Environmental Science (BS)



Annual Assessment Plan



2 Applied Skills - Applied Skills

Demonstrate competence in applied skills and ethical decision-making required for environmental science-related careers and post-graduate studies.

Outcome(s)

Choose one or more accreditor outcome that aligns with your Program Learning Outcome.

There is no selected outcome.

2 Choose one or more Institution outcome that aligns with your Program Learning Outcome.

Selected Outcomes:

o ULO 4 - Specialized Skills and Scholarship

Please Enter The Following Information Below:

Measures - Need to name specific course/ required experience plus exact exam items, assignments, rubric lines, etc. used for the analysis of performance on the PLO.

Targets - Percentage of students expected to earn a particular score on the measure.

Measures	Targets	Timeline
BIOL 170L 01 SUBMIT: Lab 1 Report	75% of students will score 70% or higher	Annually
BIOL 170L 01 SUBMIT: Lab 2 Report	75% of students will score 70% or higher	Annually
BIOL 170L 02 SUBMIT: Lab 1 Report	75% of students will score 70% or higher	Annually
BIOL 170L 02 SUBMIT: Lab 2 Report	75% of students will score 70% or higher	Annually
BIOL 170L 03 SUBMIT: Lab 1 Report	75% of students will score 70% or higher	Annually

Measures	Targets	Timeline
BIOL 170L 03 SUBMIT: Lab 2 Report	75% of students will score 70% or higher	Annually
BIOL 170L 04 SUBMIT: Lab 1 Report	75% of students will score 70% or higher	Annually
BIOL 170L 04 SUBMIT: Lab 2 Report	75% of students will score 70% or higher	Annually
BIOL 170L 05 SUBMIT: Lab 1 Report	75% of students will score 70% or higher	Annually
BIOL 170L 05 SUBMIT: Lab 2 Report	75% of students will score 70% or higher	Annually
BIOL 170L 06 SUBMIT: Lab 1 Report	75% of students will score 70% or higher	Annually
BIOL 170L 06 SUBMIT: Lab 2 Report	75% of students will score 70% or higher	Annually
BIOL 265L 01 SUBMIT: Lab 5 Manuscript	75% of students will score 70% or higher	Annually
BIOL 265L 01 SUBMIT: Lab 8 Manuscript	75% of students will score 70% or higher	Annually
BIOL 265L 02 SUBMIT: Lab 5 Manuscript	75% of students will score 70% or higher	Annually
BIOL 265L 02 SUBMIT: Lab 8 Manuscript	75% of students will score 70% or higher	Annually
BIOL 265L 03 SUBMIT: Lab 5 Manuscript	75% of students will score 70% or higher	Annually
BIOL 265L 03 SUBMIT: Lab 8 Manuscript	75% of students will score 70% or higher	Annually
BIOL 265L 04 SUBMIT: Lab 5 Manuscript	75% of students will score 70% or higher	Annually

Measures	Targets	Timeline
BIOL 265L 04 SUBMIT: Lab 8 Manuscript	75% of students will score 70% or higher	Annually
BIOL 422 01 Lab Safety Video Training	80% of students will score 70% or higher	Annually
BIOL 422 01 Technical Ability	80% of students will score 70% or higher	Annually
BIOL 497 IS Lab Safety Video Training	80% of students will score 70% or higher	Annually
BIOL 497 IS Technical Ability	80% of students will score 70% or higher	Annually
BIOL 498 IS Lab Safety Video Training	80% of students will score 70% or higher	Annually
BIOL 498 IS Technical Ability	80% of students will score 70% or higher	Annually
BIOL 498 IT Lab Safety Video Training	80% of students will score 70% or higher	Annually
BIOL 498 IT Technical Ability	80% of students will score 70% or higher	Annually
ENVS 270 01 Quiz 1 Map, Compass and Orienteering	75% of students will score 70% or higher	Annually
ENVS 270 01 Quiz 2- Tree and Shrub Identification	75% of students will score 70% or higher	Annually
ENVS 270 01 Quiz 3 Vegetation and Forest Sampling Techniques	75% of students will score 70% or higher	Annually
ENVS 315 01 Term Paper Part 3 - Environmental Challenge Draft	75% of students will score 70% or higher	Annually
BIOL 336 01 Field Notebook Lab Summaries	80% of students will score 70% or higher	Annually

Measures	Targets	Timeline
BIOL 456 01 Bird ID Practical	80% of students will score 70% or higher	Annually
GIS 245 01 Final Project	75% of students will score 70% or higher	Annually

BIOL 170L: Target met. 3/3 (100%) scored 70 percent or higher.
BIOL 304: Target met. 3/3 (100%) scored 70 percent or higher.
BIOL 336: Target met. 5/6 (83.33%) scored 70 percent or higher.
BIOL 422: Target met. 1/1 (100%) scored 70 percent or higher.
BIOL 456: Target met. 3/3 (100%) scored 70 percent or higher.
ENVS 270: Target met. 10/10 (100%) scored 70 percent or higher.
ENVS 315: Target met. 4/4 (100%) scored 70 percent or higher.
GIS 245: Target met. 6/6 (100%) scored 70 percent or higher.

Action Plans - If student performance did not meet the target, identify specific improvement strategies to enact in the upcoming academic year. For example, add instruction on the topic, change an assignment, revise course requirements, revise objectives, identify additional support/resources for students.

To challenge ourselves, the department will discuss raising the proficiency bar from 70% to 75%.

Closing the Loop - If you entered action plans for the PLO last year, they will appear in the box below. Please explain what you did to accomplish the action plan this year, re-examine student performance, and determine the success of your action plan.

No action plans were instituted last year.

Environmental Literature - Environmental Literature

Demonstrate proficiency in searching and evaluating published environmental science literature.

Outcome(s)

Choose one or more accreditor outcome that aligns with your Program Learning Outcome.

There is no selected outcome.

Choose one or more Institution outcome that aligns with your Program Learning Outcome.

Selected Outcomes:

ULO 4 - Specialized Skills and Scholarship

3 Please Enter The Following Information Below:

Measures - Need to name specific course/ required experience plus exact exam items, assignments, rubric lines, etc. used for the analysis of performance on the PLO.

Targets - Percentage of students expected to earn a particular score on the measure.

Measures	Targets	Timeline
BIOL 393 01 Submit Final Version of Research Proposal	75% of students will score 70% or higher	Annually
BIOL 422 01 SUBMIT: Senior Research Manuscript	80% of students will score 70% or higher	Annually
BIOL 497 IS Senior Research Manuscript	80% of students will score 70% or higher	Annually
BIOL 498 IS Senior Research Manuscript	80% of students will score 70% or higher	Annually

Measures	Targets	Timeline
BIOL 498 IT Senior Research Manuscript	80% of students will score 70% or higher	Annually
ENVS 315 01 Term Paper Part 1- Annotated Bibliography	75% of students will score 70% or higher	Annually
BIOL 262 01 Annotated Bibliography	75% of students will score 70% or higher	Annually
BIOL 393 01 Submit Final Version of Research Proposal (including non- technical summary, timeline and budget)	75% of students will score 70% or higher	Annually
BIOL 393 02 Submit Final Version of Research Proposal (including non- technical summary, timeline and budget)	75% of students will score 70% or higher	Annually
BIOL 456 01 Avian Conservation Paper	80% of students will score 70% or higher	Annually

BIOL 262: Target met. 4/4 (100%) scored 70 percent or higher.

BIOL 393: Target met. 2/2 (100%) scored 70 percent or higher.

BIOL 456: Target not met. 2/3 (66.67%) scored 70 percent or higher.

ENVS 315: Target met. 4/4 (100%) scored 70 percent or higher.

Action Plans - If student performance did not meet the target, identify specific improvement strategies to enact in the upcoming academic year. For example, add instruction on the topic, change an assignment, revise course requirements, revise objectives, identify additional support/resources for students.

To challenge ourselves, the department will discuss raising the proficiency bar from 70% to 75%. For BIOL 456, we will need review the assignment that was taught by an adjunct instructor while the usual instructor was on sabbatical leave.

Closing the Loop - If you entered action plans for the PLO last year, they will appear in the box below. Please explain what you did to accomplish the action plan this year, re-examine student performance, and determine the success of your action plan.

No action plans were instituted last year.

A Nature of Science - Nature of Science

Describe the nature and process of science, and the fundamentals of environmental science spanning molecular, cellular, organismal, and ecological subdisciplines.

Outcome(s)

1 Choose one or more accreditor outcome that aligns with your Program Learning Outcome.

There is no selected outcome.

Choose one or more Institution outcome that aligns with your Program Learning Outcome.

Selected Outcomes:

- o ULO 2 Breadth and Depth of Knowledge
- 3 Please Enter The Following Information Below:

Measures - Need to name specific course/ required experience plus exact exam items, assignments, rubric lines, etc. used for the analysis of performance on the PLO.

Targets - Percentage of students expected to earn a particular score on the measure.

Timeline - The frequency with which the department will analyze and report student performance on the PLO.

Measures	Targets	Timeline
BIOL 170 01 Unit 1 Exam	75% of students will score 70% or higher	Annually
BIOL 170 01 Unit 2 Exam	75% of students will score 70% or higher	Annually
BIOL 170 01 Unit 3 Exam	75% of students will score 70% or higher	Annually
BIOL 170 01 Unit 4 Exam	75% of students will score 70% or higher	Annually
BIOL 170 02 Unit 1 Exam	75% of students will score 70% or higher	Annually
BIOL 170 02 Unit 2 Exam	75% of students will score 70% or higher	Annually
BIOL 170 02 Unit 3 Exam	75% of students will score 70% or higher	Annually
BIOL 170 02 Unit 4 Exam	75% of students will score 70% or higher	Annually
BIOL 265 01 Exam 1	75% of students will score 70% or higher	Annually
BIOL 265 01 Exam 2	75% of students will score 70% or higher	Annually
BIOL 265 01 Exam 3	75% of students will score 70% or higher	Annually
BIOL 265 01 Exam 4 (Final)	75% of students will score 70% or higher	Annually
BIOL 265 02 Exam 1	75% of students will score 70% or higher	Annually

Measures	Targets	Timeline
BIOL 265 02 Exam 2	75% of students will score 70% or higher	Annually
BIOL 265 02 Exam 3	75% of students will score 70% or higher	Annually
BIOL 265 02 Exam 4 (Final)	75% of students will score 70% or higher	Annually
BIOL 332 01	80% of students will score 70% or higher	Annually
BIOL 332 01 Lecture Exam 1	80% of students will score 70% or higher	Annually
BIOL 332 01 Lecture Exam 2	80% of students will score 70% or higher	Annually
BIOL 332 01 Lecture Exam 3	80% of students will score 70% or higher	Annually
BIOL 332 01 Plant ID Quiz 1	80% of students will score 70% or higher	Annually
BIOL 332 01 Plant ID Quiz 2	80% of students will score 70% or higher	Annually
BIOL 332 01 Plant ID Quiz 3	80% of students will score 70% or higher	Annually
BIOL 393 01 Submit Section I Draft for Peer Review	75% of students will score 70% or higher	Annually
BIOL 393 01 Submit Section II Draft (In-class peer review)	75% of students will score 70% or higher	Annually
ENVS 315 01 Exam 1	75% of students will score 70% or higher	Annually
ENVS 315 01 Exam 2	75% of students will score 70% or higher	Annually

Measures	Targets	Timeline
GEOL 201 01 Exam 1	75% of students will score 70% or higher	Annually
GEOL 201 01 Exam 2	75% of students will score 70% or higher	Annually
GEOL 201 01 Final Exam	75% of students will score 70% or higher	Annually
BIOL 172 01 Lab 10 Practical Quiz: Tree Identification by Bark	75% of students will score 70% or higher	Annually
BIOL 172 01 Lab 9 Practical Quiz - Tree Identification by Leaves	75% of students will score 70% or higher	Annually
BIOL 172 01 LECTURE EXAM #1 2021	75% of students will score 70% or higher	Annually
BIOL 172 01 LECTURE EXAM #2 2021	75% of students will score 70% or higher	Annually
BIOL 172 01 LECTURE EXAM #3 2021	75% of students will score 70% or higher	Annually
BIOL 172 01 LECTURE EXAM #4 2021	75% of students will score 70% or higher	Annually
BIOL 262 01 Exam 1	75% of students will score 70% or higher	Annually
BIOL 262 01 Exam 2	75% of students will score 70% or higher	Annually
BIOL 262 01 Exam 3	75% of students will score 70% or higher	Annually
BIOL 262 01 Exam 4	75% of students will score 70% or higher	Annually

Measures	Targets	Timeline
BIOL 393 01 Submit Final Version of Research Proposal (including non- technical summary, timeline and budget)	75% of students will score 70% or higher	Annually
BIOL 393 02 Submit Final Version of Research Proposal (including non- technical summary, timeline and budget)	75% of students will score 70% or higher	Annually
BIOL 456 01 Exam #1 (Chapters 1-7)	80% of students will score 70% or higher	Annually
BIOL 495 02 Biology	80% of students will score	Annually

```
BIOL 170: Target met. 3/3 (100%) scored 70 percent or higher.
BIOL 172: Target met. 6/6 (100%) scored 70 percent or higher.
BIOL 262: Target met. 4/4 (100%) scored 70 percent or higher.
BIOL 304: Target met. 3/3 (100%) scored 70 percent or higher.
BIOL 393: Target met. 2/2 (100%) scored 70 percent or higher.
BIOL 456: Target met. 3/3 (100%) scored 70 percent or higher.
ENVS 315: Target met. 4/4 (100%) scored 70 percent or higher.
GEOL 201: Target not met. 2/3 (66.67%) scored 70 percent or higher.
```

Action Plans - If student performance did not meet the target, identify specific improvement strategies to enact in the upcoming academic year. For example, add instruction on the topic, change an assignment, revise course requirements, revise objectives, identify additional support/resources for students.

To challenge ourselves, the department will discuss raising the proficiency bar from 70% to 75%. For GEOL 456, we will need review the assignment that was taught by an adjunct instructor that normally teaches this course.

Closing the Loop - If you entered action plans for the PLO last year, they will appear in the box below. Please explain what you did to accomplish the action plan this year, re-examine student performance, and determine the success of your action plan.

No action plans were instituted last year.

Relate Science and Faith - Relate Science and Faith

Articulate a rationally defensible integration of science and faith.

Outcome(s)

1 Choose one or more accreditor outcome that aligns with your Program Learning Outcome.

There is no selected outcome.

Choose one or more Institution outcome that aligns with your Program Learning Outcome.

Selected Outcomes:

- ULO 3 Faith Knowledge & Application
- 3 Please Enter The Following Information Below:

Measures - Need to name specific course/ required experience plus exact exam items, assignments, rubric lines, etc. used for the analysis of performance on the PLO.

Targets - Percentage of students expected to earn a particular score on the measure.

Measures	Targets	Timeline
	. a. gete	

Measures	Targets	Timeline
ENVS 315 01 Term Paper Part 2- A Christian Environmental Ethic (draft)	75% of students will score 70% or higher	Annually
PIOL 405 02 Eaith Integration	90% of students will score	Appually

ENVS 315: Target met. 4/4 (100%) scored 70 percent or higher.

Action Plans - If student performance did not meet the target, identify specific improvement strategies to enact in the upcoming academic year. For example, add instruction on the topic, change an assignment, revise course requirements, revise objectives, identify additional support/resources for students.

To challenge ourselves, the department will discuss raising the proficiency bar from 70% to 75%.

Closing the Loop - If you entered action plans for the PLO last year, they will appear in the box below. Please explain what you did to accomplish the action plan this year, re-examine student performance, and determine the success of your action plan.

No action plans were instituted last year.

6 Community-Vocational - Scientific Community-Vocation

Engage with the professional scientific community appropriate for vocational pursuits in environmental science.

Outcome(s)

Choose one or more accreditor outcome that aligns with your Program Learning Outcome.

There is no selected outcome.

2 Choose one or more Institution outcome that aligns with your Program Learning Outcome.

Selected Outcomes:

ULO 5 - Self-Awareness

3 Please Enter The Following Information Below:

Measures - Need to name specific course/ required experience plus exact exam items, assignments, rubric lines, etc. used for the analysis of performance on the PLO.

Targets - Percentage of students expected to earn a particular score on the measure.

Measures	Targets	Timeline
BIOL 332 01 Plant Systematics Presentation	80% of students will score 70% or higher	Annually
BIOL 393 01 Research Proposal Presentation	80% of students will score 70% or higher	Annually
BIOL 422 01 Oral and/or Poster Presentation	80% of students will score 70% or higher	Annually
BIOL 497 IS Oral and/or Poster Presentation	80% of students will score 70% or higher	Annually
BIOL 498 IS Oral and/or Poster Presentation	80% of students will score 70% or higher	Annually
BIOL 498 IT Oral and/or Poster Presentation	80% of students will score 70% or higher	Annually
ENVS 270 01 Final Presentation	75% of students will score 70% or higher	Annually

Measures	Targets	Timeline
BIOL 172 01 Individual Grade, Ethnobotany Presentation	75% of students will score 70% or higher	Annually
BIOL 262 01 Group Research Presentation	75% of students will score 70% or higher	Annually
BIOL 336 01 Chapter 1 Introduction Apply What You Have Learned	80% of students will score 70% or higher	Annually
BIOL 336 01 Chapter 2 Diagnosis and Goal Setting- Apply What You Have Learned	80% of students will score 70% or higher	Annually
BIOL 336 01 Chapter 3- Planning	80% of students will score 70% or higher	Annually
BIOL 336 01 Chapter 4 Social and Institutional Support	80% of students will score 70% or higher	Annually
BIOL 336 01 Chapter 5- Monitoring and Evaluation	80% of students will score 70% or higher	Annually
BIOL 336 01 Chapter 7- Soil and Water Quality	80% of students will score 70% or higher	Annually
BIOL 393 01 Research Proposal Presentation	80% of students will score 70% or higher	Annually
BIOL 393 02 Research Proposal Presentation	80% of students will score 70% or higher	Annually
BIOL 456 01 Avian Conservation Presentation	80% of students will score 70% or higher	Annually
GIS 245 01 Messiah University landuse	75% of students will score 70% or higher	Annually

BIOL 172: Target met. 6/6 (100%) scored 70 percent or higher.
BIOL 262: Target met. 4/4 (100%) scored 70 percent or higher.
BIOL 304: Target met. 3/3 (100%) scored 70 percent or higher.
BIOL 336: Target met. 6/6 (100%) scored 70 percent or higher.
BIOL 393: Target met. 2/2 (100%) scored 70 percent or higher.
BIOL 456: Target met. 3/3 (100%) scored 70 percent or higher.
ENVS 270: Target met. 10/10 (100%) scored 70 percent or higher.
GIS 245: Target met. 6/6 (100%) scored 70 percent or higher.

Action Plans - If student performance did not meet the target, identify specific improvement strategies to enact in the upcoming academic year. For example, add instruction on the topic, change an assignment, revise course requirements, revise objectives, identify additional support/resources for students.

To challenge ourselves, the department will discuss raising the proficiency bar from 70% to 75%. For BIOL 456, we will need review the assignment that was taught by an adjunct instructor while the usual instructor was on sabbatical leave.

Closing the Loop - If you entered action plans for the PLO last year, they will appear in the box below. Please explain what you did to accomplish the action plan this year, re-examine student performance, and determine the success of your action plan.

No action plans were instituted last year.

Holistic program improvement goals: Programs are expected to have at least one action plan to improve student learning annually. If you have not yet identified an action plan associated with this year's assessment results, or if the department has identified additional issues that require action plans, describe the specific, measurable action plan and its relation to evidence of student performance.

Assessment Rubric



Process

	1	2	3	4
Is the plan being implemented faithfully and revised as needed?	Assessment plan is not implemented.	Most aspects of plan are being implemented or all aspects are implemented to some degree.	Assessment plan is fully implemented.	Plan is faithfully executed and modified/evaluated as needed.

2 Explanations:

3

Engagement

1	2	3	4

	1	2	3	4
Are all relevant parties are meaningfully involved in the creation/revision, implementation, analysis,	Limited involvement beyond chair/director	All educators contributing to the curriculum are aware of process and results	All educators contributing to the curriculum participate in conversations regarding the use of assessment data to improve student	All relevant stakeholders (students, employers, alumni) are meaningfully involved in the creation/revision,
interpretation and learning improvement process?			learning	implementation, analysis, interpretation, and/or improvement processes associated with this assessment plan.

Program Learning Objectives

1	2	3	4

7

Measures

1	2	3	4

Targets

1	2	2	A
•	_	•	–

	1	2	3	4
Are the targets based on professional standards and/or analysis of past student work? Are targets challenging and achievable?	Some targets are missing.	Targets are arbitrarily chosen or reflect minimal expectations.	Targets are challenging and achievable based on prior student performance, and reflect an appropriate level of performance.	Targets are challenging and achievable. Targets are based on professional standards and/or prior student performance. Targets are set at a level to inspire program improvement.



Timeline

	1	2	3	4
Is the timeline for data collection manageable with sufficient data points to effectively inform decision making and program review?	Not identified clearly for all measures.	Clearly states semester/year for each objective/measure. Data analysis delayed from data collection. Time between collection points may not facilitate informed decision making.	Clearly stated and manageable schedule. At least two data points for each objective per review cycle.	Timeline for data collection is manageable and allows for continuous improvement with timely and meaningful decision making even before program review.

12 Explanations:

Action Plan

	1	2	3	4
Is the department effectively examining and using assessment data to revise curriculum and pedagogy to support student learning?	Assessment data not collected/analyzed/used for decisions and/or results not documented in AEFIS.	Data collected, documented and discussed by department. Department reviewed confidence in measures and data as sufficient indicators of student performance. If data indicated changes were needed, action plans were developed in consultation with	Data collected, documented and discussed by department. Department and dean confirmed confidence in measures and data as sufficient indicators of student performance. Action plans (e.g. improving outcomes, measures, targets, curriculum or pedagogy) developed	Department collected and discussed follow-up data after the implementation of action plans in order to determine whether changes resulted in improvement or whether additional action is necessary. Data confirms effective curriculum and pedagogy for learning outcomes.
		dean (e.g. improving outcomes, measures, targets, curriculum or pedagogy).	in consultation with dean. If prior year data warranted action plans, the department implemented the changes.	Score of 4 should be assigned only if objectives, measures, targets and timeline all score a 4.

Explanations:

15

Dissemination

1	2	3	4



16

Explanations:

Additional Feedback

1

Please enter any additional feedback for changes that should be made:

CLOSE AND EXIT