Assessment Action Plan - January 2015** (Adobe Acrobat Document)

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.