

Degree Program Student Learning Report

Revised November 2019

Department of Biology

BS in Biology

For 2020-2021 Academic Year

PART 1

Degree Program Mission and Student Learning Outcomes

A. State the school, department, and degree program missions.

University Mission	School Mission	Department Mission	Degree Program Mission
Our mission is to ensure students develop the skills and knowledge required to achieve professional and personal goals in dynamic local and	Central to the mission of the School is the preparation of students to achieve professional and personal goals in their respective disciplines	The mission of the Department of Biology at Rogers State University is to support students in their pursuit of knowledge in biology and life	Under the Bachelor of Science in Biology, there are two emphases: the Medical/Molecular emphasis and the Environmental Conservation

University Mission	School Mission	Department Mission	Degree Program Mission
global communities.	and to enable their success in dynamic local and global communities. Our strategy is to foster an academic setting of diverse curricula that inherently incorporates an environment of service and collegiality:	science.	emphasis. The four-year program seeks to develop a biologist well-grounded in either area of emphasis. The student integrates mathematical and physical science concepts into biology. The student uses the scientific method as well as evaluates others' use of this method of inquiry. He/she writes and presents scientific papers and reports. The degree is augmented with individual research and internships for successful postgraduate and professional careers.

B. Align school purposes, department purposes, and program student learning outcomes with their appropriate University commitments.

University Commitments	School Purposes	Department Purposes	Student Learning Outcomes
To provide quality associate, baccalaureate, and graduate degree opportunities and educational experiences which foster student excellence in oral and written	The School offers innovative degrees, which focus upon developing skills in oral and written communication, critical thinking, creativity, empirical and evidenced-	To increase the student's critical thinking and reasoning abilities.	1. To demonstrate an understanding of the fundamental processes of life.

University Commitments	School Purposes	Department Purposes	Student Learning Outcomes
<p>communications, scientific reasoning, and critical and creative thinking.</p>	<p>based inquiry, experimental investigation and theoretical explanation of natural phenomena, and innovative technology.</p>	<p>To prepare a student to matriculate into a four-year degree program in math or science related fields or graduate.</p>	<p>2. To apply scientific method and interpret current technology and research techniques relating to the biological sciences.</p>
<p>To promote an atmosphere of academic and intellectual freedom and respect for diverse expression in an environment of physical safety that is supportive of teaching and learning.</p>			
<p>To provide a general liberal arts education that supports specialized academic programs and prepares students for lifelong learning and service in a diverse society.</p>	<p>The School educates its majors to think independently and have the knowledge, skills, and vision to work in all types of situations and careers and communicate with all types of people.</p>	<p>To increase student understanding and appreciation of the biological world and his/her ability to apply this understanding to his/her personal and professional life.</p>	<p>3. To be adequately prepared for transition into a productive professional career.</p>

University Commitments	School Purposes	Department Purposes	Student Learning Outcomes
		To increase the student's ability to interpret and understand his/her world.	4. To demonstrate an understanding of the fundamental processes of life. (This outcome meets two different departmental purposes).
To provide students with a diverse, innovative faculty dedicated to excellence in teaching, scholarly pursuits, and continuous improvement of programs.	The School fosters a community of scholars among the faculty and students of the institution.		
To provide university-wide student services, activities and resources that complement academic programs.			
To support and strengthen student, faculty and administrative structures that promote shared governance of the institution.			
To promote and encourage student, faculty, staff and community interaction in a positive academic climate that creates opportunities for cultural, intellectual and personal enrichment for the University and	The School will offer and promote artistic, scientific, cultural, and public affairs events on the campus and in the region.	To increase the student's awareness of the benefits of incorporation of technology into science studies.	5. To apply scientific method and interpret current technology and research techniques relating to the biological sciences (This outcome meets two different departmental

University Commitments	School Purposes	Department Purposes	Student Learning Outcomes
the communities it serves.		To serve as a resource for the community; utilizing the expertise of the faculty.	purposes).

PART 2

Revisit Proposed Changes Made in Previous Assessment Cycle

Revisit each instructional/assessment change proposed in Part 5 of the degree program SLR for the preceding year. Indicate whether the proposed change was implemented and comment accordingly. Any changes the department implemented for this academic year, but which were not specifically proposed in the preceding report, should also be reported and discussed here. Please note if no changes were either proposed or implemented or this academic year.

Proposed Change	Implemented? (Y/N)	Comments
No instructional/assessment changes were proposed in the previous cycle.	N/A	
Two weeks of distance learning and online final exam in Fall 2020	Y	Due to the COVID-19 pandemic, all final exams were administered through online.

Online and on-ground alternative lab schedule in fall 2020 and Spring 2021	Y	Due to the COVID-19 pandemic, all our labs were administered through online and on-ground alternative format in fall 2020; some labs in spring 2021.
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PART 3

Response to University Assessment Committee Peer Review

The University Assessment Committee provides written feedback on departmental assessment plans through a regular peer review process.

This faculty-led oversight is integral to RSU's commitment to the continuous improvement of student learning and institutional effectiveness. UAC recommendations are not compulsory and departments may implement them at their discretion. Nevertheless, respond below to each UAC recommendations from last year's peer review report. Indicate whether the recommendation was implemented and comment accordingly. Please indicate either if the UAC had no recommendations or if the program was not subject to review in the previous cycle.

Peer Review Feedback	Implemented (Y/N)	Comments
<p>1. To ensure that we are accurately showing how assessments are tied to changes in curriculum, we recommend that you document the reasons for changes to your program in Part 2. If no changes are proposed or made, please consider documenting the rationale.</p> <p>2. Please ensure that you respond to Parts 3 and 6 and try to reflect on the reasons for any changes made to the department curriculum or teaching methods in Part 2.</p>	Y	<p>1. We have added all changes in Part 2.</p> <p>2. We have added all changes in Part 2.</p>

<p>3. For SLO #1, consider changing the sampling method from “most of the students in the BIOL 4801 classes” to “all of the students in the BIOL 4801 classes” to get a better assessment.</p>	Y	<p>3. We changed “most of the students” in sampling methods back to all of the students. We had used “most of the students” in the sampling because we could not conduct the test all of the students due to the COVID-19 Pandemic.</p>
<p>4. For SLOs #1a and #2a, consider finding a different assessment than students’ self-perception since the students often will not recognize what they do not know.</p>	N	<p>4. We have been using two objective methods to measure students’ learning in both SLO #1 and #2. They are Education Testing Service (ETS) Field Assessment Exam (SLO #1) and BIOL 4801 Biology Research Method classes (SLO #2), which measure students’ understandings of scientific method and skills of current research techniques. We have recently added another measure, BIOL-3204 Genetics-comprehensive pre-post exam, for SLO #2.</p>
<p>5. For SLOs #1b and #1c, using an outside exam is an excellent measure, but consider increasing our performance standard to raise the bar a little higher.</p>	N	<p>5. We have two degree options in biology program (Medical Molecular option and Environmental Conservation option). Each option empathizes different biology fields. However, the ETS test covers all biology fields. We believe that it is unreasonable to directly compare our students’ mean to the national mean. We will look for another outside exam which measures our students’ learning more acutely.</p>
<p>6. For SLO #2b, consider adding the rubric used to the report to provide more detailed information.</p>	Y	<p>6. We have included a rubric in appendix for our students’ final presentation.</p>
<p>7. For SLO #2c, consider increasing the post-test performance standard.</p>	Y	<p>7. We have increased the performance standard: 70% of students will score 70% or above on post test.</p>
<p>8. For SLO #3a, consider documenting how many surveys as well as the percentage of surveys on which we are basing our data.</p>	Y	<p>8. We have not conducted the survey for last three years. We will include our survey information.</p>
<p>9. On SLO #3a, consider determining how to increase the percentage of surveys that we receive back.</p>	Y	<p>9. We will conduct survey using online tool.</p>
<p>10. For SLO #3b, consider clarifying the percentage of reports</p>	Y	<p>10. We have included the information.</p>

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PART 4

Evidence of Student Learning

Evidence and analyze student progress for each of the student learning outcomes (same as listed in Part I B above) for the degree program. See the *Appendix* for a detailed description of each component. Note: The table below is for the first program learning outcome. Copy the table and insert it below for each additional outcome. SLO numbers should be updated accordingly.

A. Student Learning Outcome						
SLO #1: To demonstrate an understanding of the fundamental processes of life						
B. Assessment Measure	C. Performance Standard	D. Sampling Method	E. Sample Size (n)	F. Results	G. Standard Met (Y/N)	
1a. Composite Score of Education Testing Service (ETS) Major Field Assessment National Exam for Biology	1a. The program mean will be within one standard deviation of the normative mean on Major Fields Test in	1a All students in BIOL 4801 classes in Fall 2020 and Spring 2021.	1a. 41	1a. Across both degree options in biology program (Medical Molecular option and Environmental Conservation option), students averaged 147±9 while the national average was 153±13. Student scores ranging over 140 with 30 of 42 students	1a. Y	

A.

Student Learning Outcome

SLO #1: To demonstrate an understanding of the fundamental processes of life

B. Assessment Measure	C. Performance Standard	D. Sampling Method	E. Sample Size (n)	F. Results	G. Standard Met (Y/N)
1b. Subscores of Education Testing Service (ETS) Major Field Assessment National Exam for Biology	biology. ETS exam reports four subscores in; subset #1) Cell Biology, subset #2) Molecular Biology & Genetics, subset #3) Organismal Biology, and subset #4) Population Biology , Evolution, & Ecology. Our measure is that three of the four subscores for the exam will be within one standard deviation of their normative means.	1b. All students in BIOL 4801.	1b. 41	(71%) (The score 140 is one standard deviation of the normative mean). 1b. The average of our students, the national average and its standard deviation, and number of students within one standard deviation of the mean for each subset are listed below. Subset #1 – Cell Biology: Our students had a mean score of 45 for the ETS compared with the national average 52±14. 12/41 students were within one standard deviation of the National Mean. For subset #2 – Molecular Biology and Genetics: Our students had a mean score of 46 for the ETS compared with the national average 53±14. 17/41 students were within one standard deviation of the National Mean.	1b. Y

A.
Student Learning Outcome

SLO #1: To demonstrate an understanding of the fundamental processes of life						
B. Assessment Measure	C. Performance Standard	D. Sampling Method	E. Sample Size (n)	F. Results	G. Standard Met (Y/N)	
1c. Survey in BIOL 4801 - Biology Research Methods II assessing understanding of program objective 1.	1c. On the survey, 70% of our students will rank themselves as a 4 or greater (Likert scale from 1 to 5) on their	1c. All students in the BIOL 4801 classes in Fall 2020 and Spring 2021. (We missed five students' data out of total 41.)	1c. 36	<p>For subset #3 – Organismal Biology: Our students had a mean score of 46 for the ETS compared with the national average 52±13. 17/41 students were within one standard deviation of the National Mean.</p> <p>For subset #4 – Population Biology, Evolution, and Ecology: Our students had a mean score of 50 for the ETS compared with the national average 52±13. 25/41 students were within one standard deviation of the National Mean.</p>	1c. Y	

A.					
Student Learning Outcome					
SLO #1: To demonstrate an understanding of the fundamental processes of life					
B.	C.	D.	E.	F.	G.
Assessment Measure	Performance Standard	Sampling Method	Sample Size (n)	Results	Standard Met (Y/N)
	understanding of the fundamental processes of life.			as 4 (Good), and 3 (9%) ranked themselves as a 3 (average) on mastery of program objective 1.	
H.					
Conclusions					
<p>1a and 1b. According to the results of the Education Testing Service (ETS) Major Field Assessment National Exam, we are accomplishing our goals both in composite and subscores. Our students performed in one standard deviation of the National Mean which had been derived from the scores of 15,595 students who attend 377 different universities and colleges in the US.</p> <p>1c. 91% indicated understanding of program objective 1. Our goal of 70% was reached. These results are an indirect measure and are of our student's perception of whether they think they understand the SLO #1. Although subjective, it is important to know whether our students believe they are learning.</p>					

A. Student Learning Outcome						
SLO #2: To apply scientific method and interpret current technology and research techniques relating to the biological sciences.						
B. Assessment Measure	C. Performance Standard	D. Sampling Method	E. Sample Size (n)	F. Results	G. Standard Met (Y/N)	
2a. 2a. Survey in BIOL 4801, Biology Research Methods II, covering understanding of program objective 2.	2a. 2a. 70% of students will indicate 4 or greater (on a Likert scale) understanding of program objective 2.	2a. All students in the BIOL 4801 classes in Fall 2020 and Spring 2021.	2a. 36	2a. Questions were based on a Likert scale from 1 to 5 with 1 being very poor and 5 being excellent. Of the 36 students surveyed, 2a-1. To apply scientific method: 18 (50%) ranked themselves as 5 (excellent) and 17 (47%) ranked themselves as 4 (Good), and 2 (3%) ranked themselves as a 3 (average) on mastery of program objective 2. Overall average for all students surveyed was 4.3±0.67. 2a-2. To interpret current technology and research techniques: 16 (44%) ranked themselves as 5 (excellent) and 16 (44%) ranked themselves as 4 (Good), and 4 (11%) ranked themselves as a 3 (average) on mastery of program objective 2. Overall average for all students surveyed was	2a. Y	

A.

Student Learning Outcome

SLO #2: To apply scientific method and interpret current technology and research techniques relating to the biological sciences.

B. Assessment Measure	C. Performance Standard	D. Sampling Method	E. Sample Size (n)	F. Results	G. Standard Met (Y/N)
2b. BIOL-4801, Biology Research Methods II, research project paper of respective research findings.	2b. 80% of students will earn a grade of "B" on BIOL 4801 (written paper, presentation, comprehensive research). Grade assigned by instructor and mentor.	2b. All students in BIOL 4801 Fall 2018 and Spring 2019.	2b. 43	4.5±0.55. 2b. Over 80% (40/43=93%, 3 Incomplete) of students completing Research Methods II in Fall 2020 and Spring 2021 earned a grade of B or higher on BIOL 4801.	2b. Y
2c. BIOL-3024, Genetics Comprehensive Pre-post exam	2c. 70% of students will score 60% or above on post-test.	2c. Given to all students in Spring 2021. (We could not administrate pre-post exams in Fall 2020 due to the Covid-19 pandemic.)	2c. 21	2c. The pre-test was administered on the first class, and the post-test was given together with the final exam. The average pre-test scores were 37%, and post-test scores were 64%. 62% (13/21=62%) of students completing	2d. N

A.						
Student Learning Outcome						
SLO #2: To apply scientific method and interpret current technology and research techniques relating to the biological sciences.						
B. Assessment Measure	C. Performance Standard	D. Sampling Method	E. Sample Size (n)	F. Results	G. Standard Met (Y/N)	
				Genetics in Spring 2021 earned 60% or higher on the post-test. However, all students (21/21=100%) completed Genetics in Spring 2021 increased their post-test scores comparing to pre-test scores. Mean changes of pre-post test scores were 26% increase.		
H.						
Conclusions						
2a. 97% (2a-1) and 88% (2a-2) students indicated understanding of program objective 2. Our goal of 70% was reached. These results are an indirect measure and are of our student's perception of whether they think they understand SLO #2. Although subjective, it is important to know whether our students believe they are learning. No new instructional changes are anticipated.						
2b. The mentoring process between faculty mentor/class instructor and mentee is providing sufficient feedback to students as they prepare the final version of their papers. Students are able to present their research findings in a comprehensive manner, as a combined result of efforts by the students, faculty mentor, and class instructor. We are accomplishing our goal. No new instructional changes are anticipated.						
2c. All students (100%) increased their post-test exam scores comparing to pre-exam scores. 62% students are 60% or above on post-test. It did not						

A.						
Student Learning Outcome						
SLO #2: To apply scientific method and interpret current technology and research techniques relating to the biological sciences.						
B. Assessment Measure	C. Performance Standard	D. Sampling Method	E. Sample Size (n)	F. Results	G. Standard Met (Y/N)	
meet our goal, but the mean changes (26%) of pre-post test scores were significantly increased. No new instructional changes are anticipated.						

A.						
Student Learning Outcome						
SLO #3: To be adequately prepared for transition into a productive professional career.						
B. Assessment Measure	C. Performance Standard	D. Sampling Method	E. Sample Size (n)	F. Results	G. Standard Met (Y/N)	
3a. A post-graduate survey consists of 21	3a. Of the surveys returned, 70% of the	3a. The biology department will	3a. N/A	3a. Will be conducted during this summer, 2021	3a. N/A	

A.

Student Learning Outcome

SLO #3: To be adequately prepared for transition into a productive professional career.

B. Assessment Measure	C. Performance Standard	D. Sampling Method	E. Sample Size (n)	F. Results	G. Standard Met (Y/N)
<p>questions, asking about their transition from RSU into post-graduate endeavors (job, internship, graduate school, professional school). The survey will be administered to graduates.</p>	<p>past graduates will indicate a score of 4 on a scale of 1 to 5 (5 being high) for their transitions from RSU into post-graduate endeavors (job, internship, graduate school, professional school).</p>	<p>administer a post-graduate survey by e-mail about their transition from RSU into post-graduate endeavors (job, internship, graduate school, professional school).</p>	<p>3b.</p>	<p>3b. Since May 2003 we have had over 400 graduates with BS in Biology. Of these students, we have been able to track 236 graduates. These 236 graduates have been placed in the following: 6 Dentistry</p>	<p>3b. Y</p>

A.

Student Learning Outcome

SLO #3: To be adequately prepared for transition into a productive professional career.

B. Assessment Measure	C. Performance Standard	D. Sampling Method	E. Sample Size (n)	F. Results	G. Standard Met (Y/N)
				38 Medical School (D.O. and M.D.) 5 Chiropractor 15 Pharmacy 17 Education (K-16) 9 Medical Technician 20 Wildlife Conservation 32 Environmental Management 3 Water Quality, Forensics 23 Graduate School Programs 4 EMT 9 R.N. 7 Veterinarian 12 PA 3 PT 3 OT 12 Work in hospital 2 Pathology assistant 1 podiatry 1 Mortician 1 Doctor of Naturopathy 18 Other occupations, including businesses	

A.
Student Learning Outcome

SLO #3: To be adequately prepared for transition into a productive professional career.

B. Assessment Measure	C. Performance Standard	D. Sampling Method	E. Sample Size (n)	F. Results	G. Standard Met (Y/N)

H.
Conclusions

3a. We have not collected this data for last three years. We are going to conduct an online survey this summer.

3b. This data was updated four years ago. We are planning to update this data during the summer, 2021.

PART 5

Proposed Instructional or Assessment Changes

Learning outcomes assessment can generate actionable evidence of student performance that can be used to improve student success and institutional effectiveness. Knowledge of student strengths and weakness gained through assessment can inform faculty efforts to improve course instruction and program curriculum. Below discuss potential changes the department is considering which are aimed at improving student learning or the assessment process. Indicate which student learning outcome(s) will be affected and provide a rationale for each proposed change. These proposals will be revisited in next assessment cycle.



Proposed Change	Applicable Learning Outcomes	Rationale and Impact
1. We will look for another outside exam which measures our students' learning more acutely.	SLO #1	We have two degree options in biology program (Medical Molecular option and Environmental Conservation option). Each option empathizes different biology fields. However, the current ETS test covers all biology fields. We need a better test to accurately measure our students' learning.
2. We will develop rubrics for BIOL-4801 Biology Research Method course.	SLO #2	We need common rubrics to evaluate our students' research more consistently among mentors.
3. We will develop an online post-graduate survey.	SLO #3	Participating rate of our previous survey was very low. We need to increase our graduates' participation.

PART 6

Summary of Assessment Measures

- A.** How many different assessment measures were used?
8
- B.** List the direct measures (see appendix):
Comprehensive exams, Class assignments, Pre/post exams, Third-party exam (ETS Major Field Test for Biology), Senior thesis of capstone projects
- C.** List the indirect measures (see appendix):
Graduate exit interviews, Job placement statistics, Student and alumni surveys that assess perceptions of the program






B. Reviewed by:

Titles	Name	Signature	Date
Department Head	Dr. Jerry Bowen		02 June 2021
Dean	Dr. Keith Martin		6/8/21

PART 7

Faculty Participation and Signatures

A. Provide the names and signatures of all full time and adjunct faculty who contributed to this report.

Faculty Name	Assessment Role	Signature
Dr. Jin Seo	Prepared report, collected data, & analyzed data	
Dr. Jerry Bowen	Collected data & reviewed report	
Dr. Jae-Ho Kim	Collected data & reviewed report	
Ms. Cheyanne Olson	Reviewed report	
Dr. Lisa Overall	Reviewed report	
Dr. Mark Peaden	Reviewed report	
Dr. Uduak Udoh	Reviewed report	
Dr. Craig Zimmermann	Collected data & reviewed report	

Appendix

Student Learning Outcome

Student learning outcomes are the observable or measurable results that are expected of a student following a learning experience. Learning outcomes may address knowledge, skills, attitudes, or values that provide evidence that learning has occurred. They can apply to a specific course, a program of study, or an institution. Outcomes should be worded in language that clearly implies a measurable behavior or quality of student work. Outcomes should also include Bloom's action verbs appropriate to the skill level of learning expected of students.

Examples:

Students will be able to apply principles of evidence-based medicine to determine clinical diagnoses and implement acceptable treatment modalities.

Students will be able to articulate cultural and socioeconomic differences and the significance of these differences for instructional planning.

Assessment Measure

An assessment measure is a tool or instrument used to gather evidence of student progress toward an established learning outcome. Every program learning outcome should have at least one appropriate assessment measure. Learning outcomes are frequently complex, however, and may require multiple measures to accurately assess student performance. Assessment plans should try to incorporate a combination of direct and indirect assessment measures. Direct provide concrete evidence of whether a student has command of a specific subject or content area, can perform a certain task, exhibits a particular skill, demonstrates a certain quality in their work, or holds a particular value. Because direct measures tap into actual student learning, it is often viewed as the preferred measure type. Indirect measures assess opinions or thoughts about the extent of a student's knowledge, skills, or attitudes. They reveal characteristics associated with learning, but they only imply that learning has occurred. Both types of measures can provide useful insight into student learning and experiences in a program. Each also has unique advantages and disadvantages in terms of the type of data and information it can provide. Examples of common direct and indirect measures are listed below.

Direct Measures

Indirect Measures

- Comprehensive exams
- Class assignments
- Juried review of performances and exhibitions
- Internship or clinical evaluations
- Portfolio evaluation
- Pre/post exams
- Third-party exams such as field tests, certification exams, or licensure exams
- Senior thesis or capstone projects
- Graduate exit interviews
- Focus group responses
- Job placement statistics
- Graduate school placement statistics
- Graduation and retention rates
- Student and alumni surveys that assess perceptions of the program
- Employer surveys that assess perceptions of graduates
- Honors and awards earned by students and alumni.

Performance Standard

A performance standard is a clearly-defined benchmark that establishes the minimally-acceptable level of performance expected of students for a particular measure.

Examples:

At least 70% of students will score 70% or higher on a comprehensive final exam.

At least 75% of students will earn score a "Proficient" or higher rating on the Communicate Effectively rubric.

Sampling Method

Sampling method describes the methodology used for selecting the students that were assessed for a given measure. In some cases, such as most course-embedded measures, it is possible to assess all active enrolled students. In other cases, however, it is not feasible to measure the population of all potential students. In these cases, it is important that a well-designed sampling scheme be used to ensure the sample of students measured is an unbiased representation of the overall population. Where multiple instructors teach a particular course, care should be taken to assess students across all instructors, including adjuncts.

Examples:

All students enrolled in BIOL 4801 Biology Research Methods II

All majors graduating in the 2016-17 academic year.

Sample Size

Sample size is the number of students from which evidence of student learning was obtained for a given assessment measure.

Results

Results are an analytical summary of the findings arising from the assessment of student performance for a particular assessment measure. Typical presentation includes descriptive statistics (mean, median, range) and score frequency distributions.

Standard Met?

This is a simple yes/no response that indicates whether the observed level of student performance for a particular measure meets or exceeds the established standard. An N/A may be used where circumstances prevented the department from accurately assessing a measure.

Conclusion

The conclusion is a reflective summary and determination of the assessment results obtained for a specific learning outcome. Questions to consider in this section include the following:

- Does the assessment evidence indicate the learning outcome is being satisfactorily met?
- Where multiple measures are used for a single outcome, do the results present a consistent or contradictory pattern?
- What are the most valuable insights gained from the assessment results?
- What strengths and weaknesses in student learning do the results indicate?
- What implications are there for enhancing teaching and learning?
- How can the assessment process be improved?

