

Academic Program Assessment Report

Assessment is a term commonly used to encompass the process of gathering and using evidence to guide improvements.

SACSCOC requires that an institution "identifies expected outcomes, assesses the extent to which it achieves these outcomes, and provides evidence of seeking improvement based on analysis of the results".

Be sure to SAVE your progress as you work!

Academic Program

Biology, B.S.

Submission Due Date

2023-2024

Assessment Coordinator Name

Mark Pilgrim

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Program Goal

Goal

Goal 1

Program Goals are broad and overarching statements about the skills, knowledge, and dispositions students are expected to gain by the end of their course of study (big picture). They support the Institution's Mission/Goals.

Program Goal

Students will demonstrate an understanding of evolution, structure and function relationships, information flow and exchange, pathways and transformations of energy and matter, and the interconnectedness within and among living systems.

Pillar of Success Supported

High-Demand, Market-Driven Programs

Outcomes

Outcome 1

Outcomes are specific, **measurable** statements that reflect the broader goals.

Academic Programs are required to develop **Student Learning Outcomes**, which describe knowledge, skills, and values that students are expected to gain as a result of their educational experiences.

Academic Programs may also develop **Operational Outcomes**, which describe the level of performance of an operational aspect of a program or office (ex. graduation rates, retention, employment data).

Most goals have at least two outcomes measured.

What type of Outcome would you like to add?

Student Learning Outcome

Enter Outcome

Percent of selected questions about evolution on the Major Field Test (MFT) in biology on which the percent of Lander students answering correctly was as high or higher than the national percent of students answering correctly.

Timeframe for this Outcome

Academic Year 2021-2022

Performance Target for "Met"

The percent of Lander students answering the question correctly was as high or higher than the percent of students answering the question correctly nationally on 60% of the questions

Performance Target for "Partially Met"

The percent of Lander students answering the questions correctly was as high or higher than the national average on at least 50% but fewer than 60% of the questions

Performance Target for "Not Met"

The percent of Lander students answering the questions correctly was as high or higher than the national average on fewer than 50% of the questions

Assessment Measure Used

Major Field Test in Biology

Frequency of Assessment

Every fall and spring semester to students enrolled in BIOL 499

Data Collected for this Timeframe (Results)

50%

Score (Met=3, Partially Met=2, Not Met=1)

2

Comments/Narrative

The percent of Lander students answering questions about evolution on the MFT was as high as or higher than the national average on 50% of the questions. Students partially met expectations for this outcome (50-60%). As is true in every cohort of biology majors now, each student taking the MFT this year had completed an evolution course (either our BIOL 303 Evolution course or a course that transferred in as equivalent) during their degree program. Every student in this cohort (who completes their biology courses in our department) will have had the benefit of our revised introductory biology curriculum (now BIOL 111/112) and required diversity course (BIOL 213 or BIOL 214) which also cover topics in basic evolutionary biology. Some students will also take upper-level group requirements or electives that provide additional instruction in evolutionary biology. The students taking the MFT during this assessment cycle (2022-2023) and prior cycles (2021-2022, 2020-2021, and 2019-2020) should have had more exposure to the topics of evolution than the cohorts before them; however, there is always variation between cohorts and this year's cohort did not have the typical success that our students have with this outcome.

Since 2017-2018, students have met expectations for this outcome in 4 of 6 years (67%) they were assessed and partially met it in the remaining 2 of 6 years (33%), which were both assessed in the 2 most recent years (2021-2022, 2022-2023). We believe that the two most recent cycles of assessment reflect learning challenges that were faced by students during the COVID-19 pandemic. We will continue to monitor student progress in these areas and predict that student performance will improve as we become farther removed from the pandemic. While we will continue to track student success and find specific ways to address these topics throughout the relevant courses in our curriculum, we are optimistic that with continued coverage of these topics throughout the courses in our major will lead to continued success on this outcome.

Resources Needed to Meet/Sustain Results

An "Item Information Report" of the MFT from the ETS, which can be purchased for \$350 per year is required to sustain results. Resource identified as needed in 2017-2018, 2018-2019, 2019-2020, 2020-2021, 2021-2022, and 2022-2023 assessment reports.

Explanation of How Resources Will Be Used

The item information report will allow biology students at Lander to be compared to students nationally specifically for questions relating to evolution. The biology department will use this data to determine which specific areas of the program need improvement. Additionally, results from questions related to evolution will be shared with the relevant instructors so that those faculty members can focus instruction in specific areas needing improvement.

Outcome 2

Outcomes are specific, **measurable** statements that reflect the broader goals.

Academic Programs are required to develop **Student Learning Outcomes**, which describe knowledge, skills, and values that students are expected to gain as a result of their educational experiences.

Academic Programs may also develop **Operational Outcomes**, which describe the level of performance of an operational aspect of a program or office (ex. graduation rates, retention, employment data).

Most goals have at least two outcomes measured.

What type of Outcome would you like to add?

Student Learning Outcome

Enter Outcome

Percent of selected questions about structure and function relationships on the Major Field Test (MFT) in biology on which the percent of Lander students answering correctly was as high or higher than the national average percent of students answering correctly.

Timeframe for this Outcome

Academic Year 2022-2023

Performance Target for "Met"

The percent of Lander students answering the questions correctly was as high or higher than the national average on 60% or more of the questions

Performance Target for "Partially Met"

The percent of Lander students answering the questions correctly was as high or higher than the national average on at least 50% but fewer than 60% of the questions

Performance Target for "Not Met"

The percent of Lander students answering the questions correctly was as high or higher than the national average on fewer than 50% of the questions

Assessment Measure Used

Major Field Test in Biology

Frequency of Assessment

Every fall and spring semester to students enrolled in BIOL 499

Data Collected for this Timeframe (Results)
21%

Score (Met=3, Partially Met=2, Not Met=1)
1

Comments/Narrative

The percent of Lander students answering questions about the relationship between structure and function on the MFT was as high as or higher than the national average on 21% of the questions. Students did not meet expectations in this category (at least 50%). Given that last year students met this expectation for the first time since we have measured this outcome, student performance shifted back below the standard. It remains unclear whether last year's performance was an artifact of that particular cohort or a shift in success on this outcome for the program, given the drop in performance this year. We will continue to monitor success and look for longer term patterns.

Over the last 6 years, students have only met expectations for this outcome in 1 of 6 years (17%) of the years they were assessed, partially met it in 2 of 6 years (33%) in which they were assessed, and failed to meet it in the remaining 3 of 6 years (50%) in which they were assessed. Now that we have a number of years to compare, it appears that students in our program are inconsistent in making progress toward their understanding of structure and function relationships. We will continue to track student success and find specific ways to address these topics throughout the relevant courses in our curriculum. These results will be discussed with the faculty teaching relevant courses to find ways to better introduce and reinforce these concepts throughout our curriculum. Because understanding structure function relationships requires memorization of specific facts, these continue to be difficult concepts for students.

Resources Needed to Meet/Sustain Results

An "Item Information Report" of the MFT from the ETS, which can be purchased for \$350 per year is required to sustain results. Resource identified as needed in 2017-2018, 2018-2019, 2019-2020, 2020-2021, 2021-2022, and 2022-2023 assessment reports.

Explanation of How Resources Will Be Used

The item information report will allow biology students at Lander to be compared to students nationally specifically for questions relating to structure and function. The biology department will use this data to determine which specific areas of the program need improvement. Additionally, results from questions related to structure and function will be shared with the relevant instructors so that those faculty members can focus instruction in specific areas needing improvement.

Outcome 3

Outcomes are specific, **measurable** statements that reflect the broader goals.

Academic Programs are required to develop **Student Learning Outcomes**, which describe knowledge, skills, and values that students are expected to gain as a result of their educational experiences.

Academic Programs may also develop **Operational Outcomes**, which describe the level of performance of an operational aspect of a program or office (ex. graduation rates, retention, employment data).

Most goals have at least two outcomes measured.

What type of Outcome would you like to add?

Student Learning Outcome

Enter Outcome

Percent of selected questions about information flow and exchange on the Major Field Test (MFT) in biology on which the percent of Lander students answering correctly was as high or higher than the national average percent of students answering correctly.

Timeframe for this Outcome

Academic Year 2022-2023

Performance Target for "Met"

The percent of Lander students answering the questions correctly was as high or higher than the national average on 60% or more of the questions

Performance Target for "Partially Met"

The percent of Lander students answering the questions correctly was as high or higher than the national average on at least 50% but fewer than 60% of the questions

Performance Target for "Not Met"

The percent of Lander students answering the questions correctly was as high or higher than the national average on fewer than 50% of the questions

Assessment Measure Used

Major Field Test in Biology

Frequency of Assessment

Every fall and spring semester to students enrolled in BIOL 499

Data Collected for this Timeframe (Results)

59%

Score (Met=3, Partially Met=2, Not Met=1)

2

Comments/Narrative

The percent of Lander students answering questions about information flow and exchange on the MFT was as high as or higher than the national average on 59% of the questions. Students partially met expectations in this category (50-60%). Considering the much higher performance on this standard last assessment cycle (2021-2022: 76%), it is not clear whether or not this reflects an artifact of this cohort or a downward trend in student performance.

Over the last 5 years, students have met expectations for this outcome in 3 of 6 years (50%) they were assessed, partially met expectations for this outcome in 1 of 6 years (17%), and failed to meet it in the remaining 2 of 6 years (33%) in which they were assessed. Now that we have a number of years to compare, it is clear that students understanding of information flow and exchange in biological systems varies across cohorts. We will continue to track student success and find specific ways to address these topics throughout the relevant courses in our curriculum. These results will be discussed with the faculty teaching teaching relevant courses to find ways to better introduce and reinforce these concepts throughout our curriculum. Because understanding information flow and exchange requires not only memorization of facts, but also the ability to synthesize material learned throughout the curriculum, these will likely continue to be difficult concepts for students.

Resources Needed to Meet/Sustain Results

An "Item Information Report" of the MFT from the ETS, which can be purchased for \$350 per year is required to sustain results. Resource identified as needed in 2017-2018, 2018-2019, 2019-2020, 2020-2021, 2021-2022, and 2022-2023 assessment reports.

Explanation of How Resources Will Be Used

The item information report will allow biology students at Lander to be compared to students nationally specifically for questions relating to information flow and exchange. The biology department will use this data to determine which specific areas of the program need improvement. Additionally, results from

questions related to information flow and exchange will be shared with the relevant instructors so that those faculty members can focus instruction in specific areas needing improvement.

Outcome 4

Outcomes are specific, **measurable** statements that reflect the broader goals.

Academic Programs are required to develop **Student Learning Outcomes**, which describe knowledge, skills, and values that students are expected to gain as a result of their educational experiences.

Academic Programs may also develop **Operational Outcomes**, which describe the level of performance of an operational aspect of a program or office (ex. graduation rates, retention, employment data).

Most goals have at least two outcomes measured.

What type of Outcome would you like to add?

Student Learning Outcome

Enter Outcome

Percent of selected questions about the pathways and transformations of energy and matter on the Major Field Test (MFT) in biology on which the percent of Lander students answering correctly was as high or higher than the national average percent of students answering correctly.

Timeframe for this Outcome

Academic Year 2022-2023

Performance Target for "Met"

The percent of Lander students answering the questions correctly was as high or higher than the national average on 60% or more of the questions

Performance Target for "Partially Met"

The percent of Lander students answering the questions correctly was as high or higher than the national average on at least 50% but fewer than 60% of the questions

Performance Target for "Not Met"

The percent of Lander students answering the questions correctly was as high or higher than the national average on fewer than 50% of the questions

Assessment Measure Used

Major Field Test in Biology

Frequency of Assessment

Every fall and spring semester to students enrolled in BIOL 499

Data Collected for this Timeframe (Results)

33%

Score (Met=3, Partially Met=2, Not Met=1)

1

Comments/Narrative

The percent of Lander students answering questions about the pathways and transformations of energy and matter on the MFT was as high as or higher than the national average on 33% of the questions. Students did not meet expectations in this category (at least 50%). While this is often a difficult outcome for the students, whether this is downward trend or an artifact of this cohort will be further investigated as our data collection continues.

Over the last 5 years, students have met expectations for this outcome in 2 of 6 years (33%) they were assessed, partially met it in 1 of 6 years (17%) in which they were assessed, and failed to meet it in the remaining 3 of 6 years (50%) in which they were assessed. Now that we have a number of years to compare, it is clear that students understanding of pathways and transformations of energy and matter in biological systems varies across cohorts. We will continue to track student success and find specific ways to address these topics throughout the relevant courses in our curriculum. These results will be discussed with the faculty teaching teaching relevant courses to find ways to better introduce and reinforce these concepts throughout our curriculum. Similarly to other outcomes for this goal, understanding the pathways and transformations of energy and matter requires not only memorization of facts, but also the ability to synthesize material learned throughout the curriculum, these will likely continue to be difficult concepts for students.

Resources Needed to Meet/Sustain Results

An "Item Information Report" of the MFT from the ETS, which can be purchased for \$350 per year is required to sustain results. Resource identified as needed in 2017-2018, 2018-2019, 2019-2020, 2021-2022, and 2022-2023 assessment reports.

Explanation of How Resources Will Be Used

The item information report will allow biology students at Lander to be compared to students nationally specifically for questions relating to the pathways and transformations of energy and matter. The biology department will use this data to determine which specific areas of the program need improvement. Additionally, results from questions related to pathways and transformations of energy and matter will be shared with the relevant instructors so that those faculty members can focus instruction in specific areas needing improvement.

Outcome 5

Outcomes are specific, **measurable** statements that reflect the broader goals.

Academic Programs are required to develop **Student Learning Outcomes**, which describe knowledge, skills, and values that students are expected to gain as a result of their educational experiences.

Academic Programs may also develop **Operational Outcomes**, which describe the level of performance of an operational aspect of a program or office (ex. graduation rates, retention, employment data).

Most goals have at least two outcomes measured.

What type of Outcome would you like to add?

Student Learning Outcome

Enter Outcome

Percent of selected questions about interconnectedness within and among biological systems on the Major Field Test (MFT) in biology on which the percent of Lander students answering correctly was as high or higher than the national average percent of students answering correctly.

Timeframe for this Outcome

Academic Year 2022-2023

Performance Target for "Met"

The percent of Lander students answering the questions correctly was as high or higher than the national average on 60% or more of the questions.

Performance Target for "Partially Met"

The percent of Lander students answering the questions correctly was as high or higher than the national average on at least 50% but fewer than 60% of the questions

Performance Target for "Not Met"

The percent of Lander students answering the questions correctly was as high or higher than the national average on fewer than 50% of the questions

Assessment Measure Used

Major Field Test in Biology

Frequency of Assessment

Every fall and spring semester to students enrolled in BIOL 499

Data Collected for this Timeframe (Results)

43%

Score (Met=3, Partially Met=2, Not Met=1)

1

Comments/Narrative

The percent of Lander students answering questions about the interconnectedness of biological systems on the MFT was as high as or higher than the national average on 43% of the questions. Students did not meet expectations (at least 50%) in this category.

Over the last 5 years, students have met expectations for this outcome in 3 of 6 years (50%) they were assessed, partially met it in 2 of 6 years (33%) they were assessed, and did not meet it in the remaining 1 of 6 years (17%) they were assessed. Now that we have a number of years to compare, it is unclear if the most recent measurement of understanding of the interconnectedness within and among biological systems is an artifact of this cohort of students or represents a downward trend in student performance. While we will continue to track student success and find specific ways to address these topics throughout the relevant courses in our curriculum, we are optimistic that continued coverage of these topics throughout the courses in our major will lead to continued success on this outcome.

Resources Needed to Meet/Sustain Results

An "Item Information Report" of the MFT from the ETS, which can be purchased for \$350 per year is required to sustain results. Resource identified as needed in 2017-2018, 2018-2019, 2019-2020, 2020-2021, 2021-2022, and 2022-2023 assessment reports.

Explanation of How Resources Will Be Used

The item information report will allow biology students at Lander to be compared to students nationally specifically for questions relating to the interconnectedness of biological systems. The biology department will use this data to determine which specific areas of the program need improvement. Additionally, results from questions related to information flow and exchange will be shared with the relevant instructors so that those faculty members can focus instruction in specific areas needing improvement.

Goal Summary

Goal Summary/Comments

This year, students did not do particularly well in meeting the expectations for Program Goal 1. Students did not meet expectations for any of the outcomes, partially met for 2 of 5 outcomes (40%), and did not meet expectations for the remaining 3 of 5 outcomes (60%) on which they were assessed. This became a program goal for the first time during 2017-2018 when we completely updated the curriculum for the major to add increased flexibility for our students seeking employment in the biological sciences and entry into many different graduate programs. When we devised this goal, we knew it was a lofty one with an overall ambition of ensuring that students are able to meet expectations in understanding the five core concepts in biology: evolution, structure and function relationships, information flow and exchange,

pathways and transformations of energy and matter, and the interconnectedness within and among living systems. Because students have the ability to choose the courses that will best help them to meet their future goals, we know that they will each have a fairly unique background in the core concepts. We are happy to report that student success has been quite good across the six years in which we have been assessing these outcomes. We believe this year's performance represents a cohort of students who received instruction in key courses during the COVID-19 pandemic (beginning spring 2020), and may not represent an overall downward trend in student performance on these learning goals. While there have been more successful and less successful cohorts in terms of this goal, our 5-year rolling average graduation rate has risen, and we are pleased that students are experiencing success in completing their degree. We will continue to monitor student success and work to find specific ways to increase success on these outcomes.

Changes Made/Proposed Related to Goal

Last year, members of the assessment committee decided to discontinue the collection of data in courses taught in the program and concentrate efforts on collecting and interpreting the results of the MFT for this goal. It was their prediction that sticking with the more objective MFT data would make comparisons across cohorts much easier to interpret. This year's performance on the MFT was lower than any of the previous 5 years where MFT data was analyzed. However, it seems likely that students taking the MFT this year represent a cohort that received exposure to MFT topics during the COVID-19 pandemic (starting in spring 2020). Dramatic changes in both instruction and learning occurred which may have affected our results. We will continue to monitor student performance on these goals to determine if the data represents a downward trend in performance or if it is characteristic unique to the COVID-19 pandemic. We will continue to meet with the department to discuss the results of the MFT and will continue to think carefully about ways that we can better address the most difficult concepts in multiple courses throughout our curriculum.

Upload Rubrics/Other Files

Goal 2

Program Goals are broad and overarching statements about the skills, knowledge, and dispositions students are expected to gain by the end of their course of study (big picture). They support the Institution's Mission/Goals.

Program Goal

Students will be able to apply appropriate quantitative reasoning, models, and simulations to classic and novel problems in biology.

Pillar of Success Supported

High-Demand, Market-Driven Programs

Outcomes

Outcome 1

Outcomes are specific, **measurable** statements that reflect the broader goals.

Academic Programs are required to develop **Student Learning Outcomes**, which describe knowledge, skills, and values that students are expected to gain as a result of their educational experiences.

Academic Programs may also develop **Operational Outcomes**, which describe the level of performance of an operational aspect of a program or office (ex. graduation rates, retention,

employment data).

Most goals have at least two outcomes measured.

What type of Outcome would you like to add?

Student Learning Outcome

Enter Outcome

Percent of selected questions requiring quantitative reasoning on the Major Field Test (MFT) in biology on which the percent of Lander students answering correctly was as high or higher than the national average percent of students answering correctly

Timeframe for this Outcome

Academic Year 2022-2023

Performance Target for "Met"

The percent of Lander students answering the questions correctly was as high or higher than the national average on 60% or more of the questions

Performance Target for "Partially Met"

The percent of Lander students answering the questions correctly was as high or higher than the national average on at least 50% but fewer than 60% of the questions

Performance Target for "Not Met"

The percent of Lander students answering the questions correctly was as high or higher than the national average on fewer than 50% of the questions

Assessment Measure Used

Major Field Test (MFT) in biology (questions related to quantitative reasoning)

Frequency of Assessment

Every fall and spring semester to students enrolled in BIOL 499

Data Collected for this Timeframe (Results)

57%

Score (Met=3, Partially Met=2, Not Met=1)

2

Comments/Narrative

The percent of Lander students answering questions requiring quantitative reasoning on the MFT was as high as or higher than the national average on 57% of the questions. Students partially met expectations for this outcome.

Over the last 6 years, students have met expectations for this outcome in 2 of 6 years (33%) they were assessed, partially met it in 2 of 6 years (33%) they were assessed, and failed to meet it in the remaining 2 of 6 years (33%) they were assessed. Now that we have a number of years to compare, it is clear that students' quantitative reasoning skills vary across cohorts. We will continue to track student success and find specific ways to address these topics throughout the relevant courses in our curriculum.

Resources Needed to Meet/Sustain Results

An "Item Information Report" of the MFT from the ETS, which can be purchased for \$350 per year is required to sustain results. Resource identified as needed in 2017-2018, 2018-2019, 2019-2020, 2020-2021, 2021-2022, and 2022-2023 assessment reports.

Explanation of How Resources Will Be Used

The item information report will allow biology students at Lander to be compared to students nationally

specifically for questions relating to quantitative reasoning. The biology department will use this data to determine which specific areas of the program need improvement. Additionally, results from questions related to the quantitative reasoning will be shared with the relevant instructors so that those faculty members can focus instruction in specific areas needing improvement.

Goal Summary

Goal Summary/Comments

For this program goal, students partially met expectations for the assessed outcome.

Over the last 6 years, students have met expectations for this outcome in 2 of 6 years (33%) they were assessed, partially met it in 2 of 6 years (33%) they were assessed, and failed to meet it in the remaining 2 of 6 years (33%) they were assessed. Now that we have a number of years to compare, it is clear that students' quantitative reasoning skills vary across cohorts. We will continue to track student success and find specific ways to address these topics throughout the relevant courses in our curriculum.

One potential reason that students do sometimes struggle with this outcome is that often the questions on the MFT related to quantitative reasoning require that they also feel comfortable with the system in which the quantitative reasons skills are addressed. It is also possible that students are less likely to believe that they will be successful on quantitative questions. Throughout our program, we have a subset of majors that have extremely high quantitative literacy, but that is not the norm. Many of our students struggle with quantitative reasoning skills, and this is one of the reasons we feel that this is a particularly important skill to stress throughout our curriculum. The first course that biology majors complete is BIOL 111 and we have worked to include practice with quantitative skills in as many places as possible throughout the lecture and lab portions of the course. In their sophomore-level evolution course, they also encounter many quantitative projects and assignments. They have at least two specific quantitative exercises in each unit (in addition to the quantitative skills that are embedded throughout the course). At least anecdotally, we think that once students realize that math, numbers, and related skills are a part of biology, they become more willing to practice these skills. A number of their upper-level group and elective courses are also heavily quantitative. We will continue to seek out every possible opportunity to include assignments and projects that relate to this goal throughout our curriculum because quantitative literacy is essential to students of science.

Changes Made/Proposed Related to Goal

Last year, members of the assessment committee decided to discontinue the collection of data in courses taught in the program and concentrate efforts on collecting and interpreting the results of the MFT for this goal. It was their prediction that sticking with the more objective MFT data would make comparisons across cohorts much easier to interpret. This year's performance on the MFT was lower than last year when students met expectations (2021-2022), but higher than the previous two years where students did not meet expectations (2019-2020 and 2020-2021) where MFT data was analyzed. It is unclear if this year's performance represents a downward trend or if it is unique to this particular cohort of students taking the MFT this year that received exposure to MFT topics during the COVID-19 pandemic (starting in spring 2020). We will continue to monitor student performance on these goals to determine if the data represents a downward trend in performance or if it is characteristic unique to the COVID-19 pandemic. We will continue to meet with the department to discuss the results of the MFT and will continue to think carefully about ways that we can better address the most difficult concepts in multiple courses throughout our curriculum.

Upload Rubrics/Other Files

Goal 3

Program Goals are broad and overarching statements about the skills, knowledge, and dispositions students are expected to gain by the end of their course of study (big picture). They support the

Institution's Mission/Goals.

Program Goal

Students will be able to explain and apply the process of science by formulating testable hypotheses, designing experiments, and collecting and analyzing data to draw conclusions about the degree to which data support their hypotheses.

Pillar of Success Supported

High-Demand, Market-Driven Programs

Outcomes

Outcome 1

Outcomes are specific, **measurable** statements that reflect the broader goals.

Academic Programs are required to develop **Student Learning Outcomes**, which describe knowledge, skills, and values that students are expected to gain as a result of their educational experiences.

Academic Programs may also develop **Operational Outcomes**, which describe the level of performance of an operational aspect of a program or office (ex. graduation rates, retention, employment data).

Most goals have at least two outcomes measured.

What type of Outcome would you like to add?

Student Learning Outcome

Enter Outcome

Percent of selected questions about the process of science on the Major Field Test (MFT) in biology on which the percent of Lander students answering correctly was as high or higher than the national average percent of students answering correctly

Timeframe for this Outcome

Academic Year 2022-2023

Performance Target for "Met"

The percent of Lander students answering the questions correctly was as high or higher than the national average on 60% or more of the questions

Performance Target for "Partially Met"

The percent of Lander students answering the questions correctly was as high or higher than the national average on at least 50% but fewer than 60% of the questions

Performance Target for "Not Met"

The percent of Lander students answering the questions correctly was as high or higher than the national average on fewer than 50% of the questions

Assessment Measure Used

Major Field Test (MFT) in biology (questions related to the process of science)

Frequency of Assessment

Every spring semester to students enrolled in BIOL 499

Data Collected for this Timeframe (Results)

53%

Score (Met=3, Partially Met=2, Not Met=1)

2

Comments/Narrative

The percent of Lander students answering questions about the process of science on the MFT was as high as or higher than the national average on 53% of the questions. Students partially met expectations for this outcome.

Over the past six years, students have met expectations for this outcome in 4 of 6 years (67%) they were assessed, partially met expectations for this outcome in 1 of 6 years (17%), and failed to meet expectations for this outcome in the remaining 1 of 6 years (16%) they were assessed. Overall, we feel that student progress and success on this goal is high and likely reflects increases in the amount of coverage and exposure to the process of science throughout their time in the program. This year's performance likely represents unique performance for this particular cohort and not a downward trend in performance overall. We will continue to track success and actively seek ways to increase student involvement in the process of science throughout the program.

Resources Needed to Meet/Sustain Results

An "Item Information Report" of the MFT from the ETS, which can be purchased for \$350 per year is required to sustain results. Resource identified as needed in 2017-2018, 2018-2019, 2019-2020, 2020-2021, 2021-2022, and 2022-2023 assessment reports.

Explanation of How Resources Will Be Used

The item information report will allow biology students at Lander to be compared to students nationally specifically for questions relating to the process of science. The biology department will use these data to determine which specific areas of the program need improvement.

Goal Summary

Goal Summary/Comments

For this program goal, students partially met expectations for the assessed outcome.

Over the past six years, students have met expectations for this outcome in 4 of 6 years (67%) they were assessed, partially met expectations for this outcome in 1 of 6 years (17%) they were assessed, and failed to meet expectations for this outcome in the remaining 1 of 6 years (16%) they were assessed. Overall, we feel that student progress and success on this goal is high and likely reflects increases in the amount of coverage and exposure to the process of science throughout their time in the program. We will continue to track student success and find specific ways to address these topics throughout the relevant courses in our curriculum.

The Biology Department continues to emphasize the process of science in both class and laboratory instruction in order to improve student performance on the "Process of Science" questions on the MFT. Labs, particularly in BIOL 111-112 are primarily inquiry based, guiding students through the steps of the scientific process. Students learn to carefully observe natural phenomena, ask questions, form hypotheses, design experiments, and analyze and interpret the results of their experiments. Although the process is highly structured for these introductory classes, these courses provide the first step in scaffolding the skills students need to explain and apply the process of science. Additionally, the courses in the biology seminar series (BIOL 299, 399, and 499) are focused on reading, analyzing, and interpreting peer-reviewed journal articles in biology. The seminars expose students to the scientific process, and move students from understanding (BIOL 299) to analyzing and evaluating (BIOL 399) to synthesizing (BIOL 499) the process of science. Other courses within the biology department have revised the curriculum in various ways to emphasize the process of science. Additionally, several upper-level course instructors have incorporated course-embedded research to ensure that students repeatedly

engage in the process of science (from project proposals, to carrying out research projects, to creating presentations of their research results).

Changes Made/Proposed Related to Goal

Last year, members of the assessment committee decided to discontinue the collection of data in courses taught in the program and concentrate efforts on collecting and interpreting the results of the MFT for this goal. It was their prediction that sticking with the more objective MFT data would make comparisons across cohorts much easier to interpret. This year's performance on the MFT was lower than last year when students met expectations (2021-2022). It is unclear if this year's performance represents a downward trend or if it is unique to this particular cohort of students taking the MFT this year that received exposure to MFT topics during the COVID-19 pandemic (starting in spring 2020). We will continue to monitor student performance on these goals to determine if the data represents a downward trend in performance or if it is characteristic unique to the COVID-19 pandemic. We will continue to meet with the department to discuss the results of the MFT and will continue to think carefully about ways that we can better address the most difficult concepts in multiple courses throughout our curriculum.

Upload Rubrics/Other Files

Goal 4

Program Goals are broad and overarching statements about the skills, knowledge, and dispositions students are expected to gain by the end of their course of study (big picture). They support the Institution's Mission/Goals.

Program Goal

Students will be able to navigate relevant primary literature, and identify and evaluate appropriate sources for a given topic.

Pillar of Success Supported

High-Demand, Market-Driven Programs

Outcomes

Outcome 1

Outcomes are specific, **measurable** statements that reflect the broader goals.

Academic Programs are required to develop **Student Learning Outcomes**, which describe knowledge, skills, and values that students are expected to gain as a result of their educational experiences.

Academic Programs may also develop **Operational Outcomes**, which describe the level of performance of an operational aspect of a program or office (ex. graduation rates, retention, employment data).

Most goals have at least two outcomes measured.

What type of Outcome would you like to add?

Student Learning Outcome

Enter Outcome

Percent of Biology graduates who scored a 2 (Proficient) or a 3 (Advanced) on the "Resources" criterion of the Student Presentation Rubric

Timeframe for this Outcome

Academic Year 2022-2023

Performance Target for "Met"

At least 70% of students scored a 2 or a 3 on the "Resources" criterion of the Student Presentation Rubric

Performance Target for "Partially Met"

At least 60% but fewer than 70% of students scored a 2 or a 3 on the "Resources" criterion of the Student Presentation Rubric

Performance Target for "Not Met"

Fewer than 60% of students scored a 2 or a 3 on the "Resources" criterion of the Student Presentation Rubric

Assessment Measure Used

BIOL 499 Student Oral Presentation Rubric

Frequency of Assessment

Every fall and spring semester to students enrolled in BIOL 499

Data Collected for this Timeframe (Results)

100%

Score (Met=3, Partially Met=2, Not Met=1)

3

Comments/Narrative

100% of the students assessed scored a 2 or 3 on the "Resources" criterion of the presentation rubric in BIOL 499. Students met expectations for this outcome again this year. In addition, this year is the 4th year in a row where we have seen improvement in this assessment measure.

Over the past six years, students have met expectations for this outcome in every year they were assessed. Many changes have been implemented and fine-tuned throughout this time to better prepare students to meet this outcome (discussed in more detail in the program goal narrative below).

Resources Needed to Meet/Sustain Results

None

Explanation of How Resources Will Be Used

N/A

Outcome 2

Outcomes are specific, **measurable** statements that reflect the broader goals.

Academic Programs are required to develop **Student Learning Outcomes**, which describe knowledge, skills, and values that students are expected to gain as a result of their educational experiences.

Academic Programs may also develop **Operational Outcomes**, which describe the level of performance of an operational aspect of a program or office (ex. graduation rates, retention, employment data).

Most goals have at least two outcomes measured.

What type of Outcome would you like to add?

Student Learning Outcome

Enter Outcome

Percent of Biology graduates who scored a 2 (Proficient) or a 3 (Advanced) on the “Content and Organization” criterion of the Student Presentation Rubric

Timeframe for this Outcome

Academic Year 2022-2023

Performance Target for "Met"

At least 70% of students scored a 2 or a 3 on the “Content and Organization” criterion of the Student Presentation Rubric

Performance Target for "Partially Met"

At least 60% but fewer than 70% of students scored a 2 or a 3 on the “Content and Organization” criterion of the Student Presentation Rubric

Performance Target for "Not Met"

Fewer than 60% of students scored a 2 or a 3 on the “Content and Organization” criterion of the Student Presentation Rubric

Assessment Measure Used

BIOL 499 Student Oral Presentation Rubric

Frequency of Assessment

Every fall and spring semester to students enrolled in BIOL 499

Data Collected for this Timeframe (Results)

90%

Score (Met=3, Partially Met=2, Not Met=1)

3

Comments/Narrative

90% of the students assessed scored a 2 or 3 on the “Content and Organization” criterion of the presentation rubric in BIOL 499. Students met expectations for this outcome again this year. This year is the 4th year in a row where we have seen improvement in this assessment measure.

Over the past six years, students have met expectations for this outcome in 5 of 6 years (83%) and failed to meet expectations for this outcome in 1 of 6 years (17%) they were assessed. Many changes have been implemented and fine-tuned throughout this time to better prepare students to meet this outcome (again, these are discussed in more detail in the program goal narrative below).

Resources Needed to Meet/Sustain Results

Explanation of How Resources Will Be Used

Goal Summary

Goal Summary/Comments

The Biology Department has made numerous changes to individual courses and the curriculum overall to increase students' ability to navigate the primary literature and create useful and informative presentations based on this literature. Beginning in their first year, students in BIOL 111 and 112 laboratories begin to learn about primary literature and are exposed to specific, relevant examples of primary research as it relates to the course topics.. Students read primary literature during the BIOL 303 course required of all majors and the biology seminar series (BIOL 299,399, 499) builds on this foundation. In BIOL 299, students learn to identify and evaluate sources for their appropriateness, read primary literature, and analyze and present on these articles in the course. In BIOL 399, students begin to choose their own papers and are expected to be able to identify and evaluate peer-reviewed articles.

BIOL 399 culminates with students independently presenting a summary of one primary literature article of their own selection. In BIOL 499, students independently present a synthesis of three journal articles they choose. Throughout the series, students learn to select appropriate articles, carefully read the literature, and write summaries of the papers they read. In addition, several upper-level electives in the biology major have incorporated exposure to the primary literature in various ways. Students in the biology program historically had difficulty finding, understanding, participating in, and organizing discussions about primary literature, and this deficiency was one of the main reasons the seminar courses were expanded and are required of biology majors. We feel confident that these changes are, indeed, helping our students gain the key skill set they need to be successful readers and interpreters of primary research.

Changes Made/Proposed Related to Goal

Currently, no substantive changes have been made recently to this goal; however, we will continue to monitor student success and think of additional ways to use primary literature in the courses we teach throughout the biology curriculum.

Upload Rubrics/Other Files

Goal 5

Program Goals are broad and overarching statements about the skills, knowledge, and dispositions students are expected to gain by the end of their course of study (big picture). They support the Institution's Mission/Goals.

Program Goal

Students will be able to accurately and effectively communicate and collaborate within the discipline of biology and with other disciplines.

Pillar of Success Supported

High-Demand, Market-Driven Programs

Outcomes

Outcome 1

Outcomes are specific, **measurable** statements that reflect the broader goals.

Academic Programs are required to develop **Student Learning Outcomes**, which describe knowledge, skills, and values that students are expected to gain as a result of their educational experiences.

Academic Programs may also develop **Operational Outcomes**, which describe the level of performance of an operational aspect of a program or office (ex. graduation rates, retention, employment data).

Most goals have at least two outcomes measured.

What type of Outcome would you like to add?

Student Learning Outcome

Enter Outcome

Percent of biology seniors who scored a 2 (Proficient) or a 3 (Advanced) on the "Effective Scientific Communication" criterion of the Student Presentation Rubric

Timeframe for this Outcome

Academic Year 2022-2023

Performance Target for "Met"

At least 70% of students scored a 2 or a 3 on the "Effective Scientific Communication" criterion of the presentation rubric

Performance Target for "Partially Met"

At least 60% but fewer than 70% of students scored a 2 or a 3 on the "Effective Scientific Communication" criterion of the presentation rubric

Performance Target for "Not Met"

Fewer than 60% of students scored a 2 or a 3 on the "Effective Scientific Communication" criterion of the Student Presentation Rubric

Assessment Measure Used

BIOL 499 Student Oral Presentation Rubric

Frequency of Assessment

Every fall and spring semester to students enrolled in BIOL 499

Data Collected for this Timeframe (Results)

83%

Score (Met=3, Partially Met=2, Not Met=1)

3

Comments/Narrative

83% of students scored a 2 or a 3 on the "Effective Scientific Communication" criterion of the presentation rubric. Students met expectations for this outcome. These results are similar to those of the last few years. We continue to see good results for this outcome and believe that this is a real trend that is the product of our recent program changes or a combination of other factors.

Over the last six years, students have met expectations for this outcome in 5 of 6 years (83%) they were assessed and failed to meet expectations in 1 of 6 years (17%) they were assessed. We feel confident that our students generally make good progress towards improving their communication skills as they move through our program. We will continue to monitor this outcome and look for additional places in the curriculum that students can gain experience communicating science to their peers and beyond.

Resources Needed to Meet/Sustain Results

Explanation of How Resources Will Be Used

Outcome 2

Outcomes are specific, **measurable** statements that reflect the broader goals.

Academic Programs are required to develop **Student Learning Outcomes**, which describe knowledge, skills, and values that students are expected to gain as a result of their educational experiences.

Academic Programs may also develop **Operational Outcomes**, which describe the level of performance of an operational aspect of a program or office (ex. graduation rates, retention, employment data).

Most goals have at least two outcomes measured.

What type of Outcome would you like to add?

Student Learning Outcome

Enter Outcome

Percent of biology seniors who scored a 2 (Proficient) or a 3 (Advanced) on the "Appropriate Scientific Communication (Vocabulary)" and "Appropriate Scientific Communication (Style/Delivery)" criteria of the Student Presentation Rubric

Timeframe for this Outcome

Academic Year 2022-2023

Performance Target for "Met"

At least 70% of students scored a 2 or a 3 on the "Appropriate Scientific Communication (Vocabulary)" and "Appropriate Scientific Communication (Style/Delivery)" criteria of the Student Presentation Rubric

Performance Target for "Partially Met"

At least 60% but fewer than 70% of students scored a 2 or a 3 on the "Appropriate Scientific Communication (Vocabulary)" and "Appropriate Scientific Communication (Style/Delivery)" criteria of the Student Presentation Rubric

Performance Target for "Not Met"

Fewer than 60% of students 2.00 scored a 2 or a 3 on the "Appropriate Scientific Communication (Vocabulary)" and "Appropriate Scientific Communication (Style/Delivery)" criteria of the Student Presentation Rubric

Assessment Measure Used

BIOL 499 Student Oral Presentation Rubric

Frequency of Assessment

Every fall and spring semester to students enrolled in BIOL 499

Data Collected for this Timeframe (Results)

83%

Score (Met=3, Partially Met=2, Not Met=1)

3

Comments/Narrative

83% of students scored a 2 or a 3 on the "Appropriate Scientific Communication" criterion of the presentation rubric. Students met expectations for this outcome.

Over the last six years, students have met expectations for this outcome in 5 of 6 years (83%) of the years they were assessed and failed to meet expectations in 1 of 6 years (17%) they were assessed. We feel confident that our students generally make good progress towards improving their communication skills as they move through our program. We will continue to monitor this outcome and look for additional places in the curriculum that students can gain experience communicating science to their peers and beyond.

Resources Needed to Meet/Sustain Results

Explanation of How Resources Will Be Used

Goal Summary

Goal Summary/Comments

Students met the expectations for all outcomes used to assess this goal. It is the hope of the faculty

teaching these courses that students are gaining communication skills from repeated practice in their courses within the biology program and in their general education and elective courses. We will continue to monitor progress on this goal over the next few years to allow us to differentiate between true patterns in the data and expected year-to-year fluctuations.

Changes Made/Proposed Related to Goal

Members of the assessment committee made some changes to the outcomes for this goal, realizing that collecting data in group courses and using data from BIOL 499 presentations did not add information to our analyses. As a result, we did not collect data in group courses taught in the program (which tends to be more subjective) and concentrated our efforts on collecting and interpreting the results of their final presentation in BIOL 499 for this goal. This is useful in a number of important ways, but the most important is that all students take BIOL 499 at the end of their time at Lander and will have had as similar an educational experience as possible at that point. Because students may take the courses we used to assess for the other outcomes related to this goal at many different stages of their college career, they have varied backgrounds, experience, knowledge, and study habits. This made the data we previously collected “messy” in a way that rendered interpretation very difficult. It was clear this year that sticking with the more objective rubrics from 499 made comparisons across cohorts much easier to interpret.

Upload Rubrics/Other Files

Goal 6

Program Goals are broad and overarching statements about the skills, knowledge, and dispositions students are expected to gain by the end of their course of study (big picture). They support the Institution's Mission/Goals.

Program Goal

To comply with Program Productivity standards as defined by the South Carolina Commission on Higher Education

Pillar of Success Supported

High-Demand, Market-Driven Programs

Outcomes

Outcome 1

Outcomes are specific, **measurable** statements that reflect the broader goals.

Academic Programs are required to develop **Student Learning Outcomes**, which describe knowledge, skills, and values that students are expected to gain as a result of their educational experiences.

Academic Programs may also develop **Operational Outcomes**, which describe the level of performance of an operational aspect of a program or office (ex. graduation rates, retention, employment data).

Most goals have at least two outcomes measured.

What type of Outcome would you like to add?

Operational Outcome

Enter Outcome

Major enrollment

Timeframe for this Outcome

Academic Year 2022-2023

Performance Target for "Met"

Using a five-year rolling average, the number of students enrolled in the major (a) for Baccalaureate programs is greater than or equal to 12.5, (b) for Master's/First Professional is greater than or equal to 6.

Performance Target for "Partially Met"

Not Applicable

Performance Target for "Not Met"

Using a five-year rolling average, the number of students enrolled in the major (a) for Baccalaureate programs is less than 12.5 (b) for Master's/First Professional is less than 6.

Assessment Measure Used

Enrollment and Graduation data extracted from Banner

Frequency of Assessment

Annually

Data Collected for this Timeframe (Results)

196.2

Score (Met=3, Partially Met=2, Not Met=1)

3

Comments/Narrative

This outcome was met. There have historically been a large number of biology majors in this program. Enrollment does tend to drop substantially after the first year, however. Many changes have recently been made to increase the number of students attending Lander at the university level, and as a result the number of students in the biology program has continued to be high. We are currently looking at retention and success rates in our program since the introduction of the new program. A summary of these data will be included in the 2023-2024 assessment report.

Resources Needed to Meet/Sustain Results

None

Explanation of How Resources Will Be Used

N/A

Outcome 2

Outcomes are specific, **measurable** statements that reflect the broader goals.

Academic Programs are required to develop **Student Learning Outcomes**, which describe knowledge, skills, and values that students are expected to gain as a result of their educational experiences.

Academic Programs may also develop **Operational Outcomes**, which describe the level of performance of an operational aspect of a program or office (ex. graduation rates, retention, employment data).

Most goals have at least two outcomes measured.

What type of Outcome would you like to add?

Operational Outcome

Enter Outcome

Completions (Degrees awarded)

Timeframe for this Outcome

Academic Year 2022-2023

Performance Target for "Met"

Using a five-year rolling average, the number of degrees awarded (a) for Baccalaureate programs is greater than or equal to 8, (b) for Master's/First Professional is greater than or equal to 3.

Performance Target for "Partially Met"

Not Applicable

Performance Target for "Not Met"

Using a five-year rolling average, the number of degrees awarded (a) for Baccalaureate programs is less than 8 (b) for Master's/First Professional is less than 3.

Assessment Measure Used

Enrollment and Graduation data extracted from Banner

Frequency of Assessment

Annually

Data Collected for this Timeframe (Results)

25

Score (Met=3, Partially Met=2, Not Met=1)

3

Comments/Narrative

This outcome was met. While there have historically been many students in the biology major at any given time, the number of graduating seniors has fluctuated somewhat. With recent changes to the program and general education requirements, a high degree of flexibility has been added to the 4-year guides for our majors. Students have the opportunity to choose courses to fit their specific needs, and we think this is increasing retention and graduation of students in the biology major.

Resources Needed to Meet/Sustain Results

None

Explanation of How Resources Will Be Used

N/A

Goal Summary

Goal Summary/Comments

Overall, the biology program easily met both outcomes for the program goal again this year. Within the department, we have recently changed our curriculum to add flexibility for students with varied career plans, and we are confident that this will not only increase retention of students but also increase graduation rates. We are currently analyzing retention, success, and graduation rates in our program since 2014. We will include a summary of these data in the 2023-2024 assessment report.

Changes Made/Proposed Related to Goal

A number of changes have recently been made to try to increase student engagement both in the classroom and outside the classroom in the Department of Biology. Four years ago, we started an annual "Biology Bash" during the early part of the fall semester so that new students could meet and interact with returning students and faculty. Members in the biology honor society, TriBeta, are still working on plans to include more students in their events and activities. Faculty teaching the first year biology courses and the biology LINK 101 instructors are planning additional activities for our students early in the first

semester of their freshman year. It is our hope that getting students engaged with each other outside the classroom will help to forge bonds between students and increase the sense of community and belonging to the major. Additionally, within the seminar series, faculty are working to include more information for students about job opportunities after they finish their degree. Because so many students start out as “pre-med” majors and find that they change their mind (for many different reasons), we are trying to give these students options with the hope that they will remain in the program and work in the biological sciences after graduation.

Upload Rubrics/Other Files

Dean's Email Address

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Approved by Dean?

Signature of Dean

Comments from Dean's Review