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 Year
2022-2023

Assessment Coordinator Name
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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 spring semester to students enrolled in BIOL 499

Data Collected for this Timeframe (Results)
56%

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 56% of the questions. Students partially met expectations for this outcome. 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. 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 (2021-2022) and the prior cycle (2020-2021) should have 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.

Over the last 5 years, students have met expectations for this outcome in 80% of the years they were assessed and partially met it in the remaining 20% of years in which they were assessed. Now that we have a number of years to compare, it seems that students are consistently making progress toward their understanding of evolution in our program. 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, and 2021-2022 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 these 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 2021-2022

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 spring semester to students enrolled in BIOL 499

Data Collected for this Timeframe (Results)
68%

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

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 68% of the questions. Students met expectations in this category. For the first time since we have been measuring these outcomes, students met expectations. It does, however, remain unclear whether this is just an artifact of this particular cohort or a shift in success on this outcome for the program. We will continue to monitor success and look for longer term patterns.

Over the last 5 years, students have met expectations for this outcome in 20% of the years they were assessed, partially met it in 40% of years in which they were assessed, and failed to meet it in the remaining 40% of years in which they were assessed. Now that we have a number of years to compare, it appears that students in our program are somewhat 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, and 2021-2022 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 2021-2022

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 spring semester to students enrolled in BIOL 499

Data Collected for this Timeframe (Results)
76%

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

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 76% of the questions. Students met expectations in this category. This is the most successful any monitored cohort has been on this outcome. Whether or not this reflects an artifact of this cohort or real improvement remains unclear at this point.

Over the last 5 years, students have met expectations for this outcome in 60% of the years they were assessed and failed to meet it in the remaining 40% of years 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, and 2021-2022 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 2021-2022

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 spring semester to students enrolled in BIOL 499

Data Collected for this Timeframe (Results)
75%

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

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 75% of the questions. Students met expectations in this category. While this is often a difficult outcome for the students, this year's cohort had great success. Whether this is true improvement 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 40% of the years they were assessed, partially met it in 20% of years in which they were assessed, and failed to meet it in the remaining 40% of years 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, and 2021-2022 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 2021-2022

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 spring semester to students enrolled in BIOL 499

Data Collected for this Timeframe (Results)
64%

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

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 64% of the questions. Students met expectations in this category.

Over the last 5 years, students have met expectations for this outcome in 60% of the years they were assessed and partially met it in the remaining 40% of years in which they were assessed. Now that we have a number of years to compare, it is clear that students understanding of the interconnectedness within and among biological systems is quite good across cohorts. 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, and 2021-2022 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 particularly well in meeting the expectations for Program Goal 1 for 80% of the outcomes on which they were assessed and partially meeting expectations for the remaining outcome for this goal. 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 five years in which we have been assessing these outcomes. 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
Members of the assessment committee have made some changes to the outcomes for this goal. We have realized that collecting data in courses and using the MFT has not added useful information to our analyses. As a result, we have decided to discontinue the collection of data in courses taught in the program (which tends to be more subjective and often allows students to revise their responses) and concentrate our efforts on collecting and interpreting the results of the MFT for this goal. This is useful in a number of important ways, but the most important is that all students take the MFT in their last semester 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 makes the data we collect “messy” in a way that renders interpretation very difficult. It is our prediction that sticking with the more objective MFT will make comparisons across cohorts much easier to interpret. Following a few years of lowered success on the MFT, this year was a major improvement (and the best results we have had in at least 5 years). We are hopeful that this means that our new program is functional, that students are learning the most important concepts in biology, and that the worst of the pandemic-related issues are behind us. We are again meeting with faculty individually 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 2021-2022

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 spring semester to students enrolled in BIOL 499

Data Collected for this Timeframe (Results)
71%

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

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 71% of the questions. Students met expectations for this outcome.

Over the last 5 years, students have met expectations for this outcome in 40% of the years they were assessed, partially met it in 20% of years in which they were assessed, and failed to meet it in the remaining 40% of years in which 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, and 2021-2022 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
2021-2022
For this program goal, students easily met expectations the assessed outcome.

Over the last 5 years, students have met expectations for this outcome in 40% of the years they were assessed, partially met it in 20% of years in which they were assessed, and failed to meet it in the remaining 40% of years in which 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
Members of the assessment committee have made some changes to the outcomes for this goal. We have realized that collecting data in courses and using the MFT has not added information to our analyses. As a result, we have decided to discontinue the collection of data in courses taught in the program (which tends to be more subjective and often allows students to revise their responses) and concentrate our efforts on collecting and interpreting the results of the MFT for this goal. This is useful in a number of important ways, but the most important is that all students take the MFT in their last semester 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 makes the data we collect "messy" in a way that renders interpretation very difficult. It is our prediction that sticking with the more objective MFT will make comparisons across cohorts much easier to interpret. Following a few years of lowered success on the MFT, this year was a major improvement (and the best results we have had in at least 5 years). We are hopeful that this means that our new program is functional, that students are learning the most important concepts in biology, and that the worst of the pandemic-related issues are behind us. We are again meeting with faculty individually 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 2021-2022

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)	Score (Met=3, Partially Met=2, Not Met=1)
73%	3

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 73% of the questions. Students met expectations for this outcome.

Over the past five years, students have met expectations for this outcome in 80% of the years they were assessed and failed to meet expectations for this outcome in 20% of the years 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 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, and 2021-2022 assessment reports.

Explanation of How Resources Will Be Used
2021-2022
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
The Biology Department has made major revisions to multiple courses to improve student performance on the “Process of Science” questions on the MFT. For example, the laboratory components of the introductory courses for biology majors, BIOL 111 and BIOL 112, have been completely revised. In the past, labs were primarily used to reinforce lecture concepts. They have been completely revised, and now the labs are primarily inquiry based. The labs in both semesters guide 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. For example, in Ecology (BIOL 306) students are required to manipulate large data sets, to formulate questions and hypotheses based on these data, to analyze these data, and to draw conclusions based on the results of their analyses. Additionally, in several upper-level courses instructors have incorporated course-embedded research to ensure that students repeatedly engage in the process of science (from project proposals to creating presentations of their research projects).

Changes Made/Proposed Related to Goal
Members of the assessment committee have made some changes to the outcomes for this goal. We have realized that collecting data in courses and using the MFT has not added information to our analyses. As a result, we have decided to discontinue the collection of data in courses taught in the

program (which tends to be more subjective and often allows students to revise their responses) and concentrate our efforts on collecting and interpreting the results of the MFT for this goal. This is useful in a number of important ways, but the most important is that all students take the MFT in their last semester 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 makes the data we collect “messy” in a way that renders interpretation very difficult. It is our prediction that sticking with the more objective MFT will make comparisons across cohorts much easier to interpret. Following a few years of lowered success on the MFT, this year was a major improvement (and the best results we have had in at least 5 years). We are hopeful that this means that our new program is functional, that students are learning the most important concepts in biology, and that the worst of the pandemic-related issues are behind us. We are again meeting with faculty individually 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 2021-2022

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 spring semester to students enrolled in BIOL 499

Data Collected for this Timeframe (Results)
96%

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

Comments/Narrative
96% 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.

Over the past five 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

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 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 2021-2022

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 spring semester to students enrolled in BIOL 499

Data Collected for this Timeframe (Results)
82%

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

Comments/Narrative
82% 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. This outcome appears to be one in which students can be expected to be successful.

Over the past five years, students have met expectations for this outcome in 80% of the years they were assessed, and failed to meet expectations in 20% of the years in which 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 new 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. 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 2021-2022

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 spring semester to students enrolled in BIOL 499

Data Collected for this Timeframe (Results)
88%

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

Comments/Narrative
88% 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. We plan to continue to examine the data collected for this outcome over the next few years in an attempt to determine whether this is a real trend that is the product of our recent program changes or the result of another factor.

Over the last five years, students have met expectations for this outcome in 80% of the years they were assessed and failed to meet expectations in 20% of the years 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 2021-2022

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 spring semester to students enrolled in BIOL 499

Data Collected for this Timeframe (Results)
84%

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

Comments/Narrative
84% 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 five years, students have met expectations for this outcome in 80% of the years they were assessed and failed to meet expectations in 20% of the years 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 have made some changes to the outcomes for this goal. We have realized that collecting data in group courses and using data from BIOL 499 presentations has not added information to our analyses. As a result, we have decided to discontinue the collection of data in group courses taught in the program (which tends to be more subjective) and concentrate 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 makes the data we collect “messy” in a way that renders interpretation very difficult. It is our prediction that sticking with the more objective rubrics from 499 will make 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 2021-2022

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)
192.6

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 2022-2023 assessment report.

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?
Operational Outcome

Enter Outcome

Completions (Degrees awarded)

Timeframe for this Outcome
Academic Year 2021-2022

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)
23.6

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

Explanation of How Resources Will Be Used

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 2022-2023 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 younger students. 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

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Dean's Email Address
dslimmer@lander.edu

Thank you for reviewing and approving this report. The approval and a copy of the report will be emailed to you and the Assessment Coordinator.