Weber State University
Annual Assessment of Evidence of Learning

Cover Page

Department/Program: Botany
Academic Year of Report: 2014/15
Date Submitted: January 18, 2016
Report author: Sue Harley

Contact Information:
        Phone: 801-626-7434
        Email: sharley@weber.edu

A. **Brief Introductory Statement:**
   Please review the Introductory Statement and contact information for your department displayed on the assessment site:
   http://www.weber.edu/portfolio/departments.html - if this information is current, please place an 'X' below. No further information is needed. We will indicate "Last Reviewed: [current date]" on the page.

   __ Information is current; no changes required.
   _X_ Information is not current; updates below.

   Update:
   Contact Information
   Dr. Sue Harley
   Weber State University
   1415 Edvalson St, Dept 2504
   Science Lab Bldg, Rm 402M
   (801) 626-6174

B. Mission Statement
Please review the Mission Statement for your department displayed on the assessment site:
http://www.weber.edu/portfolio/departments.html - if it is current, please indicate as much; we will mark the web page as "Last Reviewed [current date]". No further information is needed.
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C. Student Learning Outcomes
Please review the Student Learning Outcomes for your department displayed on the assessment site:
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If they are not current, please provide an update:

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D. **Curriculum**

Please review the Curriculum Grid for your department displayed on the assessment site:
http://www.weber.edu/portfolio/departments.html - if it is current, please indicate as much; we will mark the web page as "Last Reviewed: [current data]". No further information is needed.
If the curriculum grid is not current, please provide an update:

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E. Assessment Plan

Please review the Assessment Plan for your department displayed on the assessment site:
http://www.weber.edu/portfolio/departments.html - if the plan current, please indicate as much; we will mark the web page as "Last Reviewed [current date]". No further information is needed.

The site should contain an up-to-date assessment plan with planning going out a minimum of three years beyond the current year. Please review the plan displayed for your department at the above site. The plan should include a list of courses from which data will be gathered and the schedule, as well as an overview of the assessment strategy the department is using (for example, portfolios, or a combination of Chi assessment data and student survey information, or industry certification exams, etc.).

Please be sure to include your planned assessment of any general education courses taught within your department. This information will be used to update the General Education Improvement and Assessment Committee's planning documentation.

Assessment plan:

General Education Life Science (LS) courses:
The four Botany General Education courses are assessed using questions on exams that address either the Natural Science or Life Science Gen Ed Learning Outcomes. This is done using Scan-Tron or Chi-Tester grading of individual questions within a category. In addition, additional assessment is done through student writing, including essay questions, written papers, or other assignments that assess one or more Learning Outcomes.

Courses within the major:
For many years, the Botany Department has been requiring that majors complete a Student Portfolio. The portfolio is introduced in Botany 2121 (*Career Planning for Botanists*) and is added to throughout the student's studies at WSU. Students complete and polish their portfolios in BTNY 4980 (*Portfolio Summative Assessment*), taken in their final semester. The portfolios are also graded in this course. Each Botany

course emphasizes some or all of the Botany Learning Outcomes to varying degrees and helps students develop skills, knowledge, and experience that they can document in their portfolio (see Curriculum Map. C.2).

The Portfolio consists of a substantial essay, worth 30% of the portfolio grade. The essay is a culmination of the knowledge that the student gained throughout their studies at WSU. Additional evidence of skills development, self-assessment skills, career preparation, as well as creativity, ethics, and an appreciation for diversity are also required. In addition, all students must have a capstone experience (thesis or directed research, paid or volunteer Botany work experience, or a library research project) that they present orally. The portfolio also requires a written statement as to how the capstone experience impacted them (see Appendix G).

General Education LS Assessment Schedule:

Area and Course	Summer 2014	Fall 2014	Spring 2015	Summer 2015	Fall 2015	Spring 2016	Summer 2016	Fall 2016	Spring 2017
LIFE SCIENCES									
BTNY 1203	X	X	X	X	X	X	X	X	X
BTNY 1303			X		X	X		X	X
BTNY 1370			X			X			X
BTNY 1403		X	X		X	X		X	X

Courses within the Major Assessment Schedule:

NOTE: By the end of the 2015-16 academic year, the faculty in the Botany Department will have experienced a 50% turnover in three years. Hence, the course load will change and the assessment schedule will have to be adjusted accordingly. The following assessment schedule is tentative.

a. At a minimum, the following courses will be evaluated within the next three years:

Course	2014-2015	2015-2016	2016-2017
BTNY 2104	X		
BTNY 2114		X	
BTNY 3105		X	
BTNY 3204		X	
BTNY 3214			X
BTNY 3303			X
BTNY 3454			X
BTNY 3504		X	
BTNY 4980	X	X	X

b.   Assessment of Thesis, Co-Op Work Experience, etc. will be done as students complete those courses.

c. Assessment schedules for the other courses within the major will be done as new faculty members are hired.

F. Report of assessment results for the most previous academic year:

There are a variety of ways in which departments can choose to show evidence of learning. This is one example. The critical pieces to include are 1) what learning outcome is being assessed, 2) what method of measurement was used, 3) what the threshold for 'acceptable performance' is for that measurement, 4) what the actual results of the assessment were, 5) how those findings are interpreted, and 6) what is the course of action to be taken based upon the interpretation.

NOTE: As indicated within the tables, some papers, etc. are graded on a **Grade Point Scale** rather than straight percentage out of 100%. The grading is as follows:

Letter Grade	Grade Point	Percentage	Letter Grade	Grade Point	Percentage
A	4.0	93–100%	C-	1.7	70-72%
A-	3.7	90–92%	D+	1.3	67-69%
B+	3.3	87–89%	D	1.0	63-66%
B	3.0	83-86%	D-	0.7	60-62%
B-	2.7	80-82%	E	0.0	0-59%
C+	2.3	77-79%			
C	2.0	73-76%			

Assessment Threshold for Gen Ed LS courses is 65% or higher on multiple choice exam questions.
Assessment Threshold Core lab courses for Botany majors and minors is 67%.
Assessment Threshold for upper division courses within the major is 70%.

a. Evidence of Learning Worksheet: **Courses within the Major**

Course: **BTNY 2104 (Plant Form and Function) (Data based on 30 students in two sections [Fall 2014 and Spring 2015]who completed the class.) This is a Core lab course for Botany majors and minors.**

BTNY 2104, Plant Form and Function			Evidence of Learning: Courses within the Major		
Measurable Learning Outcome	Method of Measurement*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results
Learning Outcome 1: Knowledge and comprehension	Measure 1: Four exams, including a cumulative final. The exams are a mixed format of multiple choice, short answer, essay, and lab practical	Measure 1: Threshold for Evidence of Student Learning is 67% out of 100% or 1.3 on a Grade Point Scale	Measure 1: Mean percentage for all exams by students who completed the class = 71.5 with a standard deviation of 20.0	Measure 1: Students successfully demonstrated knowledge and comprehension	Measure 1: No curricular or pedagogical changes needed at this time
	Measure 2: Essay on seven plant challenges	Measure 2 Threshold for Evidence of Student Learning is 67% out of 100% or 1.3 on a Grade Point Scale:	Measure 2: Mean score (4 point scale equivalent to GPA) for essays by students who completed the class = 2.80 with a standard deviation of 0.92 (N = 26)	Measure 2: Students successfully demonstrated knowledge and comprehension	Measure 2: No curricular or pedagogical changes needed at this time
Learning Outcome 2: Skills	Measure 1: Thirteen lab exercises with minimal data analysis	Measure 1: Threshold for Evidence of Student Learning is 67% out of 100% or 1.3 on a Grade Point Scale	Measure 1: Mean percentage 345 lab exercises turned in by students who completed the class = 85.8 with a standard deviation of 15.2	Measure 1: Students successfully demonstrated development of laboratory and problem solving skills	Measure 1: No curricular or pedagogical changes needed at this time
	Measure 2: Five lab exercises requiring data analysis with statistics &/or graphing done in Excel or equivalent	Measure 2 Threshold for Evidence of Student Learning is 67% out of 100% or 1.3 on a Grade Point Scale:	Measure 2: Mean percentage for138 lab exercises turned in by students who completed the class = 86.4 with a	Measure 2: Students successfully students who completed all procedures in these labs demonstrated development of	Measure 2: No curricular or pedagogical changes needed at this time

Measurable Learning Outcome	Method of Measurement*	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results
BTNY 2104, Plant Form and Function			Evidence of Learning: Courses within the Major		
			standard deviation of 24.4	problem solving and computer skills	
	Measure 3: Library assignment	Measure 1: Threshold for Evidence of Student Learning is 67% out of 100% or 1.3 on a Grade Point Scale	Measure 3: Mean percentage for 22 assignments turned in by students who completed the class = 83.7 with a standard deviation of 9.9	Measure 3: Students successfully demonstrated development of information seeking skills	Measure 3: No curricular or pedagogical changes needed at this time
	Measure 4: Four case studies	Measure 1: Threshold for Evidence of Student Learning is 67% out of 100% or 1.3 on a Grade Point Scale	Measure 4: Mean percentage for all four case studies by students who completed the class = 72.6 with a standard deviation of 19.9	Measure 4: Students successfully demonstrated development of problem solving and critical thinking skills	Measure 4: No curricular or pedagogical changes needed at this time
	Measure 5: Essay on seven plant challenges	Measure 1: Threshold for Evidence of Student Learning is 67% out of 100% or 1.3 on a Grade Point Scale	Measure 5: Mean score (4 point scale equivalent to GPA) for 26 essays turned in by students who completed the class = 2.80 with a standard deviation of 0.92	Measure 5: Students successfully demonstrated communication, information seeking, and critical thinking skills	Measure 5: No curricular or pedagogical changes needed at this time

*Direct and indirect: at least one measure per objective must be a direct measure.

Additional narrative (optional – use as much space as needed):

BTNY 4980 (Portfolio Summative Assessment), N = 11 (N = 5 in Fall 2014; N = 5 in Spring 2015)

BTNY 4980, Portfolio Summative Assessment			Evidence of Learning: Courses within the Major		
Measurable Learning Outcome	Method of Measurement	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results
Learning Outcome 1: Knowledge and comprehension	Measure 1: Final Botany Knowledge and Comprehension Essay	Threshold for Evidence of Student Learning is 70% out of 100% or 1.7 on a Grade Point Scale	Measure 1: Mean score= 1.98 with a standard deviation of 0.77	Measure 1: Students successfully demonstrated knowledge and comprehension	Measure 1: No curricular or pedagogical changes needed at this time
	Measure 2: Science as a Process Folder		Measure 2: Mean score= 2.12 with a standard deviation of 0.95	Measure 2: Students successfully demonstrated knowledge and comprehension	Measure 2: No curricular or pedagogical changes needed at this time
Learning Outcome 2: Skills	Measure 1: Skills Folder	Threshold for Evidence of Student Learning is 70% out of 100% or 1.7 on a Grade Point Scale	Measure 1: Mean score= 2.98 with a standard deviation of1.21	Measure 1: Students successfully demonstrated development of laboratory and problem solving skills	Measure 1: No curricular or pedagogical changes needed at this time
	Measure 2: Capstone Folder		Measure 2: Mean score= 2.89 with a standard deviation of 1.13	Measure 2: Students successfully demonstrated communication, information seeking, and critical thinking skills	Measure 2: No curricular or pedagogical changes needed at this time
Learning Outcome 3: Affective domain	Measure 1: Affective Domain Folder	Threshold for Evidence of Student Learning is 70% out of 100% or 1.7 on a Grade Point Scale	Measure 1: Mean score= 3.05 with a standard deviation of 1.08	Measure 1: Students successfully demonstrated development the affective domain	Measure 1: No curricular or pedagogical changes needed at this time
	Measure 2: Creativity Folder		Measure 2: Mean score= 3.18 with a standard deviation of 1.08	Measure 2: Students successfully demonstrated development the affective domain	Measure 2: No curricular or pedagogical changes needed at this time

Additional narrative (optional – use as much space as needed):
Eleven students completed the class with a mean score (4 point scale equivalent to GPA) of 2.76 and a standard deviation of 0.45

b.   Evidence of Learning: High Impact or Service Learning
        If you provide students with high impact or service learning opportunities briefly describe those opportunities and explain how you assess their impact on student learning. This excerpt from George D. Kuh provides a brief overview of high-impact practices.
b.i. **Direct Evidence of High Impact or Service Learning:**

BTNY 4970 Botany Student Thesis (N=2)

Evidence of Learning: High Impact Service Learning					
Program Learning Goal Students will…	Measurable Learning Outcome Students will…	Method of Measurement Direct and Indirect Measures*	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results
		Measure 2:	Measure 2:	Measure 2:	Measure 2:
Goal: gain the knowledge and skills required to design, perform, evaluate, write up, defend and present a thesis research project.	Learning Outcome 1. acquire Research Skills	Measure 1: Evaluation based on grade in class which includes evaluation of the written thesis and oral presentation of thesis.	Measure 1: The two students received an A and a B- in the course, respectively.	Measure 1: The students learned research/analytical skills & gained in writing and oral presentation skills.	Measure 1: No curricular or pedagogical changes needed at this time.
		Measure 2: Acceptance to present research at conferences from local to national levels.	Measure 2: **Student 1:** successfully presented research at WSU and the Botanical Society of America national conference and published the thesis in Ergo. **Student 2:** No public presentation beyond the required presenation to the Botany Dept..	Measure 2: Student 1 gained skills in writing abstracts, and presenting a poster at a conference.	Measure 2: No curricular or pedagogical changes needed at this time.

b.ii. **Indirect Evidence of High Impact or Service Learning:**

1. One graduating Botany student received the Hulet Round River Scholarship for the Summer 2014 and used his experiences in British Columbia as the basis for his senior seminar presentation.

c. Evidence of Learning: General Education Courses
(duplicate this page as needed or delete if department does not offer GE courses)

BOTANY LS 1203 (Plant Biology), Combined 3 online sections, 1 each for Summer 2014, Fall 2014, and Spring 2015 (N=130)

Evidence of Learning: General Education Area LS					
Measurable Learning Outcome Students will…	Method of Measurement	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results
Learning Outcome NS1: Nature of Science	Measure 1: 4 Multiple Choice Questions spread across 3-4 exams Measure 2: Three written assignments in which students summarize self-selected research articles from the journal *Economic Botany* and indicate how each article incorporates the four NS Learning Outcomes.	Measure 1 65% or higher on multiple choice exam questions Measure 2: 65% or higher on the assignment	Measure 1: 42% of students met the 65% threshold for these questions Measure 2: Average score was 88.6% on the papers, with a standard deviation of 14.1%. (N=342 papers. Not all students who enroll in the class did the assignments, even though they account for 15% of the final grade.)	Measure 1: Students demonstrated poor understanding of the nature of science. Measure 2: Students who did the assignment successfully articulated the purpose, methodology, data, and conclusions presented in the research articles and identified how the research applied to the four NS Learning Outcomes.	Measure 1: Address the principles and terminology for the nature of science more clearly in course materials. Provide more questions that address the material in diverse ways. Measure 2: No curricular or pedagogical changes needed at this time.
Learning Outcome NS2: Integration of Science	Measure 1: 14 Multiple Choice Questions spread across 3-4 exams Measure 2: Three written assignments in which students summarize self-selected research articles from the journal *Economic Botany* and indicate	Measure 1: 65% or higher on multiple choice exam questions Measure 2: 65% or higher on the assignment	Measure 1: 66% of students met the 65% threshold for these questions Measure 2: Average score was 88.6% on the papers, with a standard deviation of 14.1%. (N=342 papers. Not all students who enroll in the class did the	Measure 1: Students successfully demonstrated an understanding of the integration of science Measure 2: Students who did the assignment successfully articulated the purpose, methodology, data,	Measure 1: No curricular or pedagogical changes needed at this time. Measure 2: No curricular or pedagogical changes needed at this time.

Evidence of Learning: General Education Area LS					
Measurable Learning Outcome Students will…	Method of Measurement	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results
	how each article incorporates the four NS Learning Outcomes		assignments, even though they account for 15% of the final grade.)	and conclusions presented in the research articles and identified how the research applied to the four NS Learning Outcomes..	
Learning Outcome NS3: Science and Society	Measure 1: 8 Multiple Choice Questions spread across 3-4 exams Measure 2: Three written assignments in which students summarize self-selected research articles from the journal *Economic Botany* and indicate how each article incorporates the four NS Learning Outcomes	Measure 1: 65% or higher on multiple choice exam questions Measure 2: 65% or higher on the assignment	Measure 1: 87% of students met the 65% threshold for these questions Measure 2: Average score was 88.6% on the papers, with a standard deviation of 14.1%. (N=342 papers. Not all students who enroll in the class did the assignments, even though they account for 15% of the final grade.)	Measure 1: Students successfully demonstrated an understanding science and society. Measure 2: Students who did the assignment successfully articulated the purpose, methodology, data, and conclusions presented in the research articles and identified how the research applied to the four NS Learning Outcomes.	Measure 1: No curricular or pedagogical changes needed at this time. Measure 2: No curricular or pedagogical changes needed at this time.
Learning Outcome NS4: Problem Solving and Data Analysis	Measure 1: 11 Multiple Choice Questions spread across 3-4 exams. This part of the assessment includes the Genetics and Evolution questions on genetic crosses and cladograms.	Measure 1: 65% or higher on multiple choice exam questions Measure 2: 65% or higher on the assignment	Measure 1: 46% of students met the 65% threshold for these questions Measure 2: Average score was 88.6% on the papers, with a standard deviation of 14.1%. (N=342 papers. Not all	Measure 1: Students struggle with the basic arithmetic used to analyze data.. Measure 2: Students who did the assignment successfully articulated the purpose,	Measure 1: Incorporate more practice into the curricular materials. Stress the importance of viewing the online video materials for assistance. Measure 2: No curricular or

Evidence of Learning: General Education Area LS					
Measurable Learning Outcome Students will…	Method of Measurement	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results
	Measure 2: Three written assignments in which students summarize self-selected research articles from the journal *Economic Botany* and indicate how each article incorporates the four NS Learning Outcomes		students who enroll in the class did the assignments, even though they account for 15% of the final grade.)	methodology, data, and conclusions presented in the research articles and identified how the research applied to the four NS Learning Outcomes.	pedagogical changes needed at this time.
Learning Outcome LS1: Levels of Organization	Measure 1: 14 Multiple Choice Questions spread across 3-4 exams	Measure 1: 65% or higher on multiple choice exam questions	Measure 1: 64% of students met the 65% threshold for these questions	Measure 1: Students successfully demonstrated an understanding of levels of organization.	Measure 1: No curricular or pedagogical changes needed at this time.
Learning Outcome LS2: Metabolism and Homeostasis	Measure 1: 22 Multiple Choice Questions spread across 3-4 exams	Measure 1: 65% or higher on multiple choice exam questions	Measure 1: 48% of students met the 65% threshold for these questions	Measure 1: Students demonstrated poor understanding of metabolism & homeostasis. These topics are complex and students often confuse photosynthesis and respiration.	Measure 1: Provide additional practice on the implications of metabolism and stress utilization of online support resources.
Learning Outcome LS3: Genetics and Evolution	Measure 1: 21 Multiple Choice Questions spread across 3-4 exams; included cladograms and genetic cross problems	Measure 1: 65% or higher on multiple choice exam questions	Measure 1: 62% of students met the 65% threshold for these questions	Measure 1: Students successfully demonstrated an understanding of genetics and evolution.	Measure 1: No curricular or pedagogical changes needed at this time. .
Learning Outcome LS4:	Measure 1:	Measure 1:	Measure 1:	Measure 1: Students successfully demonstrated an	Measure 1:

Evidence of Learning: General Education Area LS					
Measurable Learning Outcome Students will…	Method of Measurement	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results
Ecological Interactions	20 Multiple Choice Questions spread across 3-4 exams	65% or higher on multiple choice exam questions	72% of students met the 65% threshold for these questions	understanding of ecological interactions.	No curricular or pedagogical changes needed at this time.

BTNY 1303 (Plants in Human Affairs) Spring 2015, 1 online section (N=50)

Evidence of Learning: General Education Area LS					
Measurable Learning Outcome Students will…	Method of Measurement	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results
Learning Outcome NS1: Nature of Science	Measure 1: 16 Multiple Choice Questions spread across 3 exams	Measure 1 65% or higher on multiple choice exam questions	Measure 1: 78.8% of the questions were answered correctly.	Measure 1: Students successfully demonstrated an understanding of the nature of science.	Measure 1: No curricular or pedagogical changes needed at this time.
Learning Outcome NS2: Integration of Science	Measure 1: 1 Multiple Choice Question	Measure 1: 65% or higher on multiple choice exam questions	Measure 1: 62.7% answered correctly.	Measure 1: Most students successfully demonstrated an understanding of the integration of science.	Measure 1: No curricular or pedagogical changes needed at this time.
Learning Outcome NS3: Science and Society	Measure 1: 76 Multiple Choice Questions spread across 3 exams	Measure 1: 65% or higher on multiple choice exam questions	Measure 1: 80.4% of the questions were answered correctly.	Measure 1: Students successfully demonstrated an understanding science and society.	Measure 1: No curricular or pedagogical changes needed at this time.
Learning Outcome NS4: Problem Solving and Data Analysis	Measure 1: 7 Multiple Choice Questions spread across 3 exams	Measure 1: 65% or higher on multiple choice exam questions	Measure 1: 72.0% of the questions were answered correctly.	Measure 1: Students successfully demonstrated an understanding of problem solving and data analysis.	Measure 1: No curricular or pedagogical changes needed at this time.
Learning Outcome LS1: Levels of Organization	Measure 1: 21 Multiple Choice Questions spread across 3 exams	Measure 1: 65% or higher on multiple choice exam questions	Measure 1: 58.1% of the questions were answered correctly.	Measure 1: Some students struggled with levels of organization.	Measure 1: Provide additional course materials on and practice with levels of organization.
Learning Outcome LS2: Metabolism and Homeostasis	Measure 1: 10 Multiple Choice Questions spread across 3 exams	Measure 1: 65% or higher on multiple choice exam questions	Measure 1: 62.8% of the questions were answered correctly.	Measure 1: Students demonstrated an understanding of metabolism & homeostasis.	Measure 1: No curricular or pedagogical changes needed at this time.

Evidence of Learning: General Education Area LS					
Measurable Learning Outcome Students will…	Method of Measurement	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results
Learning Outcome LS3: Genetics and Evolution	Measure 1: 31 Multiple Choice Questions spread across 3 exams	Measure 1: 65% or higher on multiple choice exam questions	Measure 1: 66.4% of the questions were answered correctly.	Measure 1: Students successfully demonstrated an understanding of genetics and evolution.	Measure 1: No curricular or pedagogical changes needed at this time.
Learning Outcome LS4: Ecological Interactions	Measure 1: 25 Multiple Choice Questions spread across 3 exams	Measure 1: 65% or higher on multiple choice exam questions	Measure 1: 63.0% of the questions were answered correctly.	Measure 1: Most students successfully demonstrated an understanding of ecological interactions.	Measure 1: No curricular or pedagogical changes needed at this time.

BTNY 1403 (Environment Appreciation) Spring 2015, 1 section (N=77)

Evidence of Learning: General Education Area LS					
Measurable Learning Outcome Students will…	Method of Measurement	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results
Learning Outcome NS1: Nature of Science	Measure 1 7 Multiple Choice Questions on Exams 1,2 & 4	Measure 1 65% or higher on multiple choice exam questions	Measure 1: 90% of students met the 65% threshold for these questions	Measure 1: Students successfully demonstrated an understanding of the nature of science.	Measure 1: No curricular or pedagogical changes needed at this time.
Learning Outcome NS2: Integration of Science	Measure 1: 5 Multiple Choice Questions on Exams 2 & 4	Measure 1: 65% or higher on multiple choice exam questions	Measure 1: 76% of students met the 65% threshold for these questions	Measure 1: Students successfully demonstrated an understanding of the integration of science.	Measure 1: No curricular or pedagogical changes needed at this time.
Learning Outcome NS3: Science and Society	Measure 1: 5 Multiple Choice Questions on Exams 1,2,3 & 4	Measure 1: 65% or higher on multiple choice exam questions	Measure 1: 70% of students met the 65% threshold for these questions	Measure 1: Students successfully demonstrated an understanding science and society.	Measure 1: No curricular or pedagogical changes needed at this time.
Learning Outcome NS4: Problem Solving and Data Analysis	Measure 1: 6 Multiple Choice Questions requiring calculations or graph interpretation on Exams 1 & 4	Measure 1: 65% or higher on multiple choice exam questions	Measure 1: 87% of students met the 65% threshold for these questions	Measure 1: Students successfully demonstrated an understanding of problem solving and data analysis.	Measure 1: No curricular or pedagogical changes needed at this time.
Learning Outcome LS1: Levels of Organization	Measure 1: 5 Multiple Choice Questions on Exam 2	Measure 1: 65% or higher on multiple choice exam questions	Measure 1: 67% of students met the 65% threshold for these questions	Measure 1: Students successfully demonstrated an understanding of levels of organization.	Measure 1: No curricular or pedagogical changes needed at this time.
Learning Outcome LS2: Metabolism and Homeostasis	Measure 1: 4 Multiple Choice Questions on Exam 2	Measure 1: 65% or higher on multiple choice exam questions	Measure 1: 74% of students met the 65% threshold for these questions	Measure 1: Students demonstrated an understanding of metabolism & homeostasis.	Measure 1: No curricular or pedagogical changes needed at this time.

Evidence of Learning: General Education Area LS					
Measurable Learning Outcome Students will...	Method of Measurement	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results
Learning Outcome LS3: Genetics and Evolution	Measure 1: 8 Multiple Choice Questions on Exam 2 which included interpretations of a cladogram	Measure 1: 65% or higher on multiple choice exam questions	Measure 1: 58% of students met the 65% threshold for these questions	Measure 1: Students successfully demonstrated an understanding of genetics and evolution, however improvement will be sought.	Measure 1: More practice is called for in this area. A class exercise will be added.
Learning Outcome LS4: Ecological Interactions	Measure 1: 6 Multiple Choice Questions on Exams 2 & 4	Measure 1: 65% or higher on multiple choice exam questions	Measure 1: 78% of students met the 65% threshold for these questions	Measure 1: Students successfully demonstrated an understanding of ecological interactions.	Measure 1: No curricular or pedagogical changes needed at this time.

BTNY/MICR/ZOOL LS1370 (Principles of Life Science) Spring 2015 (N=29)

Learning Outcome	Number of Questions	Average Pre-test % Correct	Average Post-Test % Correct
NS 1 = Nature of science	4	70.0	80.3
NS 2 = Integration of science	4	60.5	57.3
NS 3 = Science and society	2	92.0	100
NS 4 = Problem solving and data analysis	3	91.7	82.3
LS 5 = Levels of organization	2	44.0	50.0
LS 6 = Metabolism and homeostasis	4	44.8	48.0
LS 7 = Genetics and evolution	7	58.0	64.1
LS 8 = Ecological interactions	3	35.5	46.3

The instructor used a selection of the questions generated by the COS Curriculum Committee (or some ad hoc entity) many years back to assess "Foundations of NS Learning Outcomes" and "Life Sciences Learning Outcomes."

*At least one measure per objective must be a direct measure; indirect measures may be used to supplement direct measure(s).

Additional narrative (optional – use as much space as needed):

Efforts to increase student learning by incorporating or increasing active learning pedagogies in Botany general education courses are ongoing. By Fall 2016, the Botany Department will have experienced a 50% turnover in faculty in three years. We anticipate that this infusion of new faculty will enhance our efforts to increase student learning.

BTNY LS1203:
The poor performance by students in the area of Problem Solving and Data Analysis (NS4) continues. This is probably because many students in general education classes are not ready for MATH 1010. There are students who will not even answer questions that require calculations such as multiplying fractions in single gene genetic crosses. Writing confidence is also low; 13 % of the students who enrolled in the class did not do the written assignments that account for 15% of the final grade.

BTNY LS1403:
Overall, students met the 65% threshold for all but one outcome (LS3: Genetics and Evolution), with a range of 67-90%. For LS3, only 58% of students met the threshold, which suggests room for improvement.   Going forward, more time will be devoted to this, including a group exercise in cladistics, as well as integrating genetics and evolution into other class exercises, discussions, and case studies in the hopes that students will better understand these topics.

G. **Summary of Artifact Collection Procedure**

Artifact	When/How Collected?	Where Stored?
BTNY LS1203 Scores for exams	Exams are given 3-4 times per semester	Exams and results are in ChiTester
Written assignments and scoring rubric	Three assignments per semester	Student papers and results are in Canvas. Detailed breakdown of scoring is in Excel files.
BTNY LS1303 Scores for exams	Exams are every given 3-4 times per semester	Exams and results are in ChiTester
BTNY LS1403 Scores for exams	Three exams throughout the semester	Excel file, Word File, and ChiTester
Group papers	Throughout the semester	Excel file & hard copies in file cabinet
BTNY/MICR/ZOOOL LS1370 Scores for pre-test and post-test	At the beginning and the end of the semester	Excel file
BTNY 2104 Essay on plant challenges & Scoring rubric	Students turn in drafts about 2/3 into the semester and the final essay at the end	Copies of some final essays as PDF files PDF of rubric
Scores for exams, lab exercises, assignments	Throughout the semester	Canvas Excel file
BTNY 4970 Evaluation of Thesis by Thesis Committee	Throughout the semester	Hard copies of Thesis in file cabinet in dept office
Oral presentation of Thesis research; rubric	End of the semester	PDF of completed rubrics
BTNY 4980 Essay rubric and final essays	End of the semester	PDF of completed rubrics; PDF of essays
Portfolio rubric	End of the semester	PDF of completed rubrics
"Science as a Process" outline	End of the semester	PDFs of outlines

Summary Information (as needed)

Appendix A

Most departments or programs receive a number of recommendations from their Five-Year Program Review processes. This page provides a means of updating progress towards the recommendations the department/program is acting upon.

Date of Program Review: 1 April 2013	Recommendation	Progress Description
Standard B, Curriculum.	The Department should carefully reassess the curriculum in terms of serving both botany majors and general education.	This is being done and taken into consideration as faculty hires are done to replace three retirements.
Standard B, Curriculum.	The Department should pursue additional interdepartmental cooperation in an introductory biology course, or sequence, as recommended in "Vision and Change" and including cell/molecular biology, genetics, evolution, and ecology	There are sporadic discussions among the three life science departments.
Standard D, Academic Advising.	We recommend that student advising be distributed among the faculty.	This will be done beginning Fall 2016.
Standard E Faculty.	New faculty hires should complement the current strengths of the Department and add to the Department's teaching and research capacity.	The hire who started 1 July 2014 has certainly done this. We hope for the same from a second hire who started 1 Dec 2015 and the third hire (search in progress).

Additional narrative:

Appendix B

Please provide the following information about the full-time and adjunct faculty contracted by your department during the last academic year (summer through spring). Gathering this information each year will help with the headcount reporting that must be done for the final Five Year Program Review document that is shared with the State Board of Regents.

Faculty	
Headcount	
With Doctoral Degrees (Including MFA and other terminal degrees, as specified by the institution)	
Full-time Tenured	4
Full-time Non-Tenured (includes tenure-track)	1
Part-time	
With Master's Degrees	
Full-time Tenured	
Full-time Non-Tenured	
Part-time	3
With Bachelor's Degrees	
Full-time Tenured	
Full-time Non-tenured	
Part-time	
Other	
Full-time Tenured	
Full-time Non-tenured	
Part-time	
Total Headcount Faculty	
Full-time Tenured	4
Full-time Non-tenured	1
Part-time	3

Please respond to the following questions.

1) Based on your program's assessment findings, what subsequent action will your program take?

  We need better consistency in acquiring assessment data. Planned actions include coordinating assessment questions for general education learning outcomes across all Botany general education offerings. We also plan to diversify assessment measures in order to get a fuller indication of student success in general education classes beyond multiple choice exams.

  Faculty continue to incorporate high impact teaching, such as flipped classrooms and case studies, in both general education classes and the lecture only majors classes. Laboratory courses continue to include skills development and to be inquiry-based. Field courses are moving beyond skills development to include inquiry components as well

  Once the full-time faculty roster stabilizes, we will have a new schedule for offering majors courses and a more consistent schedule for assessing courses in the major. With implementation of the new schedule and the recently completed Grad Maps, we hope to see better learning outcomes for our majors as they progress through the major, taking major and support courses in a sensible order and combination.

2) Are there assessment strategies within your department or program that you feel are particularly effective and/or innovative? If so, what are those strategies and what do you learn about your students by using them?

  The most distinctive assessment strategy for the Botany Program is the Botany Student Portfolio.
  http://www.weber.edu/botany/Student_Portfolio.html
The introduction to the portfolio guidelines states:
"A portfolio is a multidimensional collection of artifacts selected by both the student and the faculty. This collection contains both developmental as well as representational materials and is well-organized and readily revisable. The material represents knowledge literacy, skills mastery, and affective development. This collecting exercise empowers students while giving new dimensions to the purpose of their education as they select items and engage in self-assessment. Portfolios are used for assessment purposes in addition to serving as an incentive to the student to develop good habits in assembling and organizing materials of relevance to themselves and others, such as personnel managers or graduate school selection committees."

Graduates are asked in their exit interview about the portfolio and if it assisted their ability to do a self-assessment.. Responses from nine 2014-15 graduates:
Question 6 of the exit interview: How well could you assess yourself with regard to the expected learning outcomes identified by the Department of Botany? Did the keeping of a portfolio assist you in your self-assessment? If so, in what way?

confident, well trained
confident that she could interview well

increased confidence as she saw how much she had improved over time
could see how learning more helped him change to become who he is comfortable being
helps you brag about yourself in job interviews

only has self-assessment skill because of keeping the portfolio
able to see strengths as well as weaknesses
developed insight into personal development
easier to identify things not good at and strengths
portfolio helpful in that it forced him to slow down and do assessment
helped identify shortcomings

documenting achievements helped organize thoughts

compared essay drafts with final and realized she had actually learned a lot

found that his writing had improved considerably
could see that his writing has changed and improved