Weber State University
Biennial Report on Assessment of Student Learning

Cover Page

Department/Program: Zoology
Academic Year of Report: 2020/21 (covering Summer 2019 through Spring 2021)
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We have updated the Institutional Effectiveness website, which includes an update for each program page. All Biennial Assessment and Program Review reports will now be available on a single page. Please review your page for completeness and accuracy, and indicate on the list below the changes that need to be made. Access your program page from the top-level results page. Select the appropriate college and then your program from the subsequent page.

A. **Mission Statement**

__x_ Information is current; no changes required.

B. **Student Learning Outcomes**
(please note the addition of certificate and associate credential learning outcomes)
_x__ Information is current; no changes required.

C. Curriculum (please note, we are using Google Sheets for this section so that updates are easier to make)

An updated Curriculum Grid is attached below.

Zoology Curriculum Map: core courses required for Zoology major

Emphasis Ratings: I = Introduced, E = Emphasized, U = Utilized, A = Assessed Comprehensively

			Learning Outcomes									
			Concepts						Competencies			
Number	**Title**	**Hours**	**1**	**2**	**3**	**4**	**5**	**6**	**1**	**2**	**3**	**4**
Required courses												
ZOOL 2220	Diversity of Animals	4	U	-	-	-	I	I	U	U	I	I
ZOOL 3200	Cell Biology	4	I	A	U	-	U	U	A	U	A	-
ZOOL 3300	Genetics	4	A	E	A	-	E	-	A	A	U	U
ZOOL 3450	Ecology	4	I	-	-	A	-	A	U	A	A	E
ZOOL 3600	Comparative Physiology	4	U	A	U	E	A	A	A	A	A	U
ZOOL 3720	Evolution	3	A	-	E	E	E	-	A	I	A	A
ZOOL 4990	Seminar	1	-	-	-	-	-	-	A	-	A	A
Elective courses (4 required)												
ZOOL 3470	Zoogeography	3	U	-	-	E	-	E	A	-	A	-
ZOOL 3500	Conservation Biology	3	U	-	I	U	I	I	I	U	U	E
ZOOL 3820	Biology of Cancer	3	I	A	U	I	I	U	U	-	A	A
ZOOL 4050	Comparative Vertebrate Anatomy*	4	A	-	-	-	A	-	-	-	-	-
ZOOL 4100	Vertebrate Embryology	4	A	-	I	-	A	-	-	-	-	-
ZOOL 4120	Histology	4	-	A	-	-	A	-	-	-	-	-
ZOOL 4210	Advanced Human Physiology	4	-	U	I	-	A	A	A	U	A	I
ZOOL 4220	Endocrinology	4	-	U	I	-	A	A	A	U	A	I
ZOOL 4250	Radiation Biology**	4										
ZOOL 4500	Parasitology	4	E	E	-	E	E	-	U	U	U	-
ZOOL 4600	Protozoology**	4										
ZOOL 4300	Molecular Genetics	4	I	E	A	-	I	-	U	A	E	U
ZOOL 4350	Animal Behavior	4	U	-	I	-	I	-	A	A	U	-
ZOOL 4470	Wildlife Ecology & Management	4	E	-	-	A	-	A	-	A	-	A
ZOOL 4480	Aquatic Ecology	4	E	-	-	A	E	A	-	A	-	E
ZOOL 4490	Marine Ecology^	4	-	-	-	-	-	-	-	-	-	-
ZOOL 4640	Entomology	4	I	-	-	I	A	-	-	-	-	-
ZOOL 4650	Ichthyology	4	A	-	-	U	A	U	-	U	-	-
ZOOL 4660	Herpetology	4	E	-	U	A	E	-	E	-	A	A
ZOOL 4670	Ornithology	4	U	-	E	U	A	E	-	-	-	-
ZOOL 4680	Mammalogy	4	A	-	U	-	A	-	A	A	A	A
Elective support courses												
ZOOL 2100	Human Anatomy	4	-	I	-	-	I	-	-	-	-	-

* Course not currently taught. // **Course not currently in rotation

^ New course

D. Program and Contact Information

__x_ Information is current; no changes required.

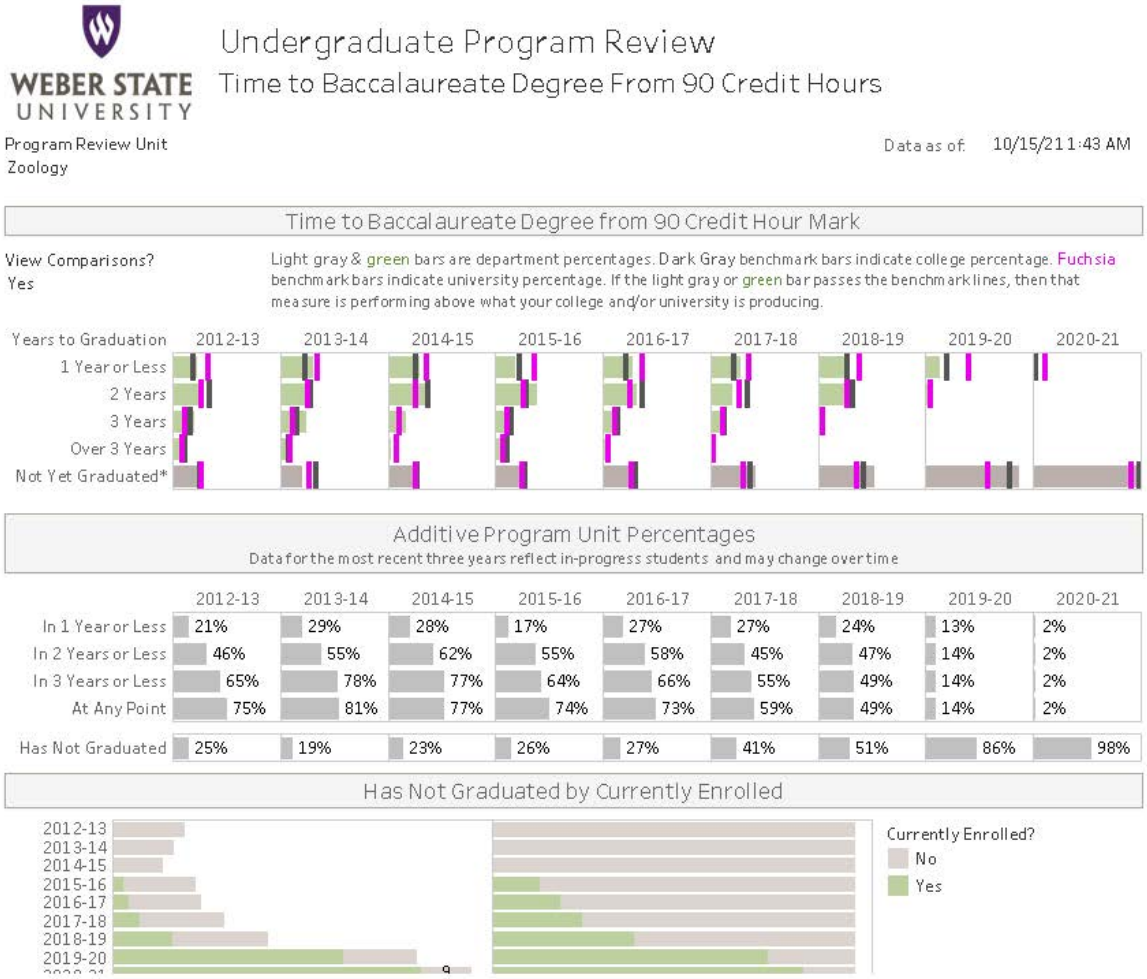
E. Assessment Plan

We have traditionally asked programs to report on outcome achievement by students at the course level. We are encouraging programs to consider alternative assessment approaches and plans that are outcome-based as opposed to course-based, though course-based assessment can continue to be used. A complete assessment plan will include a timeline (which courses or which outcomes will be assessed each year), an overall assessment strategy (course-based, outcome-based, reviewed juries, ePortfolio, field tests, etc.), information about how you will collect and review data, and information about how the department/program faculty are engaged in the assessment review.

__x_ Information is current; no changes required.

F. Student Achievement

i. Percent of students completing degrees after 90 credit hours within 2 years and a reflection on that metric (this information can be accessed on the Program Review Undergraduate dashboard – tab labeled, 'Time to Grad from 90CH – please reach out to oie@weber.edu if you need help with this metric). What department initiatives are in place to address this?



2020-21

Overall Numbers and Percentages

		2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21
1 Year or Less	University	959 (31%)	986 (33%)	1045 (35%)	993 (35%)	1051 (36%)	1024 (34%)	1141 (37%)	1171 (39%)	303 (10%)
	College	28 (18%)	36 (22%)	36 (24%)	39 (22%)	39 (20%)	45 (20%)	49 (25%)	38 (19%)	3 (2%)
	Program	11 (21%)	17 (29%)	11 (28%)	10 (17%)	16 (27%)	13 (27%)	13 (24%)	8 (13%)	0 (0%)
2 Years	University	760 (25%)	714 (24%)	740 (25%)	703 (25%)	705 (24%)	770 (26%)	789 (26%)	115 (4%)	
	College	51 (33%)	43 (26%)	54 (36%)	50 (28%)	68 (35%)	73 (32%)	61 (31%)	8 (4%)	
	Program	13 (25%)	15 (26%)	13 (33%)	22 (38%)	18 (31%)	9 (18%)	13 (24%)	1 (2%)	
3 Years	University	297 (10%)	300 (10%)	273 (9%)	280 (10%)	302 (10%)	301 (10%)	62 (2%)		
	College	23 (15%)	22 (13%)	13 (9%)	24 (13%)	24 (12%)	25 (11%)	5 (3%)		
	Program	10 (19%)	13 (22%)	6 (15%)	5 (9%)	5 (8%)	5 (10%)	1 (2%)		
Over 3 Years	University	242 (8%)	215 (7%)	182 (6%)	173 (6%)	126 (4%)	25 (1%)			
	College	16 (10%)	11 (7%)	9 (6%)	19 (11%)	8 (4%)	2 (1%)			
	Program	5 (10%)	2 (3%)	0 (0%)	6 (10%)	4 (7%)	2 (4%)			
Not Yet Graduated*	University	787 (26%)	741 (25%)	748 (25%)	682 (24%)	758 (26%)	882 (29%)	1087 (35%)	1698 (57%)	2602 (89%)
	College	38 (24%)	51 (31%)	38 (25%)	48 (27%)	56 (29%)	80 (36%)	80 (41%)	153 (77%)	184 (98%)
	Program	13 (25%)	11 (19%)	9 (23%)	15 (26%)	16 (27%)	20 (41%)	28 (51%)	55 (86%)	65 (98%)

*Students who have not yet graduated may or may not be enrolled..

*On 1st June of every year the recent academic year will be updated

For the 2016-17 academic year, 66 percent of Zoology majors finished their degree in 3 years or less. Nineteen percent are still enrolled. For 2017-18, it was 55 percent, with 25 percent currently enrolled. For 2018-19, it was 48 percent, with 39 percent currently enrolled. If we combine those percentages, we can see that over 80 percent of zoology majors have finished in 3 years (after 90 CH) or are still working on their degree. We have active departmental advising that aims to get students through their degree in a reasonable time. One confounding factor relates to the number of students who declare a second major in Zoology in order to receive financial aid. These students typically take a few of our classes that they need in order to apply to various pre-professional programs but HAVE NO INTENTION to finish the degree.

Evidence of Learning

There are varieties of ways in which departments can choose to show evidence of learning.

1) Course-based assessment
    a. This is the format we have traditionally suggested programs use for assessment. The familiar 'evidence of learning worksheets' are included in the template and can also be accessed from the IE website. The critical pieces to include are:
        i. learning outcomes addressed in the course,
        ii. method(s) of measurement used,
        iii. threshold for 'acceptable – that is, the target performance,
        iv. actual results of the assessment,
        v. interpretation/reflection on findings,
        vi. the course of action to be taken based upon the interpretation,
        vii. how that action will be evaluated.

2) Outcome-based assessment
    a. Moving from course-based to outcome-based assessment has the potential for programs to gather and reflect upon data that are more meaningful, and to connect assessment findings from throughout the program. The approach may be much easier for associates and certificate programs where only select students in classes are earning the credential. For more information email (gniklason@weber.edu)

    b. Reporting options include:
        i. A traditional evidence-of-learning worksheet with an outcome (across multiple courses) as the focus (instead of a course with multiple outcomes).
        ii. A report that is more narrative-based.
        iii. Other tools such as an ePortfolio in which key or signature assignments have been identified by the faculty, and uploaded by the student with their reflection. The key or signature assignments are aligned to student learning outcomes. (ePortfolio is an excellent assessment tool for certificates and associate degrees.)
        iv. There are other approaches such as juried reviews, physical portfolios, field tests, etc.

3) General Education course assessment needs to continue to be reported at the course level using either the traditional template or a more narrative-based format. See the Checklist and Template page for area-specific worksheets as well.

Note: if you cannot download templates directly from this document, please visit our template page for downloads.

A. Evidence of Learning: Courses within the Major: A target performance threshold is set at 72 % (unless otherwise noted). This reflects the C- grade that is "Passing" for Zoology classes; for most of our classes and learning outcomes, this value has been exceeded.

Evidence of Learning Worksheet: Courses within the Major

Course: Zoology 2100: Human Anatomy Semester taught: Fall 2019-Spring 2020 Sections included: all

Evidence of Learning: Courses within the Major						
Measurable Learning Outcome	Method of Measurement*	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Closing the Loop"
Learning Outcome 2: Cellular organization	Direct measure: 36 multiple choice exam questions over 8 exams (each semester = 4 exams). 282 students in total.	Exam score = 72% or higher	66.67% students scoring 65% or higher correctly answered these questions.	Roughly 31% of students scoring 65% or higher on exams were unable to master every question relating to Outcome 2.	Almost 2/3 of the students demonstrated learning this concept, leaving some room for potential improvement.	Will continue to emphasize details in lecture in effort to improve this score.
Learning Outcome 5: Structure & function	Direct measure: 70 multiple choice exam questions over 8 exams (each semester = 4 exams). 282 students in total.	Exam score = 72% or higher	76.24% of students scoring 65% or higher correctly answered these questions.	Roughly 24% of students scoring 65% or higher were unable to answer master every question relating to Outcome 5.	Over 3/4 of the students demonstrated learning this concept. We believe this demonstrates an acceptable level of learning.	Will continue to emphasize structure & function.

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

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

This analysis includes the Fall 2019 and Spring 2020 semesters. I was on sabbatical during the Spring 2019 semester. Fall 2020 through Spring 2021 semesters were completely online due to COVID-19 and were not included in this analysis due to the significant difference in course delivery.

Course:ZOOL 2220, Diversity of Animals, Brasso Semesters taught: Fall 2019, Spring 2020, Fall 2020, Spring 2021

Sections included: 23150, 22843, 32154, 33547

Evidence of Learning: Courses within the Major						
Measurable Learning Outcome	Method of Measurement*	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Closing the Loop"
Learning Outcome 1: Concept 1. Evolution	Measure 1: 291 exam questions (561 student responses)	Measure 1: Class average >72%	Measure 1: Class average 83.9%	Measure 1: Students understand that the diversity of life is a result of mutation, adaptation, and selection	Continue use of assessment	Continue to emphasize this outcome throughout the course
Learning Outcome 2: Concept 5: Structure and function	Measure 1: 289 exam questions (617 student responses)	Measure 1: Class average >72%	Measure 1: Class average 85.7%	Measure 1: Students understand the relationships among molecular, cellular, and organismal structure and function	Continue use of assessment	Continue to emphasize this outcome throughout the course.
Learning Outcome 3: Concept 6: System regulation	Measure 1: 6 exam questions (109 student responses)	Measure 1: Class average >72%	Measure 1: Class average 95%	Measure 1: Students understand biological systems are governed by biochemical/ physiological processes	Continue use of assessment	Continue to emphasize this outcome throughout the course.
Learning outcome 4: Comp 1: Process of Science	Measure 1: Students develop testable hypotheses related to a class experiment; use primary literature to inform hypothesis development.	Measure 1: Class average >72%	Measure 1: Class average 78.3%	Measure 1: Students used observational strategies to test hypotheses and critically evaluate experimental evidence.	Continue use of assessment	I have added additional assignments prior to the first draft to help students better formulate hypotheses related to the data being collected

Evidence of Learning: Courses within the Major						
Measurable Learning Outcome	Method of Measurement*	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Closing the Loop"
	Draft of the introduction (in which students write out hypotheses) to a scientific manuscript is graded with a rubric (108 student assignments)					
Learning outcome 5: Comp 2: Quantitative reasoning	Measure 1: Use descriptive and comparative statistics to compare data sets from data collected during class experiment. Lab activity; draft of scientific manuscript that includes results sections (108 assignments)	Measure 1: Class average >72%	Measure 1: Class average: 78.3%	Measure 1: Students used experimental data sets to generate figures (graphs) and applied statistical methods (t-tests, chi-square analysis).	Continue use of assessment	Continue to emphasize through additional small assignments leading up to the draft of the scientific manuscript

Evidence of Learning: Courses within the Major						
Measurable Learning Outcome	Method of Measurement*	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Closing the Loop"
Learning outcome 6: Comp 3: Communication	Measure 1: Students communicate the results of their experiment in the form of a formal scientific manuscript (106 manuscripts)	Measure 1: Class average >72%	Measure 1: Class average 81.1%	Measure 1: Students explained scientific concepts to a scientific audience and worked collaboratively on the experiment and interpretation of the data	Continue use of assessment	Continue to include this as a significant part of the grade for the students in this course
Learning Outcome 7: Comp 4: Science and Society	Measure 1: 3 exam questions (80 student responses)	Measure 1: Class average >72%	Measure 1: Class average 92.5%	Measure 1: Students develop applications to evaluate and address societal problems	Continue use of assessment	Continue to emphasize this outcome throughout the course. Include aspects of climate change and socio-economic importance of organisms

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

Course: Zoology 2220 Diversity of Animals, Mull **Semester taught: Fall 2020**

Evidence of Learning: Courses within the Major						
Measurable Learning Outcome	Method of Measurement*	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Closing the Loop"
Learning Outcome 1: **Concept 1: Evolution**	Measure 1: Exam 1	Measure 1: 72% or higher	Measure 1: 93% of students exceeded target; range was 46.5 – 95%	Measure 1: The majority of students exceeded target performance	Examine the elements of this assignment that were most difficult for students and determine ways to improving my teaching of it	Compare results of next round of assessment with this one to see if the outcome is better
	Measure 2: Phylum report	Measure 2: 72% or higher	Measure 2: 100% of students exceeded target; 86 – 100%	Measure 2: All students exceeded target performance	Continue with this approach	Continue assessing to determine if this approach remains successful
Learning Outcome 5: **Concept 5: Structure and function**	Measure 1: Exam 2	Measure 1: 72% or higher	Measure 1: 93% of students exceeded target; range 60 – 100%	Measure 1: The majority of students exceeded target performance	Examine the elements of this assignment that were most difficult for students and determine ways to improving my teaching of it	Compare results of next round of assessment with this one to see if the outcome is better
	Measure 2: Exam 3	Measure 2: 72% or higher	Measure 2: 96.5% of students exceeded target; range 58.3 – 100%	Measure 2: The majority of students exceeded target performance	Examine the elements of this assignment that were most difficult for students and determine ways to improving my teaching of it	Compare results of next round of assessment with this one to see if the outcome is better
Learning Outcome 6: Concept 6: **Systems regulation**	Measure 1: Exam 2	Measure 1: 72% or higher	Measure 1: 93% of students exceeded target; range 60 – 100%	Measure 1: The majority of students exceeded target performance	Examine the elements of this assignment that were most difficult for students and determine ways to	Compare results of next round of assessment with this one to see if the outcome is better

Evidence of Learning: Courses within the Major						
Measurable Learning Outcome	Method of Measurement*	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Closing the Loop"
					improving my teaching of it	
	Measure 2: Exam 3	Measure 2: 72% or higher	Measure 2: 96.5% of students exceeded target; range 58.3 – 100%	Measure 2: The majority of students exceeded target performance	Examine the elements of this assignment that were most difficult for students and determine ways to improving my teaching of it	Compare results of next round of assessment with this one to see if the outcome is better
Learning Outcome 7: Competency 1: **The process of science**	Measure 1: Exam 1	Measure 1: 70% or higher	Measure 1: 93% of students exceeded target; range was 46.5 – 95%	Measure 1: The majority of students exceeded target performance	Examine the elements of this assignment that were most difficult for students and determine ways to improving my teaching of it	Compare results of next round of assessment with this one to see if the outcome is better
	Measure 2: Research paper	Measure 2: 72% or higher	Measure 2: 100% of students exceeded target; 73 -100%	Measure 2: All students exceeded target performance	Continue with this approach	Compare results of next round of assessment with this one to see if the outcome is better
Learning Outcome 8: Competency 2: **Quantitative Reasoning**	Measure 1: Research paper	Measure 1: 72% or higher	Measure 1: 100% of students exceeded target; range 73 -100%	Measure 1: All students exceeded target performance	Continue with this approach	Continue assessing to determine if this approach remains successful
Learning Outcome 9: Competency 3:	Measure 1: Research paper	Measure 1: 72% or higher	Measure 1: 100% of students	Measure 1: All students exceeded target performance	Continue with this approach	Continue assessing to determine if this

Evidence of Learning: Courses within the Major						
Measurable Learning Outcome	Method of Measurement*	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Closing the Loop"
Communication			exceeded target; range 73 -100%			approach remains successful
Learning Outcome 10: Competency 4: **Science and Society**	Measure 1: Exam 1	Measure 1: 72% or higher	Measure 1: 93% of students exceeded target; range was 46.5 – 95%	Measure 1: The majority of students exceeded target performance	Examine the elements of this assignment that were most difficult for students and determine ways to improving my teaching of it	Compare results of next round of assessment with this one to see if the outcome is better
	Measure 2: Exam 3	Measure 2: 72% or higher	Measure 2: 96.5% of students exceeded target; range 58.3 – 100%	Measure 2: The majority of students exceeded target performance	Examine the elements of this assignment that were most difficult for students and determine ways to improving my teaching of it	Compare results of next round of assessment with this one to see if the outcome is better

Course: ZOOL 3200 Semesters taught: Fall 2019, Spring 2020, Spring 2021 Sections included: Three

Evidence of Learning: Courses within the Major						
Measurable Learning Outcome	Method of Measurement*	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/ Use of Results	"Closing the Loop"
Learning Outcome: Evolution	Method 1: 132 exam questions	Method 1: Class average >72%	Method 1: Class average: 80%	Students understand the evolution of cellular mechanisms, as well as the role cells play in evolutionary processes.	Continue use of assessment	This assessment covers in-person, hybrid, and online versions of this course. The results are consistent across delivery modality.
Learning Outcome: Cellular Organization	Method 1: 2156 exam questions	Method 1: Class average >72%	Method 1: Class average: 83%	Students are mastering the fundamentals of cellular organization.	Continue use of assessment	This is obviously the major focus of this course and over this period students performed above average.
Learning Outcome: Genetics	Method 1: 118 exam questions	Method 1: Class average >72%	Method 1: Class average: 77%	Students are mastering the fundamentals of cellular organization.	Continue use of assessment	Performance still above average but will consider how this material integrated into the course.
Learning Outcome: Structure and function	68 Exam questions	Method 1: Class average >72%	Method 1: Class average: 79%	Students are mastering the fundamentals of cellular organization.	Continue use of assessment	ZOOL 3200 instructors are reconsidering the emphasis of this learning objective, as it's not a major focus of the course.
Learning Outcome: Systems regulation	492 Exam questions	Method 1: Class average >72%	Method 1: Class average: 80%	Students are mastering the fundamentals of cellular organization.	Continue use of assessment	This is a focus of this course and over this period students performed above average.

Evidence of Learning: Courses within the Major **ZOOL 3200**						
Measurable Learning Outcome	Method of Measurement*	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/ Use of Results	"Closing the Loop"
Learning Outcome: The process of science	Method 1: 1698 exam questions Method 2: Multi-week lab activity done in groups. Students develop, implement and evaluate experiments Students write a lab report graded via rubric.	Method 1: Class average >72% Method 2: Class average >72%	Method 1: Class average: 82% Method 2: Class average: 84%	Students are able to generate as well as test hypotheses, as well as collect, interpret and evaluate data they have collected.	Continue use of both assessments	This is a major focus of this course and is addressed by two assessment methods. Over this period students performed above average.

Evidence of Learning: Courses within the Major **ZOOL 3200**						
Measurable Learning Outcome	Method of Measurement*	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/ Use of Results	"Closing the Loop"
Learning Outcome: Quantitative reasoning	Method 1: 656 exam questions Method 2: Multi-week lab activity done in groups. Students develop, implement and evaluate experiments Students write a lab report graded via rubric. Method 3: Students interpreted figures from a primary research article by answering essay questions which were graded with a rubric.	Method 1: Class average >70% Method 2: Class average >70% Method 3: Class average: >70%	Method 1: Class average: 74% Method 2: Class average: 84% Method 3: Class average: 86%	As measured by exam questions, students are preforming slightly above the threshold for competency. Students are doing better in other activities that assess real-life applications (Methods 2 and 3)	Continue use of all assessments.	Covering quantitative applications in the life sciences is always challenging. Using three assessment methods students performed above average.

Evidence of Learning: Courses within the Major **ZOOL 3200**						
Measurable Learning Outcome	Method of Measurement*	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/ Use of Results	"Closing the Loop"
Learning Outcome: Communication	Method 1: 210 exam questions. Method 2: Multi-week lab activity done in groups. Students develop, implement and evaluate experiments Students write a lab report graded via rubric. Method 3: Group presentations describing the findings of a figure from primary literature.	Method 1: Class average: >70% Method 2: Class average >70% Method 3: Class average >70%	Method 1: Class average: 82% Method 2: Class average: 84% Method 3: Class average: 86%	Students can effectively communicate scientific information at different levels and can work collaboratively. Students perform well in activities measuring real-life applications.	Continue use of all three assessments. Lab and group activities are worthwhile in achieving competency in this core concept.	Using three assessment methods students performed above average over three semesters.
Learning Outcome: Science and society	Not assessed	–	–	–	–	

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

Course: ZOOL 3200 Cell Biology Sandquist Fall 2021

Program Learning Goal or Outcome	Method of Measurement	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results and Closing the Loop
Learning Outcome 1: Evolution	Method 1: 3 exam questions Method 2: Students interpret the results of a primary research article on evolution.	Method 1: Class average >72% Method 2: Class average >72%	Method 1: Class average: 87% Method 1: Class average: 74%	Students are able to discuss how evolutionary forces have shaped animals' physiology	Continue use of assessments. Low number of assessment methods indicates this is an area I should work to emphasize in the future.
Learning Outcome 2: Cellular Organization	Method 1: 125 exam questions	Method 1: Class average >72%	Method 1: Class average: 84%	Students are able to collect, analyze and/or discuss data about cellular function	Continue use of assessments.
Learning Outcome 3: Genetics	Method 1: 35 exam questions	Method 1: Class average >72%	Method 1: Class average: 82%	Students are able to are able to collect, analyze and/or discuss data on how genetic changes/differences alter the physiology of animals	Continue use of assessments.
Learning Outcome 4: Ecosystems	Not assessed.				
Learning Outcome 5: Structure and function	Method 1: 27 exam questions	Method 1: Class average >72%	Method 1: Class average: 83%	Students are able to collect, analyze and/or discuss data on how differences in protein expression lead to differences in cellular function which lead to differences in physiology.	Continue use of assessments. Added second method of assessment F21.
Learning Outcome 6: Systems regulation	Method 1: 35 exam questions	Method 1: Class average >72%	Method 1: Class average: 90%	Students are able to collect, analyze and/or discuss data on how	Continue use of assessments

Program Learning Goal or Outcome	Method of Measurement	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results and Closing the Loop
				animals maintain homeostasis despite changes in their internal or external environments.	
Learning Outcome 7: The process of science	Method 1: 15 exam questions Method 2: Multi-week lab activity.	Method 1: Class average >72% Method 2: Class average >72%	Method 1: Class average: 95% Method 2: Class average: 92%	Students are able to generate as well as test hypotheses. Students are able to collect and evaluate data as well interpret and evaluate already collected data.	Continue use of assessments
Learning Outcome 8: Quantitative reasoning	Method 1: Lab activity done in groups determining the effects of cell type on proliferation. Students must create graphs representing the data collected in a lab report. Graded via rubrics. Method 2: Students interpreted figures from a primary research article by answering essay questions which were graded with a rubric.	Method 1: Class average >72% Method 2: Class average >72%	Method 1: Class average: 90% Method 2: Class average: 79%	Students are able to analyze physiological data statistically and display data graphically.	Continue use of assessments
Learning Outcome 9: Communication	Method 1: Multi-week lab researching the effects of cell on proliferation. Students write a lab report graded via rubric.	Method 1: Class average >72%	Method 1: Class average: 92%	Students can effectively communicate scientific information at different levels and can work collaboratively.	Continue use of assessments.

Program Learning Goal or Outcome	Method of Measurement	Threshold for Evidence of Student Learning	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results and Closing the Loop
	Method 2: Lab notebooks were completed for every experiment and graded 3 times by a rubric. Method 3: Group presentations on the findings of a figure from primary literature.	Method 2: Class average >72% Method 3: Class average >72%	Method 2: Class average: 88% Method 3: Class average: 92%		
Learning Outcome 10: Science and society	Not assessed				

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

Course: Zool 3200 (Cell Biology); Semester taught: Fall 2020
Sections included: Trask (CRN 22845)

Evidence of Learning: Courses within the Major						
Measurable Learning Outcome	Method of Measurement*	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Closing the Loop"
Learning Outcome 1: Evolution	Method 1: 4 short answer & essay exam questions	Method 1: Class average >72%	Method 1: Class average: 78.3%	Students understand the evolution of cells and cell components at a level slightly above the threshold.	As a critical concept in Zoology courses, additional questions will be developed and included in assessments.	Although new questions were developed, no additional questions were included in the Summer, 2021 course offering. The class average for both semesters was similar.
Learning Outcome 2: Cellular Organization	Method 1: 35 short answer & essay exam questions	Method 1: Class average >72%	Method 1: Class average: 85.1%	Students are mastering the fundamentals of cellular organization.	Continue use of assessment.	Class average in the Summer, 2021 course offering was similar.
Learning Outcome 3: Genetics	Method 1: 16 short answer & essay exam questions	Method 1: Class average >72%	Method 1: Class average was 72.3%	Students at the threshold of understanding how cells transmit information between generations	Spend additional time on this concept in future classes to ensure student understanding.	More time was spent on this concept in the Summer, 2021 course offering, and fewer (14) questions were used. The class average increased to 86%.
Learning Outcome 4: Ecosystems	Not assessed	----	----	----	----	
Learning Outcome 5: Structure and function	Method 1: 10 short answer & essay exam questions	Method 1: Class average >72%	Method 1: Class average was 80.4%	Students understand the relationship between the structure (of subcellular components) and their function	Continue this assessment.	Fewer questions (9) were used in the Summer, 2021 course offering. The class average was slightly lower, at 75.5%.

Learning Outcome 6: System regulation	Method 1: 27 short answer & essay exam questions	Method 1: Class average >72%	Method 1: Class average was 70%	Did not meet the threshold of competency in understanding that that cell behavior is regulated via chemical reactions that remain in homeostatic balance.	Although this concept is emphasized, the number of questions used in this course offering was astoundingly high. Cut back on the number of questions, and consider simplifying the manner in which this concept is discussed in class.	The number of questions assessing this concept in the Summer, 2021 course offering was decreased to 18; Class average in this category increased to 82.4%.
Learning Outcome 7: The process of science	Method 1: 18 essay exam questions requiring data analysis Method 2: Single or multi-week lab activities done in groups. Students develop, implement and evaluate experiments. Students complete post-lab analysis assignments (7; total 70 possible points) Method 3: Multi-week lab activity done in groups. Students develop, implement and evaluate experiment to	Method 1: Class average >72% Method 2: Class average >72% Method 3: Class average >72%	Method 1: Class average: 69.6% Method 2: Class average: 81.6% (82.8% without one student who did not complete all assessments and earned zero points—UW student) Method 3: Class average: 73.8% (78.4% without one student who did not complete all assessments and earned zero	Students are able to generate and hypotheses, as well as collect, interpret and evaluate data that is presented to them, or which they have generated and collected. Despite much practice in earlier coursework and reading/presenting multiple primary literature articles throughout this class, students struggle with developing possible explanations for unexpected results, often relying on "operator error" as a simple explanation.	Continue use of assessments; Spend class time discussing approaches to problem solving when encountering application of knowledge in data analysis to support student success on exams.	In the Summer, 2021 course offering, more time was spent in class discussing how to approach problems in cell biology. Because of this, class averages increased on Method 1 to 80.4%, on Method 2 to 86.4%, and on Method 4 to 82.6%. Unfortunately, however, the class average using Method 3 decreased to 68%. It is likely that this decrease was due to the fast pace of the accelerated nature of a block summer course, but will analyze and potentially alter the amount of time spent discussing manuscripts in future

	produce a manuscript-style write up (1; 35 possible points). Method 4: 25 in-class "problem sets" (423 points) requiring application of concepts learned in class, completed in groups.	Method 4: Class average >72%	points—UW student) Method 4: Class average: 75.2% (78.5% without the two students who did not complete all assessments and earned 0 points—UW students)			course offerings, especially when courses are taught in an accelerated format.
Learning Outcome 8: Quantitative reasoning	Method 1: Multi-week lab activities done in groups in which students apply statistical analysis to data they've generated and collected, calculate volumes of different protein solutions needed to compare multiple samples equitably, and/or use standard curves to determine protein concentrations of unknown mixtures (4 post-lab assignments and write up; 75 possible points).	Method 1: Class average >72%	Method 1: Class average: 77.7% (80.8% without one student who did not complete all assessments and earned zero points—UW student)	Students are performing above, yet near the edge of the threshold for competency, likely reflecting their discomfort with mathematical applications.	Continue use of assessment, though allow more time for students to work through their calculations (possibly giving practice problems) in advance of lab activities.	Class averages were similar in the Summer, 2021 course offering, despite giving students more time to work through calculations (and despite providing the proper formulae to use). A practice problem or two must be incorporated in future course offerings.

Learning Outcome 9: Communication	Method 1: Written post-lab assignments (9; 94 possible points) in which students communicate experimental results in graphic form. Method 2: Multi-week lab activity done in groups. Students develop, implement and evaluate experiment to produce a manuscript-style write up (1; 35 possible points). Method 3: Group oral presentations (2; 60 possible points) describing the findings of a figure from primary literature. Method 4: Writing assignment on *The Immortal Life of Henrietta Lacks* (Skloot; 25 points)	Method 1: Class average: >72% Method 2: Class average >72% Method 3: Class average >72% Method 4: Class average >72%	Method 1: Class average: 81.6% (82.8% without one student who did not complete all assessments and earned zero points—UW student) Method 2: Class average: 73.8% (78.4% without one student who did not complete all assessments and earned zero points—UW student) Method 3: Class average: 74.5% (80.7% without the three students who did not complete all assessments and earned 0 points—UW students) Method 4: Class average: 78.4% (88.8% without the two students who did not complete all assessments and	Students can work collaboratively and independently to effectively communicate scientific information in many ways (written, oral, graphic) and to different audiences. Students continue to struggle with producing coherent manuscript-style papers.	Continue use of assessments.	Class average for Method 1 was similar in the Summer, 2021 course offering. Class average for Method 2 was slightly lower and below threshold at 68%, but the class average for Methods 3 and 4 were significantly higher at 8% and 90.6%, respectively. The lower average achieved in Method 2 is attributable to the fast pace of the accelerated nature of a block summer course, but will consider spending more time preparing students on writing manuscripts in future course offerings, especially when the course is offered in an accelerated format.

			earned 0 points—UW students)			
Learning Outcome 10: Science and society	Method 1: Writing assignment on *The Immortal Life of Henrietta Lacks* (Skloot) in which students are asked to consider sociological implications of scientific advancements (25 points)	Method 1: Class average >72%	Method 1: Class average: 78.4% (88.8% without the two students who did not complete all assessments and earned 0 points—UW students)	Students are aware of sociological implications of cell biology research.	Continue use of assessment.	

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

Course: ZOOL 3300, Genetics Semesters taught: Fall 2019, Spring 2020, Spring 2021 Sections included: Three

Evidence of Learning: Courses within the Major						
Measurable Learning Outcome	Method of Measurement*	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Closing the Loop"
Learning Outcome: Evolution	Method 1: 596 exam questions Method 2: Students identify a topic related to human evolution and adaptation and summarize a research paper on this topic. Summary is graded via a rubric.	Method 1: Class average >70% Method 2: Class average >70%	Method 1: Class average: 81% Method 2: Class average 81%	Students understand the genetic basis of evolution. Student evolution summary is effective in exploring genetics in more detail.	Continue use of these assessments.	This assessment covers in-person, hybrid, and online versions of this course. Furthermore, exams were given in multiple choice format, essay/short answer on paper, and as take-home assignments. The results are consistent across modalities.
Learning Outcome: Cellular Organization	Method 1: 254 exam questions	Method 1: Class average >70%	Method 1: Class average: 80%	Students are mastering the relationship between cells and genetics.	Continue use of assessment.	See comments above.

Evidence of Learning: Courses within the Major						
Measurable Learning Outcome	Method of Measurement*	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Closing the Loop"
Learning Outcome: Genetics	Method 1: 236 exam questions Method 2: Students work in groups on seven laboratory exercises and work collaboratively to collect, analyze and present their data in a laboratory report. Report is graded via a rubric.	Method 1: Class average >70% Method 2: Class average >70%	Method 1: Class average: 78% Method 2: Class average 82%	Exam scores demonstrate student mastery of basic genetic principles. Laboratory exercises and lab report provide deeper understanding of the breadth of genetics.	Continue use of these three assessments.	This is obviously the major focus of this course and is addressed by two assessment methods. Over this period students performed above average.
Learning Outcome: Ecosystems	Not assessed	–	–	–	–	
Learning Outcome: Structure and function	Method 1: 280 exam questions	Method 1: Class average >70%	Method 1: Class average: 82%	Coverage of this topic and student performance are above average.	Continue use of this assessment.	This is a focus of this course and over this period students performed above average.

Learning Outcome: The process of science	Method 1: 642 exam questions Method 2: Students identify a topic related to human evolution and adaptation and summarize a research paper on this topic. Summary is graded via a rubric. Method 3: Students work in groups on seven laboratory exercises and work collaboratively to collect, analyze and present their data in a laboratory report. Report is graded via a rubric.	Method 1: Class average >70% Method 2: Class average >70% Method 3: Class average >70%	Method 1: Class average: 74% Method 2: Class average: 81% Method 3: Class average: 82%	Students can recognize how scientific principles have been used to study genetics. Evolution report exposes students to a variety of published research papers in genetics. For lab reports, students gain insight into collecting and presenting genetic data, as well as providing context for their findings.	Continue use of these three assessments.	This is a major focus of this course and is addressed by three assessment methods. Each assessment showed above average performance, but performance seems better for those activities emphasizing real-life applications

Learning Outcome: Quantitative reasoning	Method 1: 2156 exam questions Method 2: Students work in groups on seven laboratory exercises and work collaboratively to collect, analyze and present their data in a laboratory report. Report is graded via a rubric.	Method 1: Class average >70% Method 2: Class average >70%	Method 1: Class average: 76% Method 2: Class average 82%	Quantitative analysis remains challenging for students. As measured by exam questions, students are preforming slightly above the threshold for competency. Students do much better in the lab report, which assess real-life applications.	Continue use of assessments. If online learning is done again, need to adjust teaching strategy to improve Method 1 outcomes.	Covering quantitative applications in the life sciences is always challenging, owing to differences in student preparation. Using two assessment methods students performed above average.
Learning Outcome: Communication	Method 1: 390 exam questions. Method 2: Students work in groups on seven laboratory exercises and work collaboratively to collect, analyze and present their data in a laboratory report. Report is graded via a rubric.	Method 1: Class average: >70% Method 2: Class average >70%	Method 1: Class average: 74% Method 2: Class average: 82%	Students can effectively communicate scientific information at different levels. Students perform well in activities measuring real-life applications.	Continue use of assessments. Lab and group activities are worthwhile in achieving competency in this core concept.	Using three assessment methods students performed above average over three semesters.

Learning Outcome: Science and society	Not assessed	–	–	–	–	

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

Course: Zool. 3300 Genetics, Marshall

Semester taught: Sp20, Fa20, Sp21 **Sections included: 3312, 33059, 23569, 22848, 33684**

Evidence of Learning: Courses within the Major						
Measurable Learning Outcome	Method of Measurement*	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Closing the Loop"
Learning Outcome 1: Evolution	Measure 1: Exam questions selected from ~ 420 exams	Measure 1: Class average >72%	Measure 1: Class average was 87%	Measure 1: Threshold exceeded	Continue use of assessment	Continue to emphasize this outcome throughout the course
Learning Outcome 2: Cellular Organization	Measure 1: Exam questions selected from ~ 420 exams	Measure 1: Class average >72%	Measure 1: Class average was 82%	Measure 1: Threshold exceeded	Continue use of assessment	Continue to emphasize this outcome throughout the course
Learning Outcome 3: Genetics	Measure 1: Exam questions selected from ~ 420 exams	Measure 1: Class average >72%	Measure 1: Class average was 83%	Measure 1: Threshold exceeded	Continue use of assessment	Continue to emphasize this outcome throughout the course
	Measure 2: Lab notebooks made from the weekly laboratory results for the entire semester	Measure 1: Class average >72%	Measure 1: Class average was 89%	Measure 1: Threshold exceeded	Continue use of assessment	Continue to emphasize this outcome throughout the course
Learning Outcome 4: Ecosystems						
	Not assessed					
Learning Outcome 5: Structure and Function	Measure 1: Exam questions selected from ~ 420 exams	Measure 1: Class average >72%	Measure 1: Class average was 87%	Measure 1: Threshold exceeded	Continue use of assessment	Continue to emphasize this outcome throughout the course
Learning Outcome 6:	Not assessed					

Evidence of Learning: Courses within the Major						
Measurable Learning Outcome	Method of Measurement*	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Closing the Loop"
Systems Regulation						
Learning Outcome 1: Process of Science	Measure 1: Exam questions selected from ~ 420 exams	Measure 1: Class average >72%	Measure 1: Class average was 78%	Measure 1: Threshold exceeded	Continue use of assessment	Continue to emphasize this outcome throughout the course
	Measure 2: Lab notebooks made from the weekly laboratory results for the entire semester	Measure 1: Class average >72%	Measure 1: Class average was 89%	Measure 1: Threshold exceeded	Continue use of assessment	Continue to emphasize this outcome throughout the course
Learning Outcome 2: Quantitative Reasoning	Measure 1: Exam questions selected from ~ 420 exams	Measure 1: Class average >72%	Measure 1: Class average was 72%	Measure 1: Threshold reached	Continue use of assessment	Continue to emphasize this outcome throughout the course, the quantitative sections of this class are always the most difficult and where students struggle the most.
	Measure 2: Lab notebooks made from the lab results for the entire semester	Measure 1: Class average >72%	Measure 1: Class average was	Measure 1: Threshold exceeded	Continue use of assessment	Continue to emphasize this outcome throughout the course
Learning Outcome 3: Communication	Measure 1: Exam questions selected from ~ 420 exams	Measure 1: Class average >72%	Measure 1: Class average was 83%	Measure 1: Threshold exceeded	Continue use of assessment	Continue to emphasize this outcome throughout the course
	Measure 2: Lab notebooks made from the lab	Measure 1: Class average >72%	Measure 1: Class average was 89%	Measure 1: Threshold exceeded	Continue use of assessment	Continue to emphasize this outcome throughout the course

Evidence of Learning: Courses within the Major						
Measurable Learning Outcome	Method of Measurement*	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Closing the Loop"
	results for the entire semester					
Learning Outcome 4: Science & society	Measure 1: Exam questions selected from ~ 420 exams	Measure 1: Class average >72%	Measure 1: Class average was 82%	Measure 1: Threshold exceeded	Continue use of assessment	Continue to emphasize this outcome throughout the course

Additional narrative: Because of Covid, lab notebooks were only handed in for 2 classes, both during spring semester 2020.

Zool 3300, Genetics, Fall 2020

Measurable Learning Outcome	Method of Measurement*	Target performance	Actual performance	Interpretation of Findings	Action Plan/Use of Results	"Closing the Loop"
Learning Outcome 1: Evolution	Method 1: Multiple choice chi-tester, drawn from a testbank (Midterms and final). Method 2: Essays and written exercises (Midterms) questions and written exam questions. Method 3: Fill-in the blank questions on weekly quizzes	Class average >72% 72% 72%	Class average: 83% 90% 72%	Students understand this subject Students do well with these essays as we discuss them in class. While many students do well, some have more difficulty with this testing format	Continue assessing Continue with this format and assessment Students need to study on a regular basis in order to do well. Students fail these quizzes for various reasons: For some, it is because they do not study but for others, they are not accustomed to this testing format and think that they know the subject and are shocked that they failed	The failure of some students to do well on the weekly fill-in the blank quizzes triggers a discussion on how to study. Often, students will say that they spent a lot of time studying but yet do not understand why they failed. Often, it is because they just stare a the book or notes but do not check how they recall the information. So, we talk about various studying techniques. I also refer them to the Science advising office where Brian Pilcher can help them the studying and testing techniques.
Learning Outcome 2: Cellular Organization	Method 1: Multiple choice chi-tester, drawn from a testbank (Midterms and final). Method 2: Essays and written exercises	Class average >72% 72%	Class average: 83% 85%	See above As above	See above As above	See above As above

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	(Midterms) questions and written exam questions. Method 3: Fill-in the blank questions on weekly quizzes	72%	78%	As above	As above	As above
Learning Outcome 3: Genetics	Method 1: Multiple choice chi-tester, drawn from a testbank (Midterms and final). Method 2: Essays and written exercises (Midterms) questions and written exam questions. Method 3: Fill-in the blank questions on weekly quizzes Method 4: Laboratory exercises	Class average > 72% 72% 72% 72%	Class average: 78% 85% 75% 95%	Most students do well on this testing format See above Students do well overall. Students do well in the labs	Continue with assessment As above This testing format is hard for the students. We need to do a lot of exercises in class, prior to the quizzes for the students to fully understand the mechanisms underlying Mendelian genetics. Continue with assessment	See above As above The class exercises are useful for a better understanding. When the students "get it", they become more enthusiastic about the subject. lab exercises
Learning Outcome 4:	Not assessed in this class	-	-	-	-	
Learning Outcome 5: Structure and function	Method 1: Multiple choice chi-tester, drawn from a testbank	Class average > 72%	Class average: 78%	While many students did very well, several struggled with the concepts.	Using concrete examples help to understand the concepts.	See above

	(Midterms and final). Method 2: Essays and written exercises (Midterms) questions and written exam questions. Method 3: Fill-in the blank questions on weekly quizzes	72% 72%	85% 75%	Students did well Overall, students did well	These subjects are discussed in class. See discussion in 1	See above See discussion in 1
Learning Outcome 6:	Not assessed					
Learning Outcome 7: The process of science	Method 1: Essays and written exercises (Midterms) questions and written exam questions. Method 2: Lab activities address this L.O.	Class average > 72% 72%	Class average: 90% 90%	Students are knowledgeable in this area. Students can generate and test hypotheses, as well as collect, interpret and evaluate data they have collected.	Continue with assessment Students enjoy the lab activities and working in teams.	See above No change
Learning Outcome 8: Quantitative reasoning	Method 1: Essays and written exercises (Midterms) questions and written exam questions. Method 2: Fill-in the blank questions on weekly	72% 72%	78% 75%	Overall, students do well. Overall, students do well	Continue use of assessments. In order to get these results, we spend a lot of time doing exercises in class.	Quantitative reasoning is hard for many students. Many hours are spent resolving problems and explaining solutions. However, these exercises provide a good understanding of the subjects.

	Method 3: Lab exercises	72%	90%	Students are able to analyze the lab results.	Continue with assessment	
Learning Outcome 9: Communication	Method 1: Essays, written and lab exercises	72%	90%	Students can effectively communicate written scientific information.	Lab and group activities are worthwhile in achieving competency in this core concept.	
	Method 2: Fill-in the blank questions on weekly quizzes	72%	90%			
	Method 3: Book reading and discussion	72%	100%	Students do well in this area	Continue with assessment	Students are very lively during the discussion of the book reading (The Double Helix)
	Method 4: Powerpoint presentation	72%	100%	Students effectively communicate orally	Continue with assessment	Students enjoy presenting on a topic of their choice (and related to the class)
Learning Outcome 10: Science and society	Method 1: Essays and written exercises.	72%	90%	Students do well	Continue with assessment	As above
	Method 2: Powerpoint presentation	72%	100%	As above	As above	

Course: Zool. 3300 Genetics, Marshall
Semester taught: Sp21 Sections included: 33088

Evidence of Learning: Courses within the Major						
Measurable Learning Outcome	Method of Measurement*	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Closing the Loop"
Learning Outcome 1: Evolution	Measure 1: Exam questions selected from ~ 240 exams	Measure 1: Class average >72%	Measure 1: Class average was 82%	Measure 1: Threshold exceeded	Continue use of assessment	Continue to emphasize this outcome throughout the course
Learning Outcome 2: Cellular Organization	Measure 1: Exam questions selected from ~ 240 exams	Measure 1: Class average >72%	Measure 1: Class average was 78%	Measure 1: Threshold exceeded	Continue use of assessment	Continue to emphasize this outcome throughout the course

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

Learning Outcome 3: Genetics	Measure 1: Exam questions selected from ~ 240 exams	Measure 1: Class average >72%	Measure 1: Class average was 79%	Measure 1: Threshold exceeded	Continue use of assessment	Continue to emphasize this outcome throughout the course
	Measure 2: Online lab assignments	Measure 1: Class average >72%	Measure 1: Class average was 93.9%	Measure 1: Threshold exceeded	Continue use of assessment	Continue to emphasize this outcome throughout the course
Learning Outcome 4: Ecosystems:**NA**						

Learning Outcome 5: Structure and Function	Measure 1: Exam questions selected from ~ 240 exams	Measure 1: Class average >72%	Measure 1: Class average was 88%	Measure 1: Threshold exceeded	Continue use of assessment	Continue to emphasize this outcome throughout the course

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Learning Outcome 6: Systems Regulation: **NA**						
Learning Outcome 7: Process of Science	Measure 1: Exam questions selected from ~ 240 exams	Measure 1: Class average >72%	Measure 1: Class average was 72%	Measure 1: Threshold exceeded	Continue use of assessment	Continue to emphasize this outcome throughout the course
	Measure 2: Online lab assignments	Measure 1: Class average >72%	Measure 1: Class average was 93.9%	Measure 1: Threshold exceeded	Continue use of assessment	Continue to emphasize this outcome throughout the course
Learning Outcome 8: Quantitative Reasoning	Measure 1: Exam questions selected from ~ 240 exams	Measure 1: Class average >72%	Measure 1: Class average was 72%	Measure 1: Threshold reached	Continue use of assessment	Continue to emphasize this outcome throughout the course, the quantitative sections of this class are always the most difficult and where students struggle the most.
	Measure 2: Online lab assignments	Measure 1: Class average >72%	Measure 1: Class average was 93.9%	Measure 1: Threshold exceeded	Continue use of assessment	Continue to emphasize this outcome throughout the course

Learning Outcome 9: Communication	Measure 1: Exam questions selected from ~ 240 exams	Measure 1: Class average >72%	Measure 1: Class average was 85%	Measure 1: Threshold exceeded	Continue use of assessment	Continue to emphasize this outcome throughout the course
	Measure 2: Online lab assignments	Measure 1: Class average >72%	Measure 1: Class average was 93.9%	Measure 1: Threshold exceeded	Continue use of assessment	Continue to emphasize this outcome throughout the course

Learning Outcome 10: Science & society	Measure 1: Exam questions selected from ~ 240 exams	Measure 1: Class average >72%	Measure 1: Class average was 81%	Measure 1: Threshold exceeded	Continue use of assessment	Continue to emphasize this outcome throughout the course

Additional narrative : Quantitative problems are the most difficult part of this course and it particularly hard to learn online so I was not surprised to see it score the lowest here. I have continued to motivate students to take adequate time to study and learn these problems. I now have individual YouTube videos to demonstrate nearly every problem assigned in the back of the quantitative chapters (Ch. 3, 4, 5, 7).

Course:ZOOL 3450, Ecology,Brasso Semesters taught: Spring 2020, Fall 2020, Spring 2021
Sections included: 22850, 33062, 33558

Evidence of Learning: Courses within the Major						
Measurable Learning Outcome	Method of Measurement*	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Closing the Loop"
Learning Outcome 1: Concept 1. Evolution	Measure 1: 12 exam questions (58 student responses)	Measure 1: Class average >72%	Measure 1: Class average 92.5%	Measure 1: Students understand that the diversity of life is a result of mutation, adaptation, and selection	Continue use of assessment	Continue to emphasize this outcome throughout the course
Learning Outcome 2: Concept 3. Genetics	Measure 1: 8 exam questions (58 student responses)	Measure 1: Class average >72%	Measure 1: Class average 91.8%	Measure 1: Students understand underlying genetic mechanisms involved in adaptation to the environment	Continue use of assessment	Continue to emphasize this outcome throughout the course. Additional exam questions testing application continue to be added
Learning Outcome 3: Concept 4. Ecology	Measure 1: 58 exam questions (157 student responses)	Measure 1: Class average >72%	Measure 1: Class average 93.2%	Measure 1: Students understand organisms are interconnected, interacting with each other and the environment	Continue use of assessment	Continue to emphasize this outcome throughout the course.
Learning Outcome 4: Concept 6: System regulation	Measure 1: 4 exam questions (24 student responses)	Measure 1: Class average >72%	Measure 1: Class average 92.6%	Measure 1: Students understand biological systems are governed by biochemical/ physiological processes	Continue use of assessment	Continue to emphasize this outcome throughout the course.
Learning Outcome 5:	Measure 1:	Measure 1:	Measure 1:	Measure 1:	Continue use of assessment	Continue to emphasize this

Comp 1: Process of Science	9 exam questions (58 student responses)	Class average >72%	Class average 93.9%	Use observational/experimental strategies to test hypotheses & critically evaluate and interpret data		outcome throughout the course. Addition of CRE designation to course in Fall 2021 to allow evaluation of understanding of complete scientific process
Learning Outcome 6: Comp 2: Quantitative reasoning	Measure 1: 6 exam questions (58 student responses)	Measure 1: Class average >72%	Measure 1: Class average 85.6%	Measure 1: Students collect and statistically analyze data, and/or interpret data provided	Continue use of assessment	Continue to emphasize this outcome throughout the course. Addition of CRE designation to course in Fall 2021 to allow evaluation of understanding of complete scientific process
Learning Outcome 7: Comp 3: Communication	Measure 1: 3 exam questions (75 student responses)	Measure 1: Class average >72%	Measure 1: Class average 90.7%	Measure 1: Students must explain scientific concepts to different audiences and work collaboratively	Continue use of assessment	Continue to emphasize this outcome throughout the course. Addition of CRE designation to course in Fall 2021 to allow evaluation of understanding of complete scientific process
Learning Outcome 8: Comp 4: Science and Society	Measure 1: 3 exam questions (43 student responses)	Measure 1: Class average >72%	Measure 1: Class average 93.9%	Measure 1: Students develop applications to evaluate and address societal problems	Continue use of assessment	Continue to emphasize this outcome throughout the course. Include aspects of climate change and socio-economic impacts to ecological concepts

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

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

Zool 3500, Conservation Biology, Hoagstrom, Spring 2020 / 28 students

Threshold: A 73% class average is chosen as a threshold with the goal that all students reach at least a C grade level on each outcome. A C- level is passing within the Zoology major, so this sets a higher standard.						
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	"Close the Loop"
Learning Concept: 1. Evolution	Method 1: 25 exam questions	Method 1: Class average >72%	Method 1: Class average: 91%	Students understand evolution as a factor within Conservation Biology	Continue current approaches	Assess future sections
Learning Concept: 2. Cellular Organization	Not assessed for this course (see grid)	-	-	-	-	-
Learning Concept: 3. Genetics	Method 1: 15 exam questions	Method 1: Class average >72%	Method 1: Class average: 88%	Students understand genetics as a factor within Conservation Biology	Continue current approaches	Assess future sections
Learning Concept: 4. Ecosystems	Method 1: 89 exam questions	Method 1: Class average >72%	Method 1: Class average: 94%	Students understand ecosystems as a factor within Conservation Biology	Continue current approaches	Assess future sections
Learning Concept: 5. Structure & function	Method 1: 13 exam questions	Method 1: Class average >72%	Method 1: Class average: 87%	Students understand organismal structure & function as factor within Conservation Biology	Continue current approaches	Assess future sections
Learning Concept: 6. Systems regulation	Method 1: 32 exam questions	Method 1: Class average >72%	Method 1: Class average: 95%	Students understand regulation of biological systems as a factor within Conservation Biology	Continue current approaches	Assess future sections
Learning Competency: I. The process of science	Method 1: 16 exam questions	Method 1: Class average >72%	Method 1: Class average: 95%	Students understand the process of science as a factor within Conservation Biology	Continue current approaches	Assess future sections
Learning Competency: 2. Quantitative reasoning	Method 1: 33 exam questions	Method 1: Class average >72%	Method 1: Class average: 94%	Students understand quantitative reasoning as a factor within Conservation Biology	Continue current approaches	Assess future sections

Learning Competency: 3. Communication	Method 1: 65 exam questions	Method 1: Class average >72%	Method 1: Class average: 96%	Students understand communication as a factor within Conservation Biology	Continue current approaches	Assess future sections
Learning Competency: 4. Science and society	Method 1: 116 exam questions	Method 1: Class average >72%	Method 1: Class average: 95%	Students understand the significance of the science of Conservation Biology to society	Continue current approaches	Assess future sections

Course: Zool 3600 Comparative Physiology Semesters taught: Fall 19, Spr 20, Fall 20, Spr 21

	Evidence of Learning: Courses within the Major					
Measurable Learning Outcome	Method of Measurement*	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Closing the Loop"
Learning Outcome: Evolution	Method 1: 12 essay exam questions graded with scoring guide Method 2: Lab activity with full lab report write up graded using a rubric	Method 1: Class average >72% Method 2: Class average >72%	Method 1: Class average was 85% Method 2: Class average was 83%	Students are able to discuss how evolutionary forces have shaped animals physiology	Continue with course activities.	Continue use of assessments
Learning Outcome: Cellular Organization	Method 1: 14 essay exam questions graded with scoring guide Method 2: Lab activity with full lab report write up graded using a rubric	Method 1: Class average >72% Method 2: Class average >72%	Method 1: Class average was 85% Method 2: Class average was 83%	Students are able to collect, analyze and/or discuss data about cellular function	Continue with course activities.	Continue use of assessments
Learning Outcome: Genetics	Method 1: 5 essay exam questions graded with scoring guide Method 2: Lab activity with full lab report write up graded using a rubric	Method 1: Class average >72% Method 2: Class average >72%	Method 1: Class average was 85% Method 2: Class average was 83%	Students are able to are able to collect, analyze and/or discuss data on how genetic changes/differences alter the physiology of animals	Continue with course activities.	Continue use of assessments
Learning Outcome: Ecosystems	Method 1: 18 essay exam questions graded with scoring guide Method 2: Two lab activities with full lab report write	Method 1: Class average >72% Method 2:	Method 1: Class average was 85% Method 2:	Students are to collect, analyze and/or discuss data on physiological adaptations of animals to their environment and	Continue with course activities.	Continue use of assessments

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	ups graded using a rubric	Class average >72%	Class average was 85%	how physiology determines the environments animals are able to live in		
Learning Outcome: Structure and function	Method 1: 32 essay exam questions graded with scoring guide Method 2: Lab activity with full lab report write up graded using a rubric	Method 1: Class average >72% Method 2: Class average >72%	Method 1: Class average was 85% Method 2: Class average was 83%	Students are to collect, analyze and/or discuss data on how differences in protein expression lead to differences in cellular function which lead to differences in physiology	Continue with course activities.	Continue use of assessments
Learning Outcome: Systems regulation	Method 1: 35 essay exam questions graded with scoring guide Method 2: Two lab activities with full lab report write ups graded using a rubric Method 3: Two lab activities with worksheets involving data analysis and interpretation graded using a rubric	Method 1: Class average >72% Method 2: Class average >72% Method 3: Class average >72%	Method 1: Class average was 85% Method 2: Class average was 85% Method 3: Class average was 89%	Students are to collect, analyze and/or discuss data on how animals maintain homeostasis despite changes in their internal or external environments	Continue with course activities.	Continue use of assessments
Learning Outcome: The process of science	Method 1: 31 essay exam questions where figures had to be interpreted graded with scoring guide Method 2: Three hypothesis driven lab activities with full lab report write ups graded using a rubric	Method 1: Class average >72% Method 2: Class average >72%	Method 1: Class average was 85% Method 2: Class average was 85%	Students are able to generate as well as test hypotheses. Students are able to collect and evaluate data as well interpret and evaluate already collected data.	Continue with course activities.	Continue use of assessments

	Method 3: Two hypothesis driven lab activities with worksheets involving data analysis and interpretation graded using a rubric	Method 3: Class average >72%	Method 3: Class average was 89%			
Learning Outcome: Quantitative reasoning	Method 1: 12 essay exam questions where students had to calculate answers or make figures graded with scoring guide. Method 2: Four lab activities with full lab report write ups graded using a rubric Method 3: Three lab activities with worksheets involving data analysis and interpretation graded using a rubric	Method 1: Class average >72% Method 2: Class average >72% Method 3: Class average >72%	Method 1: Class average was 84% Method 2: Class average was 85% Method 3: Class average was 90%	Students are able to analyze physiological data statistically and display data graphically.	Continue with course activities.	Continue use of assessments
Learning Outcome: Communication	Method 1: Three presentations with different formats graded by peer-review using a rubric Method 2: Lab activity where students collected data in groups and wrote a group lab report.	Method 1: Class average >72% Method 2: Class average >72%	Method 1: Class average was 94% Method 2: Class average was 84%	Students can effectively communicate scientific information at different levels and can work collaboratively.	Continue with course activities.	Continue use of assessments
Learning Outcome: Science and society	Method 1: Lab activity assessing effect of commonly consumed foods on blood glucose levels with worksheet that has essay questions	Method 1: Class average >72%	Method 1: Class average was 89%	Students can effectively collect and analyze data that can be used to address a societal problem.	Continue with course activities.	Continue use of assessment

	about role of dietary choices on diabetes prevention/treatment. Graded using a rubric.					

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

Course: Zool. 3720 Evolution, Marshall
Semester taught: Su19, Fa19, Sp20, Su20, Fa20, Sp21
Sections included: 11859, 23247, 33381, 11512, 22852, 33365

Evidence of Learning: Courses within the Major						
Measurable Learning Outcome	Method of Measurement*	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Closing the Loop"
Learning Outcome 1: Evolution	Measure 1: Exam questions from ~ 700 exams	Measure 1: Class average >72%	Measure 1: Class average was 77%	Measure 1: Threshold exceeded	Continue use of assessment	Continue to emphasize this outcome throughout the course
	Measure 2: Critical book review of selected book on evolution written for the general public (>120 reviews graded)	Measure 2: Class average >72%	Measure 2: Class average was 87.3%	Measure 2: Threshold exceeded	Continue use of assessment	Continue to emphasize this outcome throughout the course, although this measure was much higher than Measure 1 I don't necessarily think it is a better metric
Learning Outcome 2: Cellular Organization **NA**	Not assessed					
Learning Outcome 3: Genetics	Measure 1: Exam questions from ~ 700 exams	Measure 1: Class average >72%	Measure 1: Class average was 81%	Measure 1: Threshold exceeded	Continue use of assessment	Continue to emphasize this outcome throughout the course
Learning Outcome 4: Ecosystems	Measure 1: Exam questions from ~ 700 exams	Measure 1: Class average >72%	Measure 1: Class average was 82%	Measure 1: Threshold exceeded	Continue use of assessment	Continue to emphasize this outcome throughout the course

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Evidence of Learning: Courses within the Major						
Measurable Learning Outcome	Method of Measurement*	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Closing the Loop"
Learning Outcome 5: Structure and Function	Measure 1: Exam questions from ~ 700 exams	Measure 1: Class average >72%	Measure 1: Class average was 74%	Measure 1: Threshold exceeded	Continue use of assessment	Continue to emphasize this outcome throughout the course, this was my lowest score so will look at focusing more on explaining this in lecture.
Learning Outcome 6: Systems Regulation	Not Assessed					
Learning Outcome 1: Process of Science	Measure 1: Exam questions from ~ 700 exams	Measure 1: Class average >72%	Measure 1: Class average was 84%	Measure 1: Threshold exceeded	Continue use of assessment	Continue to emphasize this outcome throughout the course
Learning Outcome 2: Quantitative Reasoning	Measure 1: Exam questions from ~ 700 exams	Measure 1: Class average >72%	Measure 1: Class average was 76%	Measure 1: Threshold exceeded	Continue use of assessment	Continue to emphasize this outcome throughout the course
Learning Outcome 3: Communication **NA**	Not assessed					
Learning Outcome 4: Science & society	Measure 1: Exam questions from ~ 700 exams	Measure 1: Class average >72%	Measure 1: Class average was 76%	Measure 1: Threshold exceeded	Continue use of assessment	Continue to emphasize this outcome throughout the course

Evidence of Learning: Courses within the Major						
Measurable Learning Outcome	Method of Measurement*	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Closing the Loop"
	Measure 2: Critical book review of selected book on evolution written for the general public (>120 reviews graded).	Measure 2: Class average >72%	Measure 2: Class average was 87.3%	Measure 2: Threshold exceeded	Continue use of assessment	Continue to emphasize this outcome throughout the course, although this measure was much higher than Measure 1 I don't necessarily think it is a better metric

Additional narrative (optional – use as much space as needed): As I transition my exams from chi tester to canvas I am going to reevaluate the problem selection and reduce the number. I also selected multiple outcomes on problems and this makes it harder to assess so I am going to only select the primary outcome that the question in addressing.

Zool 3730 Population Biology Spring 2021						
Evidence of Learning: Courses within the Major						
Measurable Learning Outcome	Method of Measurement*	Target performance	Actual performance	Interpretation of Findings	Action Plan/Use of Results	"Closing the Loop"
Learning Outcome 1: Evolution	Method 1: Exercises after every chapter Method 2: Written exams	Class average > 72% 72%	Class average: 79% 80%	Students are mastering the concepts As above	Continue with assessment As above	This area is introduced in the class. Students do well when they are given examples.
Learning Outcome 2: Cellular Organization	Not assessed	-	-	-	-	
Learning Outcome 3: Genetics	Method 1: Exercises after every chapter Method 2: Written exams	Class average > 72% 72%	Class average: 75% 79%	Considering the amount and difficulty of the subject, most students who remained in the class (2/3) did well	The use of applied exercises is very useful for a good understanding of the subjects	Many students had difficulty with the exercises relevant to the various subjects. This class is heavily "mathematically" oriented as the math exercises directly apply to population management. However, the introduction of more literature readings and discussions might bring more understanding about the usefulness of these tools and might make the class more interesting and "easier to digest".
Learning Outcome 4: Ecosystems	Method 1: Exercises after every chapter Method 2: Written exams	Class average > 72%	Class average: 77%	As above, the mathematical concepts were a challenge for many students but those who remained in the class (2/3) did well.	The ecological concepts were easier to grasp that the genetic one. Most students were interested by the mathematical tools given in this class but its mathematical aspect was hard on a few of them.	As above, the introduction of more literature readings will offer many applied examples and will demonstrate the importance of these mathematical tools for population management.

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Learning Outcome 5: Structure and function	Not assessed this semester	–	–	–	-	
Learning Outcome 6: Systems regulation	Not assessed this semester	–	–	–	-	
Learning Outcome 7: The process of science	Method 1: Exercises after every chapter Method 2: Written exams	Class average > 72%	Class average: 95%	Most students are able to understand and follow the scientific process.	Continue with assessment	Introduce more literature readings so students are more exposed to this process
Learning Outcome 8: Quantitative reasoning	Method 1: Exercises after every chapter Method 2: Written exams	Class average > 72%	Class average: 77%	Most students that remained in the class gained many tools to assess populations. However, 1/3 of the students dropped out	This class was very heavy in mathematical application useful for population management. Some students were surprised by this mathematical aspect.	Introduce more literature reading in future classes.
Learning Outcome 9: Communication	Power point presentation on a subject relevant to the class.	Class average > 72%	Class average: 95%	Students performed well in this area.	Continue this aspect of the class	Students were able to find many applications to what they were learning, and overall, enjoyed the presentations,
Learning Outcome 10: Science and society	Method 1: Exercises after every chapter Method 2: Written exams	Class average > 72%	80%	Students gained a good understanding of the interrelationship between science and human society	Continue with assessment	

Course: Zool 3820, Biology of Cancer, Trask; Semester taught: Spring 2021
Sections included: (CRN 33093)

Evidence of Learning: Courses within the Major						
Measurable Learning Outcome	Method of Measurement*	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Closing the Loop"
Learning Outcome 1: Evolution	Method 1: Essay exam question (exam 1, 1 question, 6 pts	Method 1: Class average >72%	Method 1: Class average: (exam 1: 84.9%)	Students understand how cells (and their component parts) change as a result of genetic mutation when placed under a selective pressure (e.g., an anti-cancer drug, competition for nutrients).	Continue use of assessment.	N/A
Learning Outcome 2: Cellular Organization	Method 1: Essay exam questions (exam 1, 4 questions, 21 pts; exam 2, 6 questions, 29 points; exam 3, 7 questions, 27 points)	Method 1: Class average >72%	Method 1: Class average: (exam 1: 82.6%) (exam 2: 61.7%) (exam 3: 72.1%) Total for 3 exams: 68.4%)	Although students met or exceeded thresholds on 2 of three exams, performance on the 2nd exam resulted in an overall performance that was below the threshold. Thus, students are not clearly understanding the cellular process and cellular behavior that leads to the development and progression of cancer.	This class had been previously taught as an experimental course and as a variable-title seminar; in each case, it was a 4000-level class for which I assumed significant earlier coursework. Indeed, the earliest renditions of the class had a prerequisite of 3200. After acquiring university approval for this course, this was the first time the class was offered as a 3000-level elective. Because of this, it's likely that some students are not coming into the class with a foundation in this important concept. Additionally, students' performance in this area suggest that I have failed to modify the content sufficiently to	N/A

					accommodate for this change in level. In future course offerings, I cannot assume that students have a significant foundation in cell biology, and must provide more foundational information in this class so that students can succeed.	
Learning Outcome 3: Genetics	Method 1: Essay exam questions (exam 1, 4 questions, 20 pts; exam 2, 4 questions, 18 points; exam 3, 3 questions, 11 points)	Method 1: Class average >72%	Method 1: Class average: (exam 1: 71.1%) (exam 2: 71.7%) (exam 3: 62.2%) Total for 3 exams: 69.3%)	Although students were only marginally below threshold on 2 of three exams, performance on the 3rd exam resulted in an overall performance that was below the threshold. Therefore, students are not clearly grasping the concept of how cells transmit information between cellular generations, how genetic alterations occur, and how they lead to the development and/or progression of cancer.	As above, it's likely that some students are not coming into the class with a foundation in genetics due to a lack of preparatory coursework. It's also likely true that I have failed to modify the content sufficiently to accommodate for the change in the level at which the course is offered. In future course offerings, do not assume that students have a significant foundation in genetics; provide more information and be more explicit about how genes can be modified to produce cancer and/or lead to disease progression.	N/A
Learning Outcome 4: Ecosystems	Method 1: Essay exam questions (exam 1--2 questions, 8 points; exam 2--1 question, 3 points	Method 1: Class average >72%	Method 1: Class average: (exam 1: 83.6%) (exam 2: 70.8%) Total for 2 exams: 80.1%)	Students grasp the relationship between environmental exposures as it relates to the development and progression of cancer.	Continue use of assessment. Although this is not a heavily-assessed concept in this class, it's an important one that deserves additional attention. Add another method of assessment (or minimally add additional exam questions relating to this concept.	N/A
Learning Outcome 5:	Method 1:	Method 1:	Method 1: Class average:	Students did not grasp the relationship between	Similar to Learning Outcomes 2 and 3, future	N/A

Structure and function	Essay exam questions (exam 1--1 question, 2 pts; exam 2--1 question, 4 points	Class average >72%	(exam 1: 40%) (exam 2: 63.3%) Total for 2 exams: 54.7%)	the structure of cancer-related proteins and their function	course offerings will have to include more explicit connections between the structure and function of proteins, as it relates to cancer biology.	
Learning Outcome 6: System regulation	Method 1: Essay Exam questions (exam 1--1 question, 8 pts; exam 2--5 questions, 24 points; exam 3--2 questions, 8 points)	Method 1: Class average >72%	Method 1: Class average: (exam 1: 57.8%) (exam 2: 65.9%) (exam 3: 66.8%) (Total for 3 exams: 64.5%)	Did not meet the threshold of competency in understanding that that cell behavior is regulated via chemical reactions that remain in homeostatic balance.	This is a difficult concept as it requires relating information across several courses, and across different disciplines (e.g., chemistry, physics). As for Learning outcomes 2, 3, and 5, it's likely that I have failed to modify the course sufficiently to meet students at the level of preparation they've brought to the class.	N/A
Learning Outcome 7: The process of science	Method 1: Essay exam questions (exam 1--1 question, 4 pts; exam 2--2 questions, 10 points; exam 3--8 questions, 26 points)	Method 1: Class average >72%	Method 1: Class average: (exam 1: 91.4%) (exam 2: 80%) (exam 3: 78.7%) (Total for 3exams: 80.3%)		Continue use of assessment. Spend class time discussing approaches to problem solving when encountering application of knowledge to improve student performance on exams.	N/A
Learning Outcome 8: Quantitative reasoning	Not assessed	---	---	---	---	N/A
Learning Outcome 9: Communication	Method 1: Written take-home, essay style exams Method 2: Group oral presentation (70 possible points) describing a novel cancer treatment.	Method 1: Class average: >72% Method 2: Class average >72%	Method 1: Class average: 80.1% Method 2: Class average: 90.1%	For all methods used, students demonstrated that can work collaboratively and independently to effectively communicate scientific information both in writing and orally.	Continue use of assessments.	N/A

	Method 3: Group discussions of *The Emperor of all Maladies* (Mukherjee; x4, each worth a maximum of 15 points for a total of 60) Method 4: Posting 'lay press' information (e.g., heard on TV or seen on social media) to a discussion board, and engaging in discussion with classmates about it (2 postings and 4 comments on other posts required, for a total of 40 points)	Method 3: Class average >72% Method 4: Class average >72%	Method 3: Class average: 93.7% Method 4: Class average: 94.2%			
Learning Outcome 10: Science and society	Method 1: Group discussions of *The Emperor of all Maladies* (Mukherjee; x4, each worth a maximum of 15 points for a total of 60) Method 2: Essay exam questions (exam 1--1 question, 6pts; exam 2--4 questions, 24 points; exam 3--5 questions, 20 points)	Method 1: Class average >72%	Method 1: Class average: 93.7% Method 2: Class average: (exam 1: 71.3%) (exam 2: 82.2%) (exam 3: 80.9%) Total for 3 exams: 80.4%)	Students are aware of sociological implications of cell biology research.	Continue use of assessments.	N/A

	Method 3: Posting 'lay press' information (e.g., heard on TV or seen on social media) to a discussion board, and engaging in discussion with classmates about it (2 postings and 4 comments on other posts required, for a total of 40 points)		Method 3: Class average: 94.2%			

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

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

Note: all performance numbers were calculated for the 16 students who completed the class. A 17th student attended class the first week and completed the first assessment but did not complete any of the others. Despite reaching out to her a number of times, the student did not drop the course and earned a UW. Her single assessment score for that first assignment was not included in the calculation of that assessment, nor were her '0' scores (for work not submitted) used in the calculations for other assessments.

For the remaining 16 students who completed the class, it is clear that I failed to meet their level of preparation. In future course offerings, I will have to make modifications to relative to previous course offerings (which were at a 4000-level).

That said, I also believe that at least some portion of students' failure to meet thresholds is attributable to the format in which the class was offered this semester.

I opted to teach this course as a "flex" option, categorizing it as such because I intended for the class to meet face-to-face on Mondays and Wednesdays and to meet virtually on Fridays. Although this was clearly stated on the flyers that were distributed in the department, most students opted to engage in the course completely virtually. I should have insisted that we adhere to the original plan, but it was difficult to tell students that I would not be recording (or virtually streaming) the other class periods since it was clear that I had the capacity to do that on Fridays. Thus, several students did join the class virtually each period, though some opted to only watch the recorded classes. Indeed, only 3 (all of who exceeded thresholds in all learning outcome areas) of 16 students attended class face-to-face on Mondays and Wednesdays. I personally found this "dual audience" format challenging, and believe that it was not the best way for many students to learn. Because of this, I will never teach another class in the "flex" format; rather, I hope to teach all future classes face-to-face. But if forced to do otherwise, the course will be offered exclusively virtually, in real-time with no recordings except in rare cases.

Course: Zoology 4100:Embryology **Semester taught: Spring 2020**

Evidence of Learning: Courses within the Major						
Measurable Learning Outcome	Method of Measurement*	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Closing the Loop"
Learning Outcome: 1 Evolution	Method 1: 15 multiple choice questions	Method 1: Class average >72%	Method 1: Class average was 94%	Students are able to collect, analyze and/or discuss data about the relationship between evolution and development	Continue use of assessments	Continue to emphasize this outcome throughout the course
Learning Outcome 2: Cellular Organization	Not assessed for this class					
Learning Outcome 3: Genetics	Not assessed for this class					
Learning Outcome 4: Ecosystems	Not assessed for this class					
Learning Outcome 5: Structure and function	Method 1: 10 multiple choice questions Method 2: In-class presentations with peer-review rubric	Method 1: Class average >72% Method 2: Class average >72%	Method 1: Class average was 96% Method 2: Class average was 92%	Students are able to collect, analyze and/or discuss data on structure and function as it pertains to developmental embryology	Continue use of assessments	Continue to emphasize this outcome throughout the course

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

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Course: Zoology 4120: Histology, Meyers **Semester taught: Fall 2019**

Evidence of Learning: Courses within the Major						
Measurable Learning Outcome	Method of Measurement*	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Closing the Loop"
Learning Outcome: Evolution	Not Assessed	Measure 1:	Measure 1:	Measure 1:		
Learning Outcome: Cellular Organization	Method 1: 25 multiple choice questions	Method 1: Class average >72%	Method 1: Class average was 90%	Students are able to collect, analyze and/or discuss data about cellular function	Continue use of assessments	Continue to emphasize this outcome throughout the course
Learning Outcome: Genetics	Not assessed for this class					
Learning Outcome: Ecosystems	Not assessed for this class					
Learning Outcome: Structure and function	Method 1: 24 multiple choice questions Method 2: In-class presentations with peer-review rubric	Method 1: Class average >72% Method 2: Class average >72%	Method 1: Class average was 85% Method 2: Class average was 93%	Students are able to collect, analyze and/or discuss data on structure and function at the histological level	Continue use of assessments	Continue to emphasize this outcome throughout the course

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

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

Report due 11/15/2021

Course: Zoology 4350, Animal Behavior Semester taught: Fall 2019

Evidence of Learning: Courses within the Major						
Measurable Learning Outcome	Method of Measurement*	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Closing the Loop"
Learning Outcome 1: **Evolution**	Measure 1: Exam 2	Measure 1: 72% or higher	Measure 1: 100% of students exceeded target; range was 72% - 100%	Measure 1: All students exceeded target performance	Continue with this approach	Continue assessing to determine if this approach remains successful
	Measure 2: Exam 3	Measure 2: 72% or higher	Measure 2: 88% of students exceeded target; range was 43% - 93.%	Measure 2: The majority of students exceeded target performance	Examine the elements of this assignment that were most difficult for students and determine ways to improving my teaching of it	Compare results of next round of assessment with this one to see if the outcome is better
Learning Outcome 2: **Genetics**	Measure 1: Exam 2	Measure 1: 72% or higher	Measure 1: 100% of students exceeded target; range was 72% - 100%	Measure 1: All students exceeded target performance	Continue with this approach	Continue assessing to determine if this approach remains successful
	Measure 2: Exam 3	Measure 2: 72% or higher	Measure 2: 88% of students exceeded target; range was 43% - 93.%	Measure 2: The majority of students Exceeded target performance	Examine the elements of this assignment that were most difficult for students and determine ways to improving my teaching of it	Compare results of next round of assessment with this one to see if the outcome is better
	Measure 1:	Measure 1:	Measure 1:	Measure 1:		

Evidence of Learning: Courses within the Major						
Measurable Learning Outcome	Method of Measurement*	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Closing the Loop"
Learning Outcome 3: **Structure and function**	Exam 1	72% or higher	91% of students Exceeded target; range 61.3% - 100%	The majority of students exceeded target performance	Examine the elements of this assignment that were most difficult for students and determine ways to improving my teaching of it	Compare results of next round of assessment with this one to see if the outcome is better
	Measure 2: Exam 2	Measure 2: 72% or higher	Measure 2: 100% of students exceeded target; range was 72% - 100%	Measure 2: The majority of students exceeded target performance	Continue with this approach	Continue assessing to determine if this approach remains successful
Learning Outcome 4: **Process of Science**	Measure 1: Research paper	Measure 1: 72% or higher	Measure 1: 100% of students exceeded target; range was 72 – 94.6%	Measure 1: All students exceeded target performance	Continue with this approach	Continue assessing to determine if this approach remains successful
	Measure 2: Exam 1	Measure 2: 72% or higher	Measure 2: 91% of students Exceeded target; range 6.13% - 100%	Measure 2: The majority of students exceeded target performance	Examine the elements of this assignment that were most difficult for students and determine ways to improving my teaching of it	Compare results of next round of assessment with this one to see if the outcome is better

Evidence of Learning: Courses within the Major						
Measurable Learning Outcome	Method of Measurement*	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Closing the Loop"
Learning Outcome 5: **Quantitative reasoning**	Measure 1: Regression analysis assignment	Measure 1: 72% or higher	Measure 1: 100% of students exceeded target; range was 76 - 100%	Measure 1: All students exceeded target performance	Continue with this approach	Continue assessing to determine if this approach remains successful
	Measure 2: Final research paper	Measure 2: 72% or higher	Measure 2: 100% of students exceeded target; range was 72 – 94.6%	Measure 2: All students exceeded target performance	Continue with this approach	Continue assessing to determine if this approach remains successful
Learning Outcome 6: **Communication**	Measure 1: Final research paper	Measure 1: 72% or higher	Measure 1: 100% of students exceeded target; range was 72% - 94.6%	Measure 1: All students exceeded target performance	Continue with this approach	Continue assessing to determine if this approach remains successful
	Measure 2: Review of trade book	Measure 2: 72% or higher	Measure 2: 97% of students exceeded target; range was 0%(no assignment) to 100%	Measure 2: Most students exceeded the target performance	Examine the elements of this assignment that were most difficult for students and determine ways to improving my teaching of it	Compare results of next round of assessment with this one to see if the outcome is better

Course: Zool 4470, Wildlife Ecology & Mgmt Semester taught: Fall 2020

Evidence of Learning: Courses within the Major						
Measurable Learning Outcome	Method of Measurement*	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Closing the Loop"
Learning Outcome 1: Evolution – Diversity of Life	Measure 1: 2 questions on Final Exam	Measure 1: 72% correct	Measure 1: 92.3%	Measure 1: Students met target performance in each of the semesters	Increase awareness of objective and relate information better to students	Continue monitoring this Learning Goal
Learning Outcome 4: Ecology – Organisms are interconnected	Measure 1: 11 questions on Final Exam	Measure 1: 72% correct	Measure 1: 83.9%	Measure 1: Students met target performance in each of the semesters	Increase awareness of objective and relate information better to students	Continue monitoring this Learning Goal
Learning Outcome 6: System Regulation: Transformations and Homeostasis	Measure 1: 4 questions on Final Exam	Measure 1: 72% correct	Measure 1: 86.6%	Measure 1: Students met target performance in each of the semesters	Increase awareness of objective and relate information better to students.	Continue monitoring this Learning Goal
Competency 2: Quantitative	Measure 1: 2 questions on Final Exam	Measure 1: 72% correct	Measure 1: 80.8%	Measure 1: Students met target performance in each of the semesters	Increase awareness of objective and relate information better to students	Continue monitoring this Learning Goal
Competency 4: Science and Society	Measure 1: 8 questions on Final Exam	Measure 1: 72% correct	Measure 1: 75.8%	Measure 1: Students met target performance in each of the semesters	Increase awareness of objective and relate information better to students	Continue monitoring this Learning Goal

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Course: Zoology 4640, Entomology Semester taught: Fall 2020

Evidence of Learning: Courses within the Major						
Measurable Learning Outcome	Method of Measurement*	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Closing the Loop"
Learning Outcome 1: **Evolution**	Measure 1: Quiz 1	Measure 1: 72% or higher	Measure 1: 93% of students exceeded target; range was 54.4 – 100%	Measure 1: Most students exceeded target performance	Examine the elements of this assignment that were most difficult for students and find ways to improving my teaching of it	Compare results of next round of assessment with this one to see if the outcome is better
	Measure 2: Final Exam	Measure 2: 72% or higher	Measure 2: 100% of students exceeded target; range was 72.8-98.7%	Measure 2: All students exceeded target performance	Continue with this approach	Continue assessing to determine if this approach remains successful
Learning Outcome 2: **Ecosystems**	Measure 1: Quiz 3	Measure 1: 72% or higher	Measure 1: 85% of students exceeded target; range 13.8 – 100%	Measure 1: Most students exceeded target performance	Examine the elements of this assignment that were most difficult for students and determine ways to improving my teaching of it	Compare results of next round of assessment with this one to see if the outcome is better
	Measure 2: Final Exam	Measure 2: 72% or higher	Measure 2: 100% of students exceeded target; range was 72.8 – 98.7%	Measure 2: All students exceeded target performance	Continue with this approach	Continue assessing to determine if this approach remains successful

Evidence of Learning: Courses within the Major						
Measurable Learning Outcome	Method of Measurement*	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Closing the Loop"
Learning Outcome 1: **Structure and function**	Measure 1: Practical exam	Measure 1: 72% or higher	Measure 1: 90% of students exceeded the target; range 59 – 100%	Measure 1: Most students exceeded target performance	Emphasize taxonomic skills more frequently and emphasize even more strongly the importance of studying for an exam that draws upon information from the entire semester	Compare results of next round of assessment with this one to see if the outcome is better
	Measure 2: Insect collection	Measure 2: 72% or higher	Measure 2: 97% of students exceeded target; range 0 - 100%	Measure 2: Most students exceeded target performance	Emphasize more strongly the importance of turning an assignment that is worth > 30% of the grade	Confirm that every student completes this assignment the next time I teach the course
Learning Outcome 2: **Science and society**	Measure 1: Quiz 5	Measure 1: 72% or higher	Measure 1: All students exceeded target; range 83.3 – 100%	Measure 1: All students exceeded target performance	Continue with this approach	Continue assessing to determine if this approach remains successful
	Measure 2: Final exam	Measure 2: 72% or higher	Measure 2: 100% of students exceeded target; range was 72.8 – 98.7%	Measure 2: All students exceeded target performance	Continue with this approach	Continue assessing to determine if this approach remains successful

Zool 4650, Ichthyology Fall 2019 / Hoagstrom / 15 students						
Threshold: A 73% class average is chosen as a threshold with the goal that all students reach at least a C grade level on each outcome. A C- level is passing within the Zoology major, so this sets a higher standard.						
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	"Close the Loop"
Learning Concept: 1. Evolution	Method 1: 52 exam questions	Method 1: Class average >73%	Method 1: Class average: 83%	Students understand evolution as a factor within Ichthyology	Continue current approaches	Assess future sections
Learning Concept: 2. Cellular Organization	Not assessed for this course (see grid)	-	-	-	-	-
Learning Concept: 3. Genetics	Not assessed for this course (see grid)	-	-	-	-	-
Learning Concept: 4. Ecosystems	Method 1: 42 exam questions	Method 1: Class average >73%	Method 1: Class average: 89%	Students understand ecosystems as a factor within Ichthyology	Continue current approaches	Assess future sections
Learning Concept: 5. Structure & function	Method 1: 74 exam questions	Method 1: Class average >73%	Method 1: Class average: 83%	Students understand organismal structure & function as factor within Ichthyology	Continue current approaches	Assess future sections
Learning Concept: 6. Systems regulation	Method 1: 33 exam questions	Method 1: Class average >73%	Method 1: Class average: 81%	Students understand regulation of biological systems as a factor within Ichthyology	Continue current approaches	Assess future sections
Learning Competency: I. The process of science	Not assessed for this course (see grid)	-	-	-	-	-
Learning Competency: 2. Quantitative reasoning	Method 1: 19 exam questions	Method 1: Class average >73%	Method 1: Class average: 93%	Students understand quantitative reasoning as a factor within Ichthyology	Continue current approaches	Assess future sections
Learning Competency: 3. Communication	Not assessed for this course (see grid)	-	-	-	-	-
Learning Competency: 4. Science and society	Not assessed for this course (see grid)	-	-	-	-	-

Course: Z00L. 4660 Herpetology, Marshall Semester taught: F19 Sections included:23251

Evidence of Learning: Courses within the Major						
Measurable Learning Outcome	Method of Measurement*	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Closing the Loop"
Learning Outcome 1: Evolution	Measure 1: Exam questions, I am currently teaching herpetology and have reorganized and restructured exams so only a limited number of exams were available to assess.	Measure 1: Class average >72%	Measure 1: Class average was 87%	Measure 1: Threshold exceeded	Continue use of assessment	Continue to emphasize this outcome throughout the course
Learning Outcome 2: Cellular Organization: **NA**	Not Assessed					
Learning Outcome 3: Genetics	Measure 1: Exam questions, I am currently teaching herpetology and have reorganized and restructured exams so only a limited number of exams were available to assess.	Measure 1: Class average >72%	Measure 1: Class average was 79%	Measure 1: Threshold exceeded	Continue use of assessment	Continue to emphasize this outcome throughout the course

Evidence of Learning: Courses within the Major						
Measurable Learning Outcome	Method of Measurement*	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Closing the Loop"
Learning Outcome 4: Ecosystems	Measure 1: Exam questions, I am currently teaching herpetology and have reorganized and restructured exams so only a limited number of exams were available to assess.	Measure 1: Class average >72%	Measure 1: Class average was 94%	Measure 1: Threshold exceeded	Continue use of assessment	Continue to emphasize this outcome throughout the course
Learning Outcome 5: Structure and Function	Measure 1: Exam questions, I am currently teaching herpetology and have reorganized and restructured exams so only a limited number of exams were available to assess.	Measure 1: Class average >72%	Measure 1: Class average was 96%	Measure 1: Threshold exceeded	Continue use of assessment	Continue to emphasize this outcome throughout the course
Learning Outcome 6: Systems Regulation:**NA**	:					
	Not Assessed					
Learning Outcome 1: Process of Science	Measure 1: Exam questions, I am currently teaching herpetology and have reorganized	Measure 1: Class average >72%	Measure 1: Class average was 98%	Measure 1: Threshold exceeded	Continue use of assessment	Continue to emphasize this outcome throughout the course

Evidence of Learning: Courses within the Major						
Measurable Learning Outcome	Method of Measurement*	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Closing the Loop"
	and restructured exams so only a limited number of exams were available to assess.					
	Measure 2: Field notebooks created by students	Measure 2: Class average >72%	Measure 2: Class average was 95%	Measure 2: Threshold exceeded	Continue use of assessment	Continue to emphasize this outcome throughout the course
Learning Outcome 2: Quantitative Reasoning:N**A**						
	Not Assessed					
Learning Outcome 3: Communication	Measure 1: Exam questions, I am currently teaching herpetology and have reorganized and restructured exams so only a limited number of exams were available to assess.	Measure 1: Class average >72%	Measure 1: Class average was 96%	Measure 1: Threshold exceeded	Continue use of assessment	Continue to emphasize this outcome throughout the course

Evidence of Learning: Courses within the Major						
Measurable Learning Outcome	Method of Measurement*	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Closing the Loop"
	Measure 2: Field notebooks created by students	Measure 2: Class average >72%	Measure 2: Class average was 95%	Measure 2: Threshold exceeded	Continue use of assessment	Continue to emphasize this outcome throughout the course
	Measure 3: Student presentations on local amphibians and reptiles	Measure 3: Class average >72%	Measure 3: Class average was 94%	Measure 3: Threshold exceeded	Continue use of assessment	Continue to emphasize this outcome throughout the course
Learning Outcome 4: Science & society	Measure 1: Exam questions, I am currently teaching herpetology and have reorganized and restructured exams so only a limited number of exams were available to assess.	Measure 1: Class average >72%	Measure 1: Class average was 84%	Measure 1: Threshold exceeded	Continue use of assessment	Continue to emphasize this outcome throughout the course
	Measure 2: Field notebooks created by students	Measure 2: Class average >72%	Measure 2: Class average was 95%	Measure 2: Threshold exceeded	Continue use of assessment	Continue to emphasize this outcome throughout the course
	Measure 3: Student presentations on local amphibians and reptiles	Measure 3: Class average >72%	Measure 3: Class average was 94%	Measure 3: Threshold exceeded	Continue use of assessment	Continue to emphasize this outcome throughout the course

Additional narrative: I am currently restructuring all of the exams and as I transition my exams from chi tester to canvas I am going to organize a much better assessment of this course. I am also going to assess as I go along and avoid the issues of running reports on modified exams.

Course: Zool 4670, Ornithology **Semester taught: Spring 2020; Spring 2021**

Evidence of Learning: Courses within the Major						
Measurable Learning Outcome	Method of Measurement*	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Closing the Loop"
Learning Outcome 1: Evolution – Diversity of Life	Measure 1: 6 questions on Final Exam	Measure 1: 72% correct	Measure 1: Avg:77.2%	Measure 1: Students met target performance in each of the semesters	Increase awareness of objective and relate information better to students	Continue monitoring this Learning Goal
Learning Outcome 3: Genetics	Measure 1: 4 questions on Exams	Measure 1: 72% correct	Measure 1: Avg:80.8%	Measure 1: Students met target performance in each of the semesters	Increase awareness of objective and relate information better to students	Continue monitoring this Learning Goal
Learning Outcome 4: Ecology – Organisms are interconnected	Measure 1: 6 questions on Final Exam	Measure 1: 72% correct	Measure 1: Avg:81.7%	Measure 1: Students met target performance in each of the semesters	Increase awareness of objective and relate information better to students	Continue monitoring this Learning Goal
Learning Outcome 5: Structure and Function	Measure 1: 6 questions on Exams	Measure 1: 72% correct	Measure 1: Avg:86.5%	Measure 1: Students met target performance in each of the semesters	Increase awareness of objective and relate information better to students	Continue monitoring this Learning Goal
Learning Outcome 6: System Regulation: Transformations/Homeostasis	Measure 1: 2 questions on Exam	Measure 1: 72% correct	Measure 1: 77.8%	Measure 1: Students met target performance in each of the semesters	Increase awareness of objective and relate information better to students.	Continue monitoring this Learning Goal

Report due 11/15/2021

Course: Zool 4680, Mammalogy Semesters taught: Spring 2020, Spring 2021

	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	"Closing the Loop"
Learning Outcome: Evolution	Method 1: 20 essay exam questions graded with a scoring guide Method 2: Lab activities involving phylogeny construction	Method 1: Class average >72% Method 2: Class average >72%	Method 1: Class average was 92% Method 2: Class average was 95%	Students are able to recognize, discuss and construct evolutionary relationships between mammals	Continue with course activities.	Continue use of assessments
Learning Outcome: Genetics	Method 1: 6 essay questions graded with a scoring grid. Method 2: Lab activity involving phylogeny construction using genetic sequences.	Method 1: Class average >72% Method 2: Class average >72%	Method 1: Class average was 91.5% Method 2: Class average was 95%	Students are able to discuss and utilize genetic information to explain relationships between and evolution of mammals.	Continue with course activities.	Continue use of assessments
Learning Outcome: Ecosystems	Method 1: 13 essay exam questions graded with a scoring guide Method 2: Multi-week lab activity developing, implementing and	Method 1: Class average >72% Method 2: Class average >72%	Method 1: Class average was 91.5% Method 2: Class average was 91%	Students are able to recognize, discuss and evaluate the role of mammals in ecosystems	Continue with course activities.	Continue use of assessments

	evaluating methods to quantify the density and diversity or behavior of mammals in Northern UT					
Learning Outcome: Structure and function	Method 1: 19 essay exam questions graded with a scoring guide Method 2: Lab activities involving specimen identification using dichotomous keys with worksheets graded using a rubric Method 3: Multi-week lab project digitizing mammal collection graded using self and peer-review rubrics	Method 1: Class average >72% Method 2: Class average >72% Method 3: Class average >72%	Method 1: Class average was 92.5% Method 2: Class average was 95% Method 3: Class average was 96%	Students are able to recognize structural differences between mammals and discuss the functional consequences.	Continue with course activities.	Continue use of assessments
Learning Outcome: Systems regulation	Method 1: 9 essay exam questions graded with a scoring guide	Method 1: Class average >72%	Method 1: Class average was 92%	Students are able to discuss how mammals maintain homeostasis despite changes to their internal and external environments.	Continue with course activities.	Continue use of assessments
Learning Outcome: The process of science	Method 1: Multi-week lab activity developing, implementing and evaluating methods to quantify the density and diversity or behavior of mammals in	Method 1: Class average >72%	Method 1: Class average was 91%	Students are able to pose hypotheses, develop methods to test hypotheses, troubleshoot methodological challenges and analyze and interpret data.	Continue with course activities.	Continue use of assessments

	Northern UT and peer-review					
Learning Outcome: Quantitative reasoning	Method 1: Multi-week lab activity developing, implementing and evaluating methods to quantify the density and diversity or behavior of mammals in Northern UT	Method 1: Class average >72%	Method 1: Class average was 91%	Students are able to collect, analyze and display data in figures.	Continue with course activities.	Continue use of assessments
Learning Outcome: Communication	Method 1: Three presentations with different formats graded by peer-review using a rubric. Method 2: Multi-week lab activity developing, implementing and evaluating methods to quantify the density and diversity or behavior of mammals in Northern UT	Method 1: Class average >72% Method 2: Class average >72%	Method 1: Class average was 96% Method 2: Class average was 94%	Students can effectively communicate scientific information at different levels and can work collaboratively.	Continue with course activities.	Continue use of assessments
Learning Outcome: Science and society	Method 1: Multi-week lab activity developing, implementing and evaluating methods to quantify the density and diversity or behavior of mammals in Northern UT	Method 1: Class average >72%	Method 1: Class average was 94%	Students are able to collaboratively work to collect data for dissemination to community partners.	Continue with course activities.	Continue use of assessments

	Method 2: Multi-week lab project digitizing mammal collection to create a digital collection that could be accessed by outside groups graded using self and peer-review rubrics	Method 2: Class average >72%	Method 2: Class average was 98%			

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

Course: Zool 4990: Seminar, Spring 2021 / Meyers

Evidence of Learning: Courses within the Major						
Measurable Learning Outcome	Method of Measurement*	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Closing the Loop"
Learning Outcome 1: Evolution	Not assessed for this course (see grid)					
Learning Outcome 2: Cellular organization	Not assessed for this course (see grid)					
Learning Outcome 3: Genetics	Not assessed for this course (see grid)					
Learning Outcome 4: Ecology	Not assessed for this course (see grid)					.
Learning Outcome 5: Structure and function	Not assessed for this course (see grid)	:				.
Learning Outcome 6: System regulation	Not assessed for this course (see grid)					
Learning Competency: I. The process of science	Method 1: Student Presentation Rubric	Method 1: Class average >72%	Method 1: Class average: 95%	Students understand the significance of the process of science via this seminar	Continue current approaches	Will continues to emphasize the competency
Learning Competency: II. Quantitative reasoning	Not assessed for this course (see grid)					
Learning Competency: III. Communication	Method 1: Student Presentation Rubric	Method 1: Class average >72%	Method 1: Class average: 95%	Students understand communication as a factor within this Seminar	Continue current approaches	Will continues to emphasize the competency
Learning Competency:	Method 1: Student Presentation Rubric	Method 1:	Method 1: Class average: 95%	Students understand the significance of the science	Continue current approaches	Will continues to emphasize the competency

Report due 11/15/2021

Evidence of Learning: Courses within the Major						
Measurable Learning Outcome	Method of Measurement*	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Closing the Loop"
IV. Science and society		Class average >72%		of to society via this seminar		

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

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

Zool 4990 Seminar Fall 2020, Berthelemy						
Measurable Learning Outcome	Method of Measurement*	Target performance	Actual performance	Interpretation of Findings	Action Plan/Use of Results	"Closing the loop"
Learning Outcome: Evolution	Not assessed					
Learning Outcome: Cellular Organization	Not assessed	-	-	-	-	
Learning Outcome: Genetics	Not assessed					
Learning Outcome: Ecosystems	Not assessed	-	-	-	-	
Learning Outcome: Structure and function	Not assessed	-	-	-	-	
Learning Outcome: Systems regulation	Not assessed					
Learning Outcome: The process of science	Power point presentation with peer evaluation	Class average > 72%	Class average 100%	Continue with same assessment	The students read many reports where the process of science elucidated many diseases	
Learning Outcome: Quantitative reasoning	Not assessed	-	-	-	-	
Learning Outcome: Communication	Power point presentation	Class average > 72%	Class average 100%	Continue with same assessment	This seminar class was online. Despite the lack of face to face contact, the students interacted well.	
Learning Outcome: Science and society	Power point presentation	Class average > 72%	Class average 100%	Continue with same assessment	The students understood well the effects of genetics condition on society and the importance of science in helping with discoveries	An important aspect of the seminar was about the impact of genetics on society.

B. Evidence of Learning: General Education Courses . Target performance set at 72 %, which is passing (C-) in the Zoology Dept

Evidence of Learning: General Education, Life Science Coursess: Zoology 1010

Semester taught: Fall 2020 Sections included:

Evidence of Learning: General Education						
Measurable Learning Outcome	Method of Measurement	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Close the Loop"
Learning Outcome 1: **LS1 Levels of organization**	Measure 1 Objectives assignment	Measure 1 72% or higher	Measure 1: 83% exceeded target	Measure 1: The majority of students exceeded the target	Measure 1: Examine the elements of this assignment that were most difficult for students and determine ways to improving my teaching of it	Compare results of next round of assessment with this one to see if the outcome is better
	Measure 2: Exam 1	Measure 2: 72% or higher	Measure 2: 90% of students exceeded target	Measure 2: The majority of students exceeded the target	Measure 2: Same as measure 1 above	Same as measure 1 above
Learning Outcome 2: **LS2 Metabolism and homeostasis**	Measure 1: Objectives assignment	Measure 1: 72% or higher	Measure 1: 88% of students exceeded target	Measure 1: The majority of students exceeded the target	Measure 1: Examine the elements of this assignment that were most difficult for students and determine ways to improving my teaching of it	Compare results of next round of assessment with this one to see if the outcome is better
	Measure 2: Exam 1	Measure 2: 72% or higher	Measure 2: 90% of students exceeded target	Measure 2:	Measure 2: Same as measure 1 above	Same as measure 1 above

Evidence of Learning: General Education						
Measurable Learning Outcome	Method of Measurement	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Close the Loop"
				The majority of students exceeded the target		
Learning Outcome 3: **LS3 Genetics and evolution**	Measure 1: Objectives assignment	Measure 1: 72% or higher	Measure 1: 97% of students exceeded target	Measure 1: The majority of students exceeded the target	Measure 1: Examine the elements of this assignment that were most difficult for students and determine ways to improving my teaching of it	Compare results of next round of assessment with this one to see if the outcome is better
	Measure 2: Exam 3	Measure 2: 72% or higher	Measure 2: 85.1% of students exceeded target	Measure 2: The majority of students exceeded the target	Measure 2: Same as measure 1 above	Same as measure 1 above
Evidence of Learning: General Education						
Measurable Learning Outcome	Method of Measurement	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Close the Loop"
Learning Outcome 1: **LS4 Ecological interactions**	Measure Objectives assignment	Measure 1 72% or higher	Measure 1: 94% of students exceeded target	Measure 1: The majority of students exceeded the target	Measure 1: Examine the elements of this assignment that were most difficult for students and determine ways to improving my teaching of it	Compare results of next round of assessment with this one to see if the outcome is better
	Measure 2: Exam 3	Measure 2: 72% or higher	Measure 2:	Measure 2:	Same as measure 1 above	Same as measure 1 above

Evidence of Learning: General Education						
Measurable Learning Outcome	Method of Measurement	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Close the Loop"
			85.1% of students exceeded target	The majority of students exceeded target performance		
Learning Outcome 2: **S1 Nature of Science**	Measure 1: Citizen Science assignment	Measure 1: 72% or higher	Measure 1: 100 % of students exceeded target	Measure 1: All students exceeded target performance	Measure 1: Continue with this approach	Continue assessing to determine if this approach remains successful
	Measure 2: Exam 1	Measure 2: 72% or higher	Measure 2: 90% of students exceeded target	Measure 2: The majority of students exceeded target performance	Measure 2: Examine the elements of this assignment that were most difficult for students and determine ways to improving my teaching of it	Compare results of next round of assessment with this one to see if the outcome is better
Learning Outcome 3: **S2 Integration of Science**	Measure 1: Citizen Science assignment	Measure 1: 72% or higher	Measure 1: 100 % of students exceeded target	Measure 1:	Measure 1: Continue with this approach	Continue assessing to determine if this approach remains successful
	Measure 2: Objectives assignment	Measure 2: 72% or higher	Measure 2: 39% of students exceeded the target	Measure 2: A minority of students exceeded target	Measure 2: Examine the elements of this assignment that were most difficult for students and determine ways to improving my teaching of it	Compare results of next round of assessment with this one to see if the outcome is better

Evidence of Learning: General Education						
Measurable Learning Outcome	Method of Measurement	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Close the Loop"
Learning Outcome 1: **S3 Science and Society**	Measure 1 Objectives assignment	Measure 1 72% or higher	Measure 1: 94% of students exceeded target	Measure 1: A majority of students exceeded target	Measure 1: Examine the elements of this assignment that were most difficult for students and determine ways to improving my teaching of it	Compare results of next round of assessment with this one to see if the outcome
	Measure 2: Exam 3	Measure 2: 72% or higher	Measure 2: 85.1% of students exceeded target	Measure 2: The majority of students exceeded target performance	Measure 2: Examine the elements of this assignment that were most difficult for students and determine ways to improving my teaching of it	Compare results of next round of assessment with this one to see if the outcome
Learning Outcome 2: **S4 Problem solving and data analysis**	Measure 1: Exam 1	Measure 1: 72% or higher	Measure 1: 90% of students exceeded target	Measure 1: The majority of students exceeded target performance	Measure 1: Examine the elements of this assignment that were most difficult for students and determine ways to improving my teaching of it	Compare results of next round of assessment with this one to see if the outcome

	Measure 2: Objectives assignment	Measure 2: 72% or higher	Measure 2: 54% of students exceeded target	Measure 2: A slight majority of students exceeded target performance	Measure 2: Same as measure 1 above	Same as measure 1 above
Learning Outcome 3: Not Assessed	Measure 1:	Measure 1:	Measure 1:	Measure 1:	Measure 1:	
	Measure 2:	Measure 2:	Measure 2:	Measure 2:	Measure 2:	

Evidence of Learning Worksheet
Course: ZOOL 1010 VTL Animal Biology Fall 2020

Evidence of Learning					
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: Levels of Organization	Method 1: 17 essay, multiple-choice, true/false, and short-answer questions Method 2: Homework/Class activities (graded) involving watching documentaries and answering related questions	Method 1: Class average >72% Method 2: Class average >72%	Method 1: Class average was 81.24% Method 2: Class average was 85.71%	Students are able to recognize, discuss and construct scientific explanations regarding organisms' level of organizations and ecological organizations.	Continue use of assessments
Learning Outcome: Evolution	Method 1: 56 essay, multiple-choice, true/false, and short-answer questions Method 2: Class activities involving examining data to construct scientific explanations and arguments using MEL diagram, watching documentaries, and answering related questions. Method 3: Extra assignments (through which students receive	Method 1: Class average >72% Method 2: Class average >72%	Method 1: Class average was 91.49% Method 2: Class average was 85.71%	Students are able to recognize, discuss and construct explanations about evolutionary changes and unique and similar animal adaptations, and evolutionary relatedness by using morphological and genetic analysis and constructing and interpreting phylogenetic trees to infer ancestral relationships.	Continue use of assessments

	extra credit) involving watching documentaries and writing essays about evolutionary relationships between human, fish, reptiles, and other apes, also involving writing an essay answering 8 essay questions about the book Beak of the Finch Book (three chapters)				
Learning Outcome: Genetics	Method 1: 6 essay question and multiple-choice questions Method 2: Class activity involving constructing phylogenetic trees (including but not limited to human ancestors) using genetic information and watching a documentary about DNA barcoding for species identification and answering the related essay questions.	Method 1: Class average >72% Method 2: Class average >72%	Method 1: Class average was 92.07% Method 2: Class average was 85.71%	Students are able to discuss and utilize genetic information to explain relationships between and evolution of mammals.	Continue use of assessments and add more essay questions regarding genetics.
Learning Outcome: Ecological Interactions	Method 1: 22 essay, multiple-choice, true/false, and short-answer questions	Method 1: Class average >72% Method 2:	Method 1: Class average was 81.08% Method 2:	Students are able to recognize, discuss and evaluate the interactions of animals with their environments, their	Continue use of assessments

	Method 2: Homework/class activities including formulating hypothesis about ecological interactions and analyzing data to test their hypothesis.	Class average > 72%	Class average was 85.71%	role in ecosystems, and animal population dynamics.	
Learning Outcome: Nature of Science/Biology	Method 1: 5 essay and multiple-choice questions Method 2: Class activities involving examining scientific cases to highlight the nature of science/biology aspects (e.g., discovery of coelacanth, Darwin's finches, discovery of feathered dinosaurs) .	Method 1: Class average >72% Method 2: Class average >72%	Method 1: Class average was 88.41% Method 2: Class average was 85.71%	Students are able to recognize, appreciate, and discuss the nature of science/biology aspects (e.g., the nature of scientific knowledge; how scientists work, etc.) and evaluate case studies (such as Darwin's examination of finches) in terms of those aspects as well as formulate hypotheses regarding evolutionary relationships among organism and animal interactions with their environment and their role in the ecosystem (habitat, niche, etc.).	Continue use of assessments
Learning Outcome: Communication	Method 1: Signature Assignment involving writing essay about evolution and the importance of evolutionary theory	Method 1: Class average >72%	Method 1: Class average was 100%	Students can effectively communicate scientific information writing argumentative essays to convince others	Continue use of assessments

	to convince others who are non-scientists about the credibility of evolution. Method 2: Extra assignment involving writing an argumentative essay concerning parasite biology. Students are expected to persuade others about the benefits of parasites.	Method 2: Class average >72%	Method 2: Class average was 95%	who are non-scientists	
Learning Outcome: Science and society	Method 1: 4 essay and multiple-choice questions. Method 2: Citizen Science Assignment involving contribution to the data collection process of a real scientific investigation. Students are expected to participate into a science project at least 15 hours.	Method 1: Class average >72% Method 2: Class average >72%	Method 1: Class average was 79.1% Method 2: Class average was 100%	Students are able to analyze and evaluate the current social problems and recognize the interrelationship between science and society. Students are able to recognize the ways in which scientists provide answer to scientific questions using data that eventually contribute to the common knowledge	Continue use of assessments
Learning Outcome: Structure and Function	Method 1: 32 essay, multiple choice, short answer, true/false questions	Method 1: Class average>72%	Method 1: Class average was 89.64%	Students are able to analyze and discuss how biological structures affect the function among animals.	Continue use of assessments

*Direct and indirect: at least one measure per objective must be a direct measure.
Note: Each week, students were expected to submit one of the in-class activities or Homework.

Course: Human Biology 1020/Gurr Semester taught: Summer 2019 – Spring 2021
Sections included: Summer 2019, Fall 2019, Spring 2020, Spring 2021

Evidence of Learning: General Education						
Measurable Learning Outcome Students will demonstrate their understanding of the following characteristics of life:	Method of Measurement	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Close the Loop"
Learning Outcome 1: Levels of organization: All life shares an organization that is based on molecules and cells and extends to organisms and ecosystems.	Measure 1: 39 exam questions	Measure 1: Class average >72%	Measure 1: Class average 77%	Measure 1: Many students could correctly identify the outcome	Measure 1: Continue emphasis on the levels of biological organization.	Continue current assessment.
	Measure 2: Written papers on these topics	Measure 2: Class average >72%	Measure 2: Class average 90%	Measure 2: Students are gaining exposure to the organization of life	Measure 2: Develop more direct methods to assess learning. Consider additional exercises that improve student understanding.	Continue current assessment.
Learning Outcome 2: Metabolism and homeostasis: Living things obtain and use energy, and maintain	Measure 1: 12 exam questions	Measure 1: Class average >72%	Measure 1: Class average 81%	Measure 1: Many students could correctly identify the outcome	Measure 1: Continue emphasis on metabolism as the organizing principle of Human Biology.	Continue current assessment.

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Evidence of Learning: General Education						
Measurable Learning Outcome Students will demonstrate their understanding of the following characteristics of life:	Method of Measurement	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Close the Loop"
homeostasis via organized chemical reactions known as metabolism.						
	Measure 2: Written papers on these topics	Measure 2: Class average >72%	Measure 2: Class average 90%	Measure 2: Students are gaining exposure to the metabolism and homeostasis	Measure 2: Develop more direct methods to assess learning. Consider additional exercises that improve student understanding.	Continue current assessment.
Learning Outcome 3: Genetics and evolution: Shared genetic processes and evolution by natural selection are universal features of all life	Measure 1: 21 exam questions	Measure 1: Class average >72%	Measure 1: Class average 82%	Measure 1: Many students could correctly identify the outcome	Measure 1: Continue emphasis on genetics and evolution. .	Continue current assessment.
	Measure 2: Written paper on these topics	Measure 2: Class average >72%	Measure 2: Class average 90%	Measure 2: Students are gaining exposure to genetics and evolution	Measure 2: Develop more direct methods to assess learning. Consider additional exercises that improve student understanding.	Continue current assessment.

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Evidence of Learning: General Education						
Measurable Learning Outcome Students will demonstrate their understanding of the following characteristics of life:	Method of Measurement	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Close the Loop"
Learning Outcome 4. Ecological interactions: All organisms, including humans, interact with their environment and other living organisms.	Measure 1: 14 exam questions Measure 2: Written paper on these topics	Measure 1: Class average >72% Measure 2: Class average >72%	Measure 1: Class average 89% Measure 2: Class average 90%	Measure 1: Many students could correctly identify the outcome Measure 2: Students are gaining exposure to ecological interactions	Measure 1: Continue emphasis on ecological interactions. Measure 2: Develop more direct methods to assess learning. Consider additional exercises that improve student understanding.	Continue current assessment.

Evidence of Learning: General Education, Life Science Courses
Course: ZOOL 1020 Fall 2019 CRN 22382 and 22387 (both sections face to face)

Gen Ed Learning Goal Students will demonstrate understanding of:	**Measurable Learning Outcome** Students will demonstrate their understanding by:	**Method of Measurement** Direct and Indirect Measures*	**Target Performance**	**Actual Performance**	**Interpretation of findings**	**Action Plan/Closing the Loop**
Nature of Science. Scientific knowledge is based on evidence that is repeatedly examined, and can change with new information. Scientific explanations differ fundamentally from those that are not scientific.	Learning Outcome 1.	Measure 1: Proctored ChiTester Exams	72%	Measure 1: 62.79%	Measure 1 More emphasis needs to be applied to these concepts.	Measure 1: Continue emphasis on the nature of science. Continue current assessment.

GE Learning Goal	**Measurable Learning Outcome**	**Method of Measure.**	**Target Performance**	**Actual Performance**	**Interpretation of findings**	**Action Plan/Closing the Loop**
Integration of Science All natural phenomena are interrelated and share basic organizational principles. Scientific explanations obtained from different disciplines should be cohesive and integrated.	Multiple Choice Exams	Measure 1: Proctored ChiTester Exams	72%	69.77%	Students just barely met the performance goal. More emphasis needs to be applied to these concepts.	Continue emphasis on the levels of biological organization. Continue current assessment.

Report due 11/15/2021

Gen Ed Learning Goal Students will demonstrate understanding of:	Measurable Learning Outcome Students will demonstrate their understanding by:	Method of Measurement Direct and Indirect Measures*	Target Performance	Actual Performance	Interpretation of findings	Action Plan/Closing the Loop
GE Learning Goal	**Measurable Learning Outcome**	**Method of Measure**	**Target Performance**	**Actual Performance**	**Interpretation of findings**	**Action Plan/Closing the Loop**
Science and Society The study of science provides explanations that have significant impact on society, including technological advancements, improvement of human life, and better understanding of human and other influences on the earth's environment.	Multiple Choice Exams	Measure 1: Proctored ChiTester Exams	72%	79.22%	Students exceeded the performance goal.	Continue emphasis on the importance of science on society. Continue current assessment.
GE Learning Goal	**Measurable Learning Outcome**	**Method of Measure**	**Target Performance**	**Actual Performance**	**Interpretation of findings**	**Action Plan/Closing the Loop**
Problem Solving & Data Analysis Science relies on empirical data, and such data must be analyzed, interpreted, and generalized in a rigorous manner.	Multiple Choice Exams	Measure 1: Proctored ChiTester Exams	72%	81.18%	Students exceeded the performance goal.	Continue emphasis on the understanding of the role of problem solving and data. Continue current assessment.

Gen Ed Learning Goal Students will demonstrate understanding of:	Measurable Learning Outcome Students will demonstrate their understanding by:	Method of Measurement Direct and Indirect Measures*	Target Performance	Actual Performance	Interpretation of findings	Action Plan/Closing the Loop
GE Learning Goal	**Measurable Learning Outcome**	**Method of Measure**	**Target Performance**	**Actual Performance**	**Interpretation of findings**	**Action Plan/Closing the Loop**
Levels of Organization All life shares an organization that is based on molecules and cells and extends to organisms and ecosystems.	Multiple Choice Exams	Measure 1: Proctored ChiTester Exams	72%	79.22%	Students exceeded the performance goal.	Continue emphasis on the understanding the role of organization in biological life. Continue current assessment.
GE Learning Goal	**Measurable Learning Outcome**	**Method of Measure**	**Target Performance**	**Actual Performance**	**Interpretation of findings**	**Action Plan/Closing the Loop**
Metabolism and homeostasis: Living things obtain and use energy, and maintain homeostasis via organized chemical reactions known as metabolism.	Multiple Choice Exams	Measure 1: Proctored ChiTester Exams	72%	74.12%	Students exceeded the performance goal.	Continue emphasis on the understanding of homeostasis and the role metabolism plays in maintaining homeostasis. Continue current assessment.

Gen Ed Learning Goal Students will demonstrate understanding of:	Measurable Learning Outcome Students will demonstrate their understanding by:	Method of Measurement Direct and Indirect Measures*	Target Performance	Actual Performance	Interpretation of findings	Action Plan/Closing the Loop

GE Learning Goal	Measurable Learning Outcome	Method of Measure	Target Performance	Actual Performance	Interpretation of findings	Action Plan/Closing the Loop
Genetics and evolution: Shared genetic processes and evolution by natural selection are universal features of all life	Multiple Choice Exams	Measure 1: Proctored ChiTester Exams	72%	91.76%	Students exceeded the performance goal.	Continue emphasis on genetics as well as the concept of evolution in the past and in daily life, *e.g.* appearance of Covid-19 variants. Continue current assessment.

GE Learning Goal	Measurable Learning Outcome	Method of Measure	Target Performance	Actual Performance	Interpretation of findings	Action Plan/Closing the Loop
Ecological interactions: All organisms, including humans, interact with their environment and other living organisms.	Multiple Choice Exams	Measure 1: Proctored ChiTester Exams	72%	89.53%	Students exceeded the performance goal.	Continue emphasis on the ecological interactions which is essential in a world undergoing climate change. Continue current assessment.

Evidence of Learning: General Education Courses
Course: Zool 1020

Semester taught: Spring 2019, 2020, 2021, Summer, Fall 2019, 2020, Fall 2019, 2020 Sections included: 7 total

Evidence of Learning: General Education						
Measurable Learning Outcome Students will…	Method of Measurement	Target Performance % students achieving competency >	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Close the Loop"
Learning Outcome LS1: Level of organization	Multiple choice test and quizzes after each chapter	72%	72%	Students understand the body levels of organization	Continue with the same assessment. Give more examples.	Since some students have some difficulty with the subject, I talk about the various studying styles, I remind them about the free tutoring services. I also mention about the Science Advising office.
Learning Outcome LS2: Metabolism and homeostasis	Measure 1: Multiple choice test and quizzes after each chapter	72%	71%	Students understand metabolism and homeostasis but this subject is more challenging for them	Review the questions in this area – Offer the students more opportunity for help through meetings and e-mails.	As above.
Learning Outcome LS3: Genetics and evolution	Measure 1: Multiple choice test and quizzes after each chapter Measure 2: Essay for signature assignment	72% 80%	81% 98%	Students are performing well in this normally challenging subject Essays on this chosen subject were well written	Continue with the same assessment Continue with the same assessment	As above.

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Evidence of Learning: General Education						
Measurable Learning Outcome Students will…	Method of Measurement	Target Performance % students achieving competency >	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Close the Loop"
Learning Outcome LS4: Ecological interactions	Measure 1 Multiple choice test and quizzes after each chapter Measure 2: Essay for signature assignment	72% 72%	78% 98%	Students understand well this subject Students wrote essays on subject of their choice	Continue with the same assessment Continue with the same assessment	As above.
Learning Outcome S1: Nature of science	Measure 1: Multiple choice test and quizzes after each chapter	72%	87%	Students performed well in this subject	Continue with the same assessment	As above.
Learning Outcome 6 S2: Integration of science	Measure 1: Multiple choice test and quizzes after each chapter Measure 2: Essay for signature assignment	72% 72%	84% 98%	Students understood this subject Students wrote essays on subject of their choice	Continue with the same assessment Continue with the same assessment	As above.
Learning Outcome S3: Science and society	Measure 1 Multiple choice test and quizzes after each chapter Measure 2: Essay for signature assignment	72% 72%	72% 98%	Students slightly underperformed in this category Students wrote essays on subject of their choice	Continue with the same assessment Continue with the same assessment	Review the questions in this area – Offer the students more opportunity for help through meetings and e-mails
Learning Outcome S4: Problem solving and data analysis	Measure 1: Multiple choice test and quizzes after each chapter	72%	91%	Students did very well in this area.	Continue with the same assessment	As above.

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

It is proposed that these assessment results will be reviewed by the General Education Improvement & Assessment Committee, who will provide feedback on evidence of continuous improvement.

Course ZOOLOGY LS 1030 Spring 2021

Gen Ed Learning Goal Students will demonstrate understanding of:	**Measurable Learning Outcome** Students will demonstrate their understanding by:	**Method of Measurement** Direct and Indirect Measures*	**Target Performance**	**Actual Performance**	**Interpretation of findings**	**Action Plan/Closing the Loop**
Nature of Science. Scientific knowledge is based on evidence that is repeatedly examined, and can change with new information. Scientific explanations differ fundamentally from those that are not scientific.	Learning Outcome 1. To assess how well students understood all GE Learning Outcomes, I analyzed the performance of all students each semester on a comprehensive multiple choice final exam. I initially went through its questions to determine which natural sci and life sci objectives each one addressed. Using Chi-Tester, I determined the %'s of students correctly answering at least 70% of the questions pertaining to each objective. There are at least 2 questions addressing each objective.	Measure 1: Direct Measure described in previous Column.	Majority of students should get at least the referred to 70% correct for each objective.	Measure 1: For each outcomes, typically at least 90% of students per course each of these two semesters correctly answered at least 70% of the question or group of questions pertaining to each outcome.	Measure 1: As is evident in the attached graphs and tables, the percentage of students grasping these concepts is quite high.	Measure 1: Through identification and discussion with students not doing relatively well on the early exams, hope to have the %s of those correctly answering questions pertaining to learning objectives increase.

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GE Learning Goal	Measurable Learning Outcome	Method of Measure.	Target Performance	Actual Performance	Interpretation of findings	Action Plan/Closing the Loop
Integration of Science All natural phenomena are interrelated and share basic organizational principles. Scientific explanations obtained from different disciplines should be cohesive and integrated.	Learning Outcome 2. To assess how well students understood all GE Learning Outcomes, I analyzed the performance of all students each semester on a comprehensive multiple choice final exam. I initially went through its questions to determine which natural sci and life sci objectives each one addressed. Using Chi-Tester, I determined the %'s of students correctly answering at least 70% of the questions pertaining to each objective. There are at least 2 questions addressing each objective.	Measure 1: Direct Measure described in previous Column.	Majority of students should get at least the referred to 70% correct for each objective.	Measure 1: For each outcomes, typically at least 90% of students per course each of these two semesters correctly answered at least 70% of the question or group of questions pertaining to each outcome.	Measure 1: As is evident in the attached graphs and tables, the percentage of students grasping these concepts is quite high.	Measure 1: Through identification and discussion with students not doing relatively well on the early exams, hope to have the %s of those correctly answering questions pertaining to learning objectives increase.

*At least one measure per objective must be a direct measure.

GE Learning Goal	Measurable Learning Outcome	Method of Measure	Target Performance	Actual Performance	Interpretation of findings	Action Plan/Closing the Loop
Science and Society The study of science provides explanations that have significant impact on society, including technological advancements, improvement of human life, and better understanding of human and other influences on the earth's environment.	Learning Outcome 3. To assess how well students understood all GE Learning Outcomes, I analyzed the performance of all students each semester on a comprehensive multiple choice final exam. I initially went through its questions to determine which natural sci and life sci objectives each one addressed. Using Chi-Tester, I determined the %'s of students correctly answering at least 70% of the questions pertaining to each objective. There are at least 2 questions addressing each objective.	Measure 1: Direct Measure described in previous Column.	Majority of students should get at least the referred to 70% correct for each objective.	Measure 1: For each outcomes, typically at least 90% of students per course each of these two semesters correctly answered at least 70% of the question or group of questions pertaining to each outcome.	Measure 1: As is evident in the attached graphs and tables, the percentage of students grasping these concepts is quite high.	Measure 1: Through identification and discussion with students not doing relatively well on the early exams, hope to have the %s of those correctly answering questions pertaining to learning objectives increase.

GE Learning Goal	Measurable Learning Outcome	Method of Measure	Target Performance	Actual Performance	Interpretation of findings	Action Plan/Closing the Loop
Problem Solving & Data Analysis Science relies on empirical data, and such data must be analyzed, interpreted, and generalized in a rigorous manner.	Learning Outcome 4. To assess how well students understood all GE Learning Outcomes, I analyzed the performance of all students each semester on a comprehensive multiple choice final exam. I initially went through its questions to determine which natural sci and life sci objectives each one addressed. Using Chi-Tester, I determined the %'s of students correctly answering at least 70% of the questions pertaining to each objective. There are at least 2 questions addressing each objective.	Measure 1: Direct Measure described in previous Column.	Majority of students should get at least the referred to 70% correct for each objective.	Measure 1: For each outcomes, typically at least 90% of students per course each of these two semesters correctly answered at least 70% of the question or group of questions pertaining to each outcome.	Measure 1: As is evident in the attached graphs and tables, the percentage of students grasping these concepts is quite high.	Measure 1: Through identification and discussion with students not doing relatively well on the early exams, hope to have the %s of those correctly answering questions pertaining to learning objectives increase.

GE Learning Goal	Measurable Learning Outcome	Method of Measure	Target Performance	Actual Performance	Interpretation of findings	Action Plan/Closing the Loop
Levels of Organization All life shares an organization that is based on molecules and cells and extends to organisms and ecosystems.	Learning Outcome 5. To assess how well students understood all GE Learning Outcomes, I analyzed the performance of all students each semester on a comprehensive multiple choice final exam. I initially went through its questions to determine which natural sci and life sci objectives each one addressed. Using Chi-Tester, I determined the %'s of students correctly answering at least 70% of the questions pertaining to each objective. There are at least 2 questions addressing each objective.	Measure 1: Direct Measure described in previous Column.	Majority of students should get at least the referred to 70% correct for each objective.	Measure 1: For each outcomes, typically at least 90% of students per course each of these two semesters correctly answered at least 70% of the question or group of questions pertaining to each outcome.	Measure 1: As is evident in the attached graphs and tables, the percentage of students grasping these concepts is quite high.	Measure 1: Through identification and discussion with students not doing relatively well on the early exams, hope to have the %s of those correctly answering questions pertaining to learning objectives increase.

GE Learning Goal	Measurable Learning Outcome	Method of Measure	Target Performance	Actual Performance	Interpretation of findings	Action Plan/Closing the Loop
Metabolism and homeostasis: Living things obtain and use energy, and maintain homeostasis via organized chemical reactions known as metabolism.	Learning Outcome 6. To assess how well students understood all GE Learning Outcomes, I analyzed the performance of all students each semester on a comprehensive multiple choice final exam. I initially went through its questions to determine which natural sci and life sci objectives each one addressed. Using Chi-Tester, I determined the %'s of students correctly answering at least 70% of the questions pertaining to each objective. There are at least 2 questions addressing each objective.	Measure 1: Direct Measure described in previous Column.	Majority of students should get at least the referred to 70% correct for each objective.	Measure 1: For each outcomes, typically at least 90% of students per course each of these two semesters correctly answered at least 70% of the question or group of questions pertaining to each outcome.	Measure 1: As is evident in the attached graphs and tables, the percentage of students grasping these concepts is quite high.	Measure 1: Through identification and discussion with students not doing relatively well on the early exams, hope to have the %s of those correctly answering questions pertaining to learning objectives increase.

GE Learning Goal	Measurable Learning Outcome	Method of Measure	Target Performance	Actual Performance	Interpretation of findings	Action Plan/Closing the Loop
Genetics and evolution: Shared genetic processes and evolution by natural selection are universal features of all life	Learning Outcome 7. To assess how well students understood all GE Learning Outcomes, I analyzed the performance of all students each semester on a comprehensive multiple choice final exam. I initially went through its questions to determine which natural sci and life sci objectives each one addressed. Using Chi-Tester, I determined the %'s of students correctly answering at least 70% of the questions pertaining to each objective. There are at least 2 questions addressing each objective.	Measure 1: Direct Measure described in previous Column.	Majority of students should get at least the referred to 70% correct for each objective.	Measure 1: For each outcomes, typically at least 90% of students per course each of these two semesters correctly answered at least 70% of the question or group of questions pertaining to each outcome.	Measure 1: As is evident in the attached graphs and tables, the percentage of students grasping these concepts is quite high.	Measure 1: Through identification and discussion with students not doing relatively well on the early exams, hope to have the %s of those correctly answering questions pertaining to learning objectives increase.

GE Learning Goal	Measurable Learning Outcome	Method of Measure	Target Performance	Actual Performance	Interpretation of findings	Action Plan/Closing the Loop
Ecological interactions: All organisms, including humans, interact with their environment and other living organisms.	Learning Outcome 8. To assess how well students understood all GE Learning Outcomes, I analyzed the performance of all students each semester on a comprehensive multiple choice final exam. I initially went through its questions to determine which natural sci and life sci objectives each one addressed. Using Chi-Tester, I determined the %'s of students correctly answering at least 70% of the questions pertaining to each objective. There are at least 2 questions addressing each objective.	Measure 1: Direct Measure described in previous Column.	Majority of students should get at least the referred to 70% correct for each objective.	Measure 1: For each outcomes, typically at least 90% of students per course each of these two semesters correctly answered at least 70% of the question or group of questions pertaining to each outcome.	Measure 1: As is evident in the attached graphs and tables, the percentage of students grasping these concepts is quite high.	Measure 1: Through identification and discussion with students not doing relatively well on the early exams, hope to have the %s of those correctly answering questions pertaining to learning objectives increase.

Evidence of Learning: General Education Courses Breadth Area – Life Sciences						
Course: Principles of Zoology ZOOL 1110	**Semesters taught: Fall 2019 84 students; Spring 2020, 47 students**				**Sections included: 2**	
Threshold: A 73% class average is chosen as a threshold with the goal that all students reach at least a C grade level on each outcome.						
Measurable Learning Outcome	Method of Measurement	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Close the Loop"
Nature of Science. Scientific knowledge is based on evidence that is repeatedly examined, and can change with new information. Scientific explanations differ fundamentally from those that are not scientific.	Measure 1 Fall 2019: 43 exam questions Spring 2020: 38 exam questions	Measure 1 Class average >73%	Measure 1: Fall 2019: Class average = 88% Spring 2020: Class average = 88%	Measure 1: Students were effectively introduced to the nature of science.	Measure 1: Continue current approach.	Similar success observed in subsequent semesters.
Integration of Science All natural phenomena are interrelated and share basic organizational principles. Scientific explanations obtained from different disciplines should be cohesive and integrated.	Measure 1: Fall 2019: 112 exam questions Spring 2020: 121 exam questions	Measure 1: Class average >73%	Measure 1: Fall 2019: Class average = 85% Spring 2020: Class average = 82%	Measure 1: Students were effectively introduced to the introgression of science.	Measure 1: Continue current approach.	Threshold exceeded both semesters despite slight dip in Spring 2020. Watch trend (COVID may have played a role).
Science and Society The study of science provides explanations that have significant impact on society, including technological advancements, improvement of human life, and better understanding of human and other influences on the earth's environment.	Measure 1: Fall 2019: 28 exam questions Spring 2020: 29 exam questions	Measure 1: Class average >73%	Measure 1: Fall 2019: Class average = 91% Spring 2020: Class average = 88%	Measure 1: Students were successfully introduced to the significance of science in society.	Measure 1: Continue current approach.	High performance in both semesters despite slight dip in Spring 2020. Watch trend.

Evidence of Learning: General Education Courses Breadth Area – Life Sciences						
Course: Principles of Zoology ZOOL 1110	**Semesters taught: Fall 2019 84 students; Spring 2020, 47 students**				**Sections included: 2**	
Threshold: A 73% class average is chosen as a threshold with the goal that all students reach at least a C grade level on each outcome.						
Measurable Learning Outcome	Method of Measurement	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Close the Loop"
Problem Solving & Data Analysis Science relies on empirical data, and such data must be analyzed, interpreted, and generalized in a rigorous manner.	Measure 1: Fall 2019: 118 exam questions Spring 2020: 110 exam questions	Measure 1: Class average >73%	Measure 1: Fall 2019: Class average = 86% Spring 2020: Class average = 84%	Measure 1: Students were successfully introduced to problem solving & data analysis in Zoology.	Measure 1: Continue current approach.	Threshold exceeded both semesters despite slight dip in Spring 2020. Watch trend (COVID may have played a role).
Levels of Organization All life shares an organization that is based on molecules and cells and extends to organisms and ecosystems.	Method 1: Fall 2019: 91 exam questions Spring 2020: 112 exam questions	Method 1: Class average >73%	Method 1: Fall 2019: Class average = 90% Spring 2020: Class average = 86%	Method 1: Students were successfully introduced to levels of organization in Zoology.	Method 1: Continue current approach	Threshold exceeded both semesters despite slight dip in Spring 2020. Watch trend (COVID may have played a role).
Metabolism and homeostasis: Living things obtain and use energy, and maintain homeostasis via organized chemical reactions known as metabolism.	Method 1: Fall 2019: 99 exam questions Spring 2020: 108 exam questions	Method 1: Class average >73%	Method 1: Fall 2019: Class average = 82% Spring 2020: Class average = 78%	Method 1: Students were successfully introduced to metabolism & homeostasis in Zoology.	Method 1: Continue current approach.	Threshold exceeded both semesters despite slight dip in Spring 2020. Watch trend (COVID may have played a role).

Evidence of Learning: General Education Courses Breadth Area – Life Sciences						
Course: Principles of Zoology ZOOL 1110	**Semesters taught: Fall 2019 84 students; Spring 2020, 47 students**				**Sections included: 2**	
Threshold: A 73% class average is chosen as a threshold with the goal that all students reach at least a C grade level on each outcome.						
Measurable Learning Outcome	Method of Measurement	Target Performance	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	"Close the Loop"
Genetics and evolution: Shared genetic processes and evolution by natural selection are universal features of all life	Method 1: Fall 2019: 158 exam questions Spring 2020: 175 exam questions	Method 1: Class average >73%	Method 1: Fall 2019: Class average = 88% Spring 2020: Class average = 85%	Method 1: Students were successfully introduced to genetics & evolution in Zoology.	Method 1: Continue current approach.	Threshold exceeded both semesters despite slight dip in Spring 2020. Watch trend (COVID may have played a role).
Ecological interactions: All organisms, including humans, interact with their environment and other living organisms.	Method 1: Fall 2019: 122 exam questions Fall 2020: 120 exam questions	Method 1: Class average >73%	Method 1: Fall 2019: Class average = 89% Fall 2020: Class average = 87%	Method 1: Students were successfully introduced to ecological interactions in Zoology.	Method 1: Continue current approach.	High performance in both semesters despite slight dip in Spring 2020. Watch trend.

Evidence of Learning: General Education, Life Science Courses
Course: ZOOL 1110 Lecture and Lab, Fall 2019, Sandquist

Measurable Learning Outcome	**Method of Measurement** Direct and Indirect Measures*	**Target Performance**	**Actual Performance**	**Interpretation of findings**	**Action Plan/Closing the Loop**
Nature of Science. Scientific knowledge is based on evidence that is repeatedly examined, and can change with new information. Scientific explanations differ fundamentally from those that are not scientific.	Measure 1: Students perform research write a scientific paper.	Class average >72%	Measure 1: 92%	Students are able to generate as well as test hypotheses. Students are able to collect and evaluate data as well interpret and evaluate already collected data.	Continue current practices. Added a second measure Sp21.
Integration of Science All natural phenomena are interrelated and share basic organizational principles. Scientific explanations obtained from different disciplines should be cohesive and integrated.	Measure 1: 47 exam questions	Class average >72%	Measure 1: 82%	Students are able to identify and describe interrelated phenomena and obtain cohesive scientific explanations based upon different disciplines.	Continue current practices. Will consider an additional method of measurement for future.
Science and Society The study of science provides explanations that have significant impact on society, including technological advancements, improvement of human life, and better understanding of human and other influences on the earth's environment.	Measure 1: Signature Assignment	Class average >72%	Measure 1: 94%	Students can develop biological applications to evaluate and address societal problems.	Continue current practices. Added a second measure F21.
Problem Solving & Data Analysis Science relies on empirical data, and such data must be analyzed, interpreted, and generalized in a rigorous manner.	Measure 1: 15 exam questions Measure 2: Assignment	Class average >72%	Measure 1: 88% Measure 2: 87%	Students are able to analyze physiological data statistically and display data graphically.	Continue current practices.

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Levels of Organization All life shares an organization that is based on molecules and cells and extends to organisms and ecosystems.	Measure 1: 112 exam questions	Class average >72%	Measure 1: 80%	Students are able to collect, analyze and/or discuss data about cellular function and how differences in protein expression lead to differences in cellular function, which lead to differences in physiology.	Continue current practices. Added a second measure Sp 21.
Metabolism and homeostasis: Living things obtain and use energy, and maintain homeostasis via organized chemical reactions known as metabolism.	Measure 1: 32 exam questions Measure 2: Lab quiz	Class average >72%	Measure 1: 84% Measure 2: 86%	Students are to collect, analyze and/or discuss data on how animals maintain homeostasis despite changes in their internal or external environments.	Continue current practices.
Genetics and evolution: Shared genetic processes and evolution by natural selection are universal features of all life.	Measure 1: 104 exam questions. Measure 2: Lab quiz	Class average >72%	Measure 1: 79% Measure 2: 92%	Students are able to are able to collect, analyze and/or discuss data on how genetic changes/differences alter the physiology of animals	Continue current practices.
Ecological interactions: All organisms, including humans, interact with their environment and other living organisms.	Measure 1: 57 exam questions	Class average >72%	Measure 1: 85%	Students understand that all organisms are interconnected, interacting with each other as well as with their dynamic environment.	Continue current practices.

*At least one measure per objective must be a direct measure.

Botany/Microbiology/Zoology 1370 Principles of Life Science Spring 2020

<<>>This class was taught by a new professor for the first time, hence no "closing the loop"

Evidence of Learning: **General Education, Life Science Courses**

Course: ZOOL 1370 Spring 2020

Gen Ed Learning Goal	Measurable Learning Outcome	Method of Measurement	Threshold for "Acceptable"	Results of Assessment	Interpretation of Findings	Action Plan/ Action evaluation
Nature of Science. Scientific knowledge is based on evidence that is repeatedly examined, and can change with new information. Scientific explanations differ fundamentally from those that are not scientific.	Students will demonstrate their understanding by performance answering exam questions focused on the nature of science.	A set of 27 multiple choice questions	Combined student performance of 72% or higher	Combined student performance = 72%	Threshold met	Continue current practices.

Gen Ed Learning Goal	Measurable Learning Outcome	Method of Measurement	Threshold for "Acceptable"	Results of Assessment	Interpretation of Findings	Action Plan/ Action evaluation
Integration of Science All natural phenomena are interrelated and share basic organizational principles. Scientific explanations obtained from different disciplines should be cohesive and integrated.	Students will demonstrate their understanding by performance answering exam questions focused on the integration of science.	A set of 17 multiple choice questions	Combined student performance of 72% or higher	Combined student performance = 72%	Threshold met	Continue current practices.

Evidence of Learning: **General Education, Life Science Courses**
Course: ZOOL 1370 Spring 2020

Gen Ed Learning Goal	Measurable Learning Outcome	Method of Measurement	Threshold for "Acceptable"	Results of Assessment	Interpretation of Findings	Action Plan/ Action evaluation
Science and Society The study of science provides explanations that have significant impact on society, including technological advancements, improvement of human life, and better understanding of human and other influences on the earth's environment.	Students will demonstrate their understanding by performance answering exam questions focused on science and society.	A set of 66 multiple choice questions	Combined student performance of 72% or higher	Combined student performance = 72%	Threshold met	Continue current practices.

Gen Ed Learning Goal	Measurable Learning Outcome	Method of Measurement	Threshold for "Acceptable"	Results of Assessment	Interpretation of Findings	Action Plan/ Action evaluation
Problem Solving & Data Analysis Science relies on empirical data, and such data must be analyzed, interpreted, and generalized in a rigorous manner.	Students will demonstrate their understanding by performance answering exam questions focused on problem solving and data analysis.	A set of 244 multiple choice questions	Combined student performance of 725% or higher	Combined student performance = 72%	Threshold met	Continue current practices.

Evidence of Learning: **General Education, Life Science Courses**
Course: ZOOL 1370 Spring 2020

Gen Ed Learning Goal	Measurable Learning Outcome	Method of Measurement	Threshold for "Acceptable"	Results of Assessment	Interpretation of Findings	Action Plan/ Action evaluation
Levels of Organization All life shares an organization that is based on molecules and cells and extends to organisms and ecosystems.	Students will demonstrate their understanding by performance answering exam questions focused on levels of organization.	A set of 72 multiple choice questions	Combined student performance of 72% or higher	Combined student performance = 76%	Threshold exceeded	Continue current practices.

Gen Ed Learning Goal	Measurable Learning Outcome	Method of Measurement	Threshold for "Acceptable"	Results of Assessment	Interpretation of Findings	Action Plan/ Action evaluation
Metabolism and homeostasis: Living things obtain and use energy, and maintain homeostasis via organized chemical reactions known as metabolism.	Students will demonstrate their understanding by performance answering exam questions focused on metabolism and homeostasis.	A set of 137 multiple choice questions	Combined student performance of 72% or higher	Combined student performance = 68%	Threshold not met	Re-evaluate teaching this concept

Evidence of Learning: **General Education, Life Science Courses**
Course: ZOOL 1370 Spring 2020

Gen Ed Learning Goal	Measurable Learning Outcome	Method of Measurement	Threshold for "Acceptable"	Results of Assessment	Interpretation of Findings	Action Plan/ Action evaluation
Genetics and evolution: Shared genetic processes and evolution by natural selection are universal features of all life	Students will demonstrate their understanding by performance answering exam questions focused on genetics and evolution.	A set of 364 multiple choice questions	Combined student performance of 72% or higher	Combined student performance = 69%	Threshold not met	Re-evaluate teaching this concept

Gen Ed Learning Goal	Measurable Learning Outcome	Method of Measurement	Threshold for "Acceptable"	Results of Assessment	Interpretation of Findings	Action Plan/ Action evaluation
Ecological interactions: All organisms, including humans, interact with their environment and other living organisms.	Students will demonstrate their understanding by performance answering exam questions focused on ecological interactions.	A set of 45 multiple choice questions	Combined student performance of 72% or higher	Combined student performance = 74%	Threshold exceeded	Continue current practices.

End of Zool 1370

Assessment of Learning Outcomes

Course: Zool 2200 Semester taught: Fall 2019, Spring and Summer 2020, 2021 Sections: 7 total

Measurable Learning Outcome	Method of Measurement	Target Performance % students achieving competency	Actual Performance	Interpretation of Findings	Action Plan/Use of Results	Closing the loop
Learning Outcome 1: Level of organization	Measure 1: Chi-tester multiple choice	72%	66%	Students could do better on this type of exam	I often mention in class the questions that give the students the most problems and explain the subject in more details so the students will have a better chance to answer correctly. I offer to give reviews before the exams. The fill-in the blank quizzes force students to study on a regular basis. Usually, the same students will get very high, consistent grades and other students will consistently get dismal results	Since some students have some difficulty with the subject, I talk about the various studying styles, I remind them about the free tutoring services. I also mention about the Science Advising office. The fill-in the blank quizzes let me know if the students are studying. Some students who consistently get low grades sometimes will say that they study hard and feel discouraged by the low grades. We then discuss about the studying styles and give them list
	Measure 2: Weekly fill in the blank quiz	72%	67%	The results from the fill-in the blank quizzes are usually, over all average to low.		
	Measure 3: Midterm written part	72%	80%	Students performed well in this area.		
	Measure 4: Laboratory exercise	72%	100%			

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						of help that they can get at WSU (see above).
Learning Outcome 2: Metabolism and homeostasis	Measure 1: Chi-tester multiple choice Measure 2: Weekly fill in the blank quiz Measure 3: Midterm written part Measure 4: Laboratory exercises	72% 72% 72% 80%	72% 67% 80% 100%	See above See above Students performed well in this area. Students performed well in this area.	The multiple choice exams usually give marginal results. See above.	The midterm exams are a mix of multiple choice (72%) and written test (30%). These written tests give them an opportunity to think about the applications of what they are studying and the importance of knowing well the subjects.
Learning Outcome 3: Genetics and evolution	Measure 1: Chi-tester multiple choice Measure 2: Weekly fill in the blank quiz Measure 3: Midterm written part Measure 4: Laboratory exercises	72% 72% 72% 72%	76% 67% 80% 100%	Students performed well in this area See above Students performed well in this area. Students performed well in this area.	See above	See above The lab exercises provide opportunities to apply their knowledge.

Learning Outcome 4: Ecological interactions	Measure 1:	Not assessed				
Learning Outcome 5: Nature of science	Measure 1:	Not assessed				
Learning Outcome 6 : Integration of science	Measure 1: Chi-tester multiple choice Measure 2: Weekly fill in the blank quiz Measure 3: Midterm written part Measure 4: Laboratory exercises	72% 72% 72% 72%	76% 67% 80% 100%	See above See above Students performed well in this area. Students performed well in this area.	See above	See above
Learning Outcome 7: Science and society	Measure 1: Chi-tester multiple choice Measure 2: Weekly fill in the blank quiz Measure 3: Midterm written part	72% 72% 72%	76% 67% 80% 100%	See above See above Students performed well in this area.	See above	See above

	Measure 4: Laboratory exercise			Students performed well in this area.		
Learning Outcome 8: Problem solving and data analysis	Measure 1: Laboratory exercises Measure 2: Written part of midterms	72% 72%	100% 80%	Students performed well in this area. Students performed well in this area.	Students enjoy doing the lab exercises	See above

Evidence of Learning: General Education, Life Science Courses
Course: Zool 2200 Human Physiology Summer 2019 – Spring 2021

Gen Ed Learning Goal Students will demonstrate understanding of:	**Measurable Learning Outcome** Students will demonstrate their understanding by:	**Method of Measurement** Direct and Indirect Measures*	**Target Performance**	**Actual Performance**	**Interpretation of findings**	**Action Plan/Closing the Loop**
Nature of Science. Scientific knowledge is based on evidence that is repeatedly examined, and can change with new information. Scientific explanations differ fundamentally from those that are not scientific.	Completing lab activities that have learning outcomes aligned to specific questions and activities.	Students answered an average of 46.7 questions aligned to learning outcome.	72% completion rate and 72% average score	Average completion was 79.1% and average score was 91.9%	Students understand that scientific knowledge is based on evidence that is repeatedly examined, and can change with new information, and that scientific explanations differ fundamentally from those that are not scientific.	Continue use of course activities and assessment.
Integration of Science All natural phenomena are interrelated and share basic organizational principles. Scientific explanations obtained from different disciplines should be cohesive and integrated.	Completing lab activities that have learning outcomes aligned to specific questions and activities.	Students answered an average of 48.5 questions aligned to learning outcome.	72% completion rate and 72% average score	Average completion was 82.38% and average score was 91.3%	Students understand that all natural phenomena are interrelated and share basic organizational principles and that scientific explanations obtained from different disciplines should be cohesive and integrated.	Continue use of course activities and assessment.

Report due 11/15/2021

Gen Ed Learning Goal Students will demonstrate understanding of:	**Measurable Learning Outcome** Students will demonstrate their understanding by:	**Method of Measurement** Direct and Indirect Measures*	**Target Performance**	**Actual Performance**	**Interpretation of findings**	**Action Plan/Closing the Loop**
Science and Society The study of science provides explanations that have significant impact on society, including technological advancements, improvement of human life, and better understanding of human and other influences on the earth's environment.	Completing lab activities that have learning outcomes aligned to specific questions and activities.	Students answered an average of 46.2 , questions aligned to learning outcome.	72% completion rate and 72% average score	Average completion was 79.8% and average score was 92.1%	Students understand that the study of science provides explanations that have significant impact on society, including technological advancements, improvement of human life, and better understanding of human and other influences on the earth's environment.	Continue use of course activities and assessment.

GE Learning Goal	**Measurable Learning Outcome**	**Method of Measure**	**Target Performance**	**Actual Performance**	**Interpretation of findings**	**Action Plan/Closing the Loop**
Problem Solving & Data Analysis Science relies on empirical data, and such data must be analyzed, interpreted, and generalized in a rigorous manner.	Completing lab activities that have learning outcomes aligned to specific questions and activities.	Students answered an average of 62.5 questions aligned to learning outcome.	72% completion rate and 72% average score	Average completion was 79.8% and average score was 91.85%	Students understand that science relies on empirical data, and such data must be analyzed, interpreted, and generalized in a rigorous manner.	Continue use of course activities and assessment.

GE Learning Goal	Measurable Learning Outcome	Method of Measure	Target Performance	Actual Performance	Interpretation of findings	Action Plan/Closing the Loop
Levels of Organization All life shares an organization that is based on molecules and cells and extends to organisms and ecosystems.	Completing lab activities that have learning outcomes aligned to specific questions and activities.	Students answered an average of 53 questions aligned to learning outcome.	72% completion rate and 72% average score	Average completion was 81.8% and average score was 92.1%	Students understand that all life shares an organization that is based on molecules and cells and extends to organisms and ecosystems.	Continue use of course activities and assessment.

GE Learning Goal	Measurable Learning Outcome	Method of Measure	Target Performance	Actual Performance	Interpretation of findings	Action Plan/Closing the Loop
Metabolism and homeostasis: Living things obtain and use energy, and maintain homeostasis via organized chemical reactions known as metabolism.	Completing lab activities that have learning outcomes aligned to specific questions and activities.	Students answered an average of 61.3 questions aligned to learning outcome.	72% completion rate and 72% average score	Average completion was 79.1% and average score was 92%	Students understand that living things obtain and use energy, and maintain homeostasis via organized chemical reactions known as metabolism.	Continue use of course activities and assessment.

GE Learning Goal	Measurable Learning Outcome	Method of Measure	Target Performance	Actual Performance	Interpretation of findings	Action Plan/Closing the Loop
Genetics and evolution: Shared genetic processes and evolution by natural selection are universal features of all life	Completing lab activities that have learning outcomes aligned to specific questions and activities.	Students answered an average of 29.5 questions aligned to learning outcome.	72% completion rate and 72% average score	Average completion was 77.3% and average score was 92.7%	Students understand that shared genetic processes and evolution by natural selection are universal features of all life	Continue use of course activities and assessment.

GE Learning Goal	Measurable Learning Outcome	Method of Measure	Target Performance	Actual Performance	Interpretation of findings	Action Plan/Closing the Loop
Ecological interactions: All organisms, including humans, interact with their environment and other living organisms.	Completing lab activities that have learning outcomes aligned to specific questions and activities.	Students answered an average of 24.7 questions aligned to learning outcome.	72% completion rate and 72% average score	Average completion was 80.3% and average score was 92.8%	Students understand that all organisms, including humans, interact with their environment and other living organisms.	Continue use of course activities and assessment.

It is proposed that these assessment results will be reviewed by the General Education Improvement & Assessment Committee, who will provide feedback on evidence of continuous improvement.

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

Appendix A

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

Date of Program Review: Feb 23, 2018	Recommendation	Progress Description
Recommendation 1	The review team recommends that already planned faculty discussions about skills and techniques taught in labs take place to ensure content diversity and prevent overlap. Zoology faculty are encouraged to pursue an introductory one-semester majors course such as BIOL 1610/1615 at other USHE schools.	There is regular discussion of class/lab content for our introductory classes. Our Zoology 1110 is equivalent to BIOL 1610 at other schools. Our Zoology curriculum necessitates the 2-semester sequence of major classes, with the second semester a class in "Animal Diversity" – Zool 2220; this content cannot fit into 1110 and is needs as background for subsequent major classes
Recommendation 2	The current review team continues to agree that the department still needs additional staff support for advising and assisting faculty with teaching and research labs.	The College does have staff advisors (i.e, Monica Linford) along with the department faculty advisors. Of course we would welcome financial support to hire additional lab and teaching staff.
Recommendation 3	The review team recommends the department hold a discussion to clean up the majors curriculum map to more accurately reflect the development of topics during a typical four years of coursework keeping in mind that not every class needs to map onto every outcome for assessment purposes.	The department does need to review the curriculum map. We plan on doing that at an upcoming department meeting.

Recommendation 4	Establish more formal and long-term partnerships if you continue your external advisory committee and/or establish a more formal pre-professional advisory committee for student graduates.	We do not have an advisory committee the faculty but the College does not have a newly hired staff pre-professional advisor (Dr. James Moore)
Recommendation 5	Seek funding from the provost office for a dedicated academic advisor to improve the availability to students	See 2 & 4 above.
Recommendation 6	We suggest targeted advertising of positions in the future to increase the diversity of the pool of applicants.	When new faculty positions become available we will seek out targeted advertising

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	2018-19	2019-20	2020-21
With Doctoral Degrees (Including MFA and other terminal degrees, as specified by the institution)			
Full-time Tenured	10	10	10
Full-time Non-Tenured (includes tenure-track)	3	3	4
Part-time and adjunct	4	5	4
With Master's Degrees	2	3	3
Full-time Tenured			
Full-time Non-Tenured			
Part-time and adjunct	2	3	2
With Bachelor's Degrees	0	0	0
Full-time Tenured	0	0	0
Full-time Non-tenured	0	0	0
Part-time and adjunct	0	0	0
Other			
Full-time Tenured			0
Full-time Non-tenured			0
Part-time			0
Total Headcount Faculty	17	18	18
Full-time Tenured	10	10	10
Full-time Non-tenured	3	3	4
Part-time	4	5	4

Report due 11/15/2021

Please respond to the following questions.

1) Review and comment on the trend of minority students enrolling in your classes (particularly lower-division, GEN Ed) and in your programs.

   >>In the zoology department, most of our minority students are Latinx, who make up approximately 13 percent of our majors. This has held relatively stable, and is up from 8 percent in Fall 2014. Part of this increase may be due to the actions of the Multicultural Advancement in Science Club (MAS: https://weber.edu/cos/Alumni.html), which is mentored by our Dr. Jon Marshall. Dr. Marshall and his club members visit local JHS and HS classes to talk to the students about college and careers in science. They have also presented to Latinos-in-Action (https://latinosinaction.org/). Although the club had reduced activities during the height of the COVID-19 pandemic in 2020, Dr. Marshall is getting the club active once again. Unfortunately we do not have access to data on minority enrollment in specific courses.

2) What support (from enrollment services, advising, first-year transition office, access & diversity, etc.) do you need to help you recruit and retain students?
   >> We have College of Science advisors (i.e., Monica Linford) as well as advising strategies in effect for our department. For example, students need to meet with a department advisor (Dr. Christopher Hoagstrom) prior to declaring a zoology major. In these meetings, Chris outlines the degree and advises student on which classes they need (and do not need) in order to streamline their progress through the major. We encourage zoology majors (by word-of-mouth and by email) to make an appointment with the Department Chair (Dr. Ron Meyers) each semester before registration in order to plan schedules and make students aware of new electives; again, to facilitate their progress through the degree. Further, Brian Chung, our Human Anatomy class professor and coordinator of the cadaver lab program, regularly offers in-lab tours for, as well as outreach to, local schools. This is expanding again post-COVID lockdown, and is an excellent form of recruitment into the Pre-professional programs of the College of Science and the Department of Zoology. We still find that HS and other Weber State advisors give incorrect recommendations (such as telling pre-professional students to complete their A.S. degree before starting their major classes). This continues to happen and results in students taking classes (e.g., Chemistry 1110, Micro 1113), which, although they fulfill GE requirements, do not count towards our major and therefore are not needed; this means students are taking extra & unnecessary classes that delays their completion of the degree. Matters would improve if students were directed to the College or Departmental advisors.

3) We have invited you to re-think your program assessment. What strategies are you considering? What support or help would you like?
   >> Our department-wide assessment strategies include a number of approaches including exam questions, rubric-graded lab reports and assignments, and presentations. The concern is that faculty see scoring and compiling these as taking up a significant amount of time that they feel could be used for other (teaching) endeavors. We plan to discuss this at an upcoming department meeting. A

significant amount of time was spent dealing with formatting these tables in Word. Faculty use different versions on different computers and that leads to all sorts of formatting issues that take much time resolve. It would be helpful if a non-editable table could be provided so when compiling all of the faculty files the data are all consistent.

4) Finally, we are supporting our Concurrent Enrollment accreditation process. Does your program offer concurrent enrollment classes? If so, have you been able to submit the information requested from the Concurrent Enrollment office? Staff from OIE will reach out to you in the next few months to assist in finalizing that data submission as well as gather information for concurrent Gen Ed assessment.
   >> we do not offer any concurrent enrollment class in the Zoology Department.

Glossary

Student Learning Outcomes/Measurable Learning Outcomes

The terms 'learning outcome', 'learning objective', 'learning competency', and 'learning goal' are often used interchangeably. Broadly, these terms reference what we want students to be able to do AFTER they pass a course or graduate from a program. For this document, we will use the word 'outcomes'. Good learning outcomes are specific (but not too specific), are observable, and are clear. Good learning outcomes focus on skills: knowledge and understanding; transferrable skills; habits of mind; career skills; attitudes and values.

- Should be developed using action words (if you can see it, you can assess it).
- Use compound statements judiciously.
- Use complex statements judiciously.

Curriculum Grid

A chart identifying the key learning outcomes addressed in each of the curriculum's key elements or learning experiences (Suskie, 2019). A good curriculum:

- Gives students ample, diverse opportunities to achieve core learning outcomes.
- Has appropriate, progressive rigor.
- Concludes with an integrative, synthesizing capstone experience.
- Is focused and simple.
- Uses research-informed strategies to help students learn and succeed.
- Is consistent across venues and modalities.
- Is greater than the sum of its parts.

Target Performance (previously referred to as 'Threshold')

The level of performance at which students are doing well enough to succeed in later studies (e.g., next course in sequence or next level of course) or career.

Actual Performance

How students performed on the specific assessment. An average score is less meaningful than a distribution of scores (for example, 72% of students met or exceeded the target performance, 5% of students failed the assessment).

Closing the Loop

The process of following up on changes made to curriculum, pedagogy, materials, etc., to determine if the changes had the desired impact.

Continuous Improvement
An idea with roots in manufacturing, that promotes the ongoing effort to improve. Continuous improvement uses data and evidence to improve student learning and drive student success.

Direct evidence
Evidence based upon actual student work; performance on a test, a presentation, or a research paper, for example. Direct evidence is tangible, visible, and measurable.

Indirect evidence
Evidence that serves as a proxy for student learning. May include student opinion/perception of learning, course grades, measures of satisfaction, participation. Works well as a complement to direct evidence.

HIEE – High Impact Educational Experiences
Promote student learning through curricular and co-curricular activities that are intentionally designed to foster active and integrative student engagement by utilizing multiple impact strategies. Please see https://weber.edu/weberthrives/HIEE.html