

# Degree Program Student Learning Report

Revised May 2024

## Select Academic Department

### **BS in Biology**

For 2023-2024 Academic Year

#### **PART 1**

#### **Degree Program Mission and Student Learning Outcomes**

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

<b>University Mission</b>	<b>College Mission</b>	<b>Department Mission</b>	<b>Degree Program Mission</b>
Our mission is to ensure students develop the skills and knowledge required to achieve professional and personal goals in dynamic local and global communities.	Central to the mission of the College is the preparation of students to achieve professional and personal goals in their respective disciplines 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.	The mission of the Department of Biology at Rogers State University is to support students in their pursuit of knowledge in biology and life science.	Under the Bachelor of Science in Biology, there are three emphases: the Medical/Molecular emphasis, the Environmental Conservation emphasis, and General Biology emphasis. The four-year program seeks to develop a biologist well-grounded in an 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.**

<b>University Commitments</b>	<b>College Purposes</b>	<b>Department Purposes</b>	<b>Student Learning Outcomes</b>
To provide quality associate, baccalaureate, and graduate degree opportunities and educational experiences which foster student excellence in oral and written communications, scientific reasoning and critical and creative thinking.	The College offers innovative degrees, which focus upon developing skills in oral and written communication, critical thinking, creativity, empirical and evidenced-based inquiry, experimental investigation and theoretical explanation of natural phenomena, and innovative technology.	To increase the student’s critical thinking and reasoning abilities.  To prepare a student to matriculate into a four-year degree program in math or science related fields or graduate.	1. To demonstrate an understanding of the fundamental processes of life.  2. To apply scientific method and interpret current technology and research techniques relating to the biological sciences.
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.			
To provide a general liberal arts education that supports specialized academic programs and prepares students for lifelong learning and service in a diverse society.	The College 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.	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.  To increase the student’s ability to interpret and understand his/her world.	1. To demonstrate an understanding of the fundamental processes of life.  3. To be adequately prepared for transition into a productive professional career.  6. To serve as a resource for the community, utilizing the expertise of the faculty.
To provide students with a diverse, innovative faculty dedicated to excellence in teaching, scholarly pursuits and continuous improvement of programs.	The College 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 communities it serves.	The College 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.  To serve as a resource for the community; utilizing the expertise of the faculty.	2. To apply the scientific method and interpret current technology and research techniques relating to the biological sciences

## 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
We will implement a new three-semester sequence of biology research courses.	Y	First round of students has progressed through the first class of the three-semester sequence of biology research courses. The first cohort spent four to five weeks with two different faculty members gaining exposure to the latest technology and research techniques in the field of biological sciences. In general, the class was well received and accomplished the goal of its creation.

### 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
The department of Biology was not subject to review in the previous cycle.	N/A	

### 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 Tests for Biology	1a. The program mean will be within one standard deviation of the national mean on	1a. All students in BIOL 4801 classes in Fall 2023 and Spring 2024. (All students participated in the	1a. 34	1a. Across three-degree options in biology program (Medical Molecular option, Environmental Conservation option, and General Biology option), students averaged 150±11 while the national	1a. Y

<b>A. Student Learning Outcome</b>					
SLO #1: To demonstrate an understanding of the fundamental processes of life.					
<b>B. Assessment Measure</b>	<b>C. Performance Standard</b>	<b>D. Sampling Method</b>	<b>E. Sample Size (n)</b>	<b>F. Results</b>	<b>G. Standard Met (Y/N)</b>
1b. Subscores of Education Testing Service (ETS) Major Field Tests for Biology	Major Fields Test in biology. (Used 2023 Comparative Data which include 423 domestic institutions, 40,976 Examinees tested between Sep. 2018-Jun. 2023)  1b. ETS exam reports four subscores: (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 the national mean.	ETS test and 33/34 participated in the survey.)  1b. All students in BIOL 4801.	1b. 34	average was 152±13. Student scores ranged over 139 with 26 of 34 students (76%) (The score 140 is one standard deviation below the national mean).  1b. The number of Students who scored within one standard deviation of the national mean for at least three of the four sub-scores of the test was 27/34 (79%).  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 49 for the ETS compared with the national average 51±14. 28/34 students were within one standard deviation of the national mean.  For subset #2 – Molecular Biology and Genetics: Our students had a mean score of 48 for the ETS compared with the	1b. Y

**A.  
Student Learning Outcome**

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

<b>B. Assessment Measure</b>	<b>C. Performance Standard</b>	<b>D. Sampling Method</b>	<b>E. Sample Size (n)</b>	<b>F. Results</b>	<b>G. Standard Met (Y/N)</b>
<p>1c. Survey in BIOL 4801 - Biology Research Methods II assessing understanding of program objective 1.</p>	<p>1c. On the survey, 70% of our students will rank themselves as a 4 or greater (Likert scale from 1 to 5) on their understanding of the fundamental processes of life.</p>	<p>1c. 33/34 students in BIOL 4801 classes in Fall 2023 and Spring 2024.</p>	<p>1c. 33</p>	<p>national average <math>53 \pm 14</math>. 28/34 students were within one standard deviation of the national mean.</p> <p>For subset #3 – Organismal Biology: Our students had a mean score of 49 for the ETS compared with the national average <math>51 \pm 13</math>. 25/34 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 52 for the ETS compared with the national average <math>51 \pm 13</math>. 31/34 students were within one standard deviation of the national mean.</p> <p>1c. Questions were based on a Likert scale from 1 to 5, with 1 being very poor and 5 being excellent. The result average was <math>3.97 \pm 0.73</math> (AVE <math>\pm</math> SD). Of the 33 students surveyed, 8 (24%) ranked themselves as 5 (excellent), 16 (49%) ranked themselves as 4 (Good), and 9 (27%) ranked themselves as a 3 (average) on mastery of program objective 1.</p>	<p>1c. Y</p>
<b>H.</b>					

<b>A. Student Learning Outcome</b>					
SLO #1: To demonstrate an understanding of the fundamental processes of life.					
<b>B. Assessment Measure</b>	<b>C. Performance Standard</b>	<b>D. Sampling Method</b>	<b>E. Sample Size (n)</b>	<b>F. Results</b>	<b>G. Standard Met (Y/N)</b>
<b>Conclusions</b>					
1a and 1b. According to the results of the Education Testing Service (ETS) Major Field Tests for Biology, we are accomplishing our goals both in composite and subscores. The National Mean had been derived from the scores of 40,976 students who attend 423 different universities and colleges in the US.					
1c. 73% 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.					

<b>A. Student Learning Outcome</b>					
SLO #2: To apply scientific method and interpret current technology and research techniques related to the biological sciences.					
<b>B. Assessment Measure</b>	<b>C. Performance Standard</b>	<b>D. Sampling Method</b>	<b>E. Sample Size (n)</b>	<b>F. Results</b>	<b>G. Standard Met (Y/N)</b>
2a. Survey in BIOL 4801, Biology Research Methods II, covering understanding of program objective 2.	2a. 70% of students will indicate 4 or greater (on a Likert scale) understanding of program objective 2.	2a. 33/34 students in BIOL 4801 classes in Fall 2023 and Spring 2024.	2a. 33	2a. Questions were based on a Likert scale from 1 to 5 with 1 being very poor and 5 being excellent. The result average was 4.15±0.67 (AVE ± SD). Of the 33 students surveyed, 10 (30%) ranked themselves as 5 (excellent), 18 (55%) ranked themselves as 4 (Good), and 5 (15%) ranked themselves as a 3 (average) on mastery of program objective 2.	2a. Y

**A.  
Student Learning Outcome**

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

<b>B. Assessment Measure</b>	<b>C. Performance Standard</b>	<b>D. Sampling Method</b>	<b>E. Sample Size (n)</b>	<b>F. Results</b>	<b>G. Standard Met (Y/N)</b>
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 classes in Fall 2023 and Spring 2024.	2b. 36	2b. Over 80% (32/36=89%, 23 A, 9 B, 2 F, 2 Incomplete) of students completing Research Methods II in Fall 2023 and Spring 2024 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. All students in BIOL 3204 Fall 2023 and Spring 2024.	2c. 39	2c. The pre-test was administrated on the first class, and the post-test was given together with the final exam.  The average pre-test scores were 42.3%, and post-test scores were 71.9%. 77% (30/39=77%) of students completing Genetics in Fall 2023 and Spring 2024 earned 60% or higher on the post-test. However, all students (35/35=100%) completed Genetics in Fall 2023 and Spring 2024 increased their post-test scores comparing to pre-test scores. Mean changes of pre-post test scores were 29.7% increase.	2c. Y

**H.  
Conclusions**

<b>A. Student Learning Outcome</b>					
<b>SLO #2: To apply scientific method and interpret current technology and research techniques related to the biological sciences.</b>					
<b>B. Assessment Measure</b>	<b>C. Performance Standard</b>	<b>D. Sampling Method</b>	<b>E. Sample Size (n)</b>	<b>F. Results</b>	<b>G. Standard Met (Y/N)</b>
<p>2a. 85% (2a) of students indicated understanding of program objective 2. Our goal of 70% was reached for 2a. These results are an indirect measure and are of our student's perception of whether they think they have an understanding of SLO #2. Although subjective, it is important to know whether our students believe they are learning. According to our results, we are accomplishing our goal. The newly implemented curriculum changes should ensure this benchmark is meant.</p> <p>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, which is a combined result of efforts of the students, faculty mentors, and class instructors. We are successfully accomplishing our goal. No new instructional changes are anticipated.</p> <p>2c. 80% of students achieved a score of 60% or above on the post-test of Genetics. We are successfully accomplishing our goal. Additionally, all students (100%) improved their post-test exam scores compared to their pre-exam scores, with an average increase of 30% (range: 9% - 55% increase). No new instructional changes are anticipated.</p>					

<b>A. Student Learning Outcome</b>																					
SLO #3: To be adequately prepared for transition into a productive professional career.																					
<b>B. Assessment Measure</b>	<b>C. Performance Standard</b>	<b>D. Sampling Method</b>	<b>E. Sample Size (n)</b>	<b>F. Results</b>	<b>G. Standard Met (Y/N)</b>																
3a. A post-graduate survey, asking about their transition from RSU into post-graduate endeavors (job, internship, graduate school, professional school). The survey will be administered to graduates.	3a. Of the surveys returned, 70% of the past graduates will indicate a score of 4 on a scale of 1 to 5 (5 being high) for their transitions from RSU in post-graduate endeavors (job, internship, graduate school, professional school).	3a. The biology department will administer a post-graduate survey by e-mail about their transition from RSU into post-graduate endeavors (job, internship, graduate school, professional school).	3a. N/A	3a. The surveys will be conducted during this summer, 2024.	3a. The survey will be administered to graduates.																
3b. Students' activities post-graduation.	3b. 80% of reporting students are working in biology field or continuing education in biology.	3b. The biology faculty and staff informally collect information about student's activities after graduation.	3b. 382	3b. Since May 2003 we have had over 677 graduates with BS in Biology. Of these students, we have been able to track 382 graduates. These 382 graduates have been placed in the following:  <table style="margin-left: 20px; border: none;"> <tr><td>Medical School</td><td style="text-align: right;">61</td></tr> <tr><td>Physicians Assistant</td><td style="text-align: right;">26</td></tr> <tr><td>Pharmacy</td><td style="text-align: right;">36</td></tr> <tr><td>Dental</td><td style="text-align: right;">8</td></tr> <tr><td>Veterinary</td><td style="text-align: right;">8</td></tr> <tr><td>Physical Therapy</td><td style="text-align: right;">5</td></tr> <tr><td>Nursing</td><td style="text-align: right;">14</td></tr> <tr><td>Optometry</td><td style="text-align: right;">2</td></tr> </table>	Medical School	61	Physicians Assistant	26	Pharmacy	36	Dental	8	Veterinary	8	Physical Therapy	5	Nursing	14	Optometry	2	3b. Students' activities post-graduation.
Medical School	61																				
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<b>A. Student Learning Outcome</b>					
SLO #3: To be adequately prepared for transition into a productive professional career.					
<b>B. Assessment Measure</b>	<b>C. Performance Standard</b>	<b>D. Sampling Method</b>	<b>E. Sample Size (n)</b>	<b>F. Results</b>	<b>G. Standard Met (Y/N)</b>
				Occupational Therapy 2 Physical Therapy Assistant 3 Dental Assistant/Hygiene 7 Health Care Industry 5 Medical Laboratory Technology 6 Chiropractic School 5 EMT 5 Public/Higher Education 11 Env/Eng/Chem Technicians 58 Graduate Programs-non-health professional 40 Law Enforcement (Wildlife and Public) 10 Careers unrelated to degree 17 Natural Resource Positions 37 Private Sector- non-STEM related 16	
<b>H. Conclusions</b>					
3a. We have not collected this data for the last five years due to a lack of resources. However, we will be launching an online survey in Summer 2024.					
3b. This data was updated in Spring 2024, with 91% of reporting students are working in biology field or continuing education in biology.					

## 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
No instructional/assessment changes in this period.		

## 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 Tests for Biology), Senior thesis of capstone projects

C. List the indirect measures (see appendix):

Graduate surveys, Job placement statistics, Student and alumni surveys that assess perceptions of the program

**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. Hannah M King	Prepared report, collected data, and analyzed data	<i>Hannah King</i>
Dr. Jin Seo	Collected data & reviewed report	<i>Jin Seo</i>
Dr. Jerry Bowen	Collected data & reviewed report	
Mr. Rance Kingfisher	Reviewed report	
Dr. Jae-Ho Kim	Collected data & reviewed report	
Dr. Keith Martin	Reviewed Report	<i>Keith Martin</i>
Dr. Cheyanne Olson	Reviewed Report	<i>Cheyenne Olson</i>
Dr. Mark Peaden	Reviewed Report	
Dr. Crag Zimmerman	Reviewed Report	<i>Crag Zimmerman</i>

B. Reviewed by:

Titles	Name	Signature	Date
Department Head	Dr. Jin Seo	<i>Jin Seo</i>	5/23/24
Dean	Dr. Susan Willis	<i>Susan Willis</i>	5-24-24

## 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

- 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

#### Indirect Measures

- 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?