Program Assessment Report (PAR)

Biological Sciences (BIO) Associate Degree

REPORT PREPARED by: Jacquemin, Stephen James

ACADEMIC YEAR COVERED BY THIS REPORT: 2021-2022

I. PROGRAM LEARNING OUTCOMES

Students will demonstrate foundational knowledge of biology in areas consistent with introductory biological chemistry, cell structure, cellular processes (e.g. respiration, photosynthesis, mitosis, meiosis, etc.), genes, heredity, biotechnology, evolution, ecology, diversity of life, anatomy and physiology.

Students will demonstrate fundamental laboratory techniques essential to biology.

Students will demonstrate effective communication related to scientific findings.

II. PROCEDURES USED FOR ASSESSMENT

A. Direct Assessment

Students will demonstrate foundational knowledge of biology in areas consistent with introductory biological chemistry, cell structure, cellular processes (e.g. respiration, photosynthesis, mitosis, meiosis, etc.), genes, heredity, biotechnology, evolution, ecology, diversity of life, anatomy and physiology. Students will complete final exams in BIO 1120 and BIO 1150 to assess foundational knowledge. Instructor will choose exams at random to assess.

- Students were assessed using key questions from exams. These questions included comprehensive overview style questions that were used to ascertain learning objectives specific to the overarching foundational aspects of the

course. A sample of questions pulled from final exams included:

General Biology I (1120) Final Exam Representative Questions:

What is the gradual change in species over time generally referred to as?

DNA replication follows what type of model?

What is the one gene – one polypeptide hypothesis?

What is metabolism?

The element present in all organic molecules is what?

General Biology II (1150) Final Exam Representative Questions:

Evolution of a species operates at which level?

Which period in Earth's history marks the appearance of many modern animal groups?

What is ONE adaptation that all animals have in common?

Which model predicts the abrupt appearance of new species in the fossil record with little or no evidence of intermediate forms?

Which genes play an integral role in limb bud development?

Students will demonstrate fundamental laboratory techniques essential to biology. Students will complete laboratory reports in BIO 1120 and BIO 1150 to assess proficiency in general biological laboratory techniques. Instructor will choose laboratory reports at random to assess.

- A lab report was pulled from one of the general biology courses for each student. This lab report coupled with lab manual was used to assess basic laboratory skills, including the following aspects (graded 1-3 for each metric on the rubric):

General Biology Laboratory Skills Items and Rubric:

Demonstrates ability to follow analytical and applied protocols in the lab

Demonstrates attention to methods and details

Demonstrates ability to test a hypothesis

Demonstrates ability to communicate science effectively

Demonstrates attention to collaboration and communication

Demonstrates attention to lab safety protocols

Students will demonstrate effective communication related to scientific findings. Students will undertake a semester long research project in BIO 2310 and present their results in the form of a poster/paper. Instructor will have students present reports in class.

- The final independent study project from BIO 2310 was pulled for each student available. This final independent research project puts together all the pieces from the students program and asks that they incorporate lab skills, field skills, writing skills, and concatenates knowledge from all foundational courses. The guiding rubric and principles underscoring this assessment piece is as follows:

Sample Independent Research Report:

Demonstrates ability to make observations of the natural world and think critically about a question

Demonstrates ability to translate questions about the natural world into a clear study

Demonstrates ability to work independently to design and carry out a scientific study

Demonstrates ability to communicate results in a clear scientific manner (IMRaD format)

Demonstrates ability to share results in a way that the general public understands

Note that all artifacts are available upon request. Scores and interpretation are in sections below. Scores generated by discipline specific faculty teaching in the program.

B. Scoring of Student Work

Scoring of student work uses in house rubrics and other methods indicated in procedures used for assessment. All scores are converted to percentages to facilitate cross mission comparisons that may be scored on different scales. Note that while percentages are not necessarily as simple to interpret as binary yes/no outcomes they do provide a much finer assessment tool through which

improvements can be charted moving forward.

This 2021-2022 program assessment includes all students registered for the AS in BIO during this time period. This assessment includes a total of 3 students. See above for rubric and question guidelines.

Direct Assessment Items

Last Name

General Biology 1 (1120 Final Exam)

General Biology 2 (1150 Final Exam)

Lab Skills (1120 Labs)

Research Project (Ecology Research)

S1

Fall 21 - 77%

Spring 22 - 64%

Fall 21 - 78%

* No Lake Campus Record

S2

Fall 22 - 90%

Spring 22 - 98%

Fall 22 - 89%

* No Lake Campus Record

S3

Fall 20 - 87%

Spring 21 - 76%

Fall 20 - 89%

Fall 21 - 95%

C. Indirect Assessment

The following Likert style survey is comprised of four questions, with each on a sliding ranking scale from 1 to 5 (with 5 being higher than 1). The survey is administered via email to students that have been enrolled in the program at one time or another. Note that not all students are/were able to be reached. As time moves forward, presentation of results will expand with a rolling composite average compared to the current assessment year.

Student Perceptions of Learning

Combined Average of All Years (N=5)

Current Year 2021-2022 (N=3)

To what extent do you feel that time in this program has fostered:

Score of 1 (Lowest) TO 5 (Highest)

- A deeper understanding of simple biological chemistry, cell structure, cell processes, and genetics

4.4

4

- An increased understanding of evolution, diversity of life on earth, and patterns/processes that have shaped it

4.8

4.7

- Improved ability to think critically about the nature of science and the natural world

4.4

4.3

- Increased skills in scientific communication (e.g. papers, lab reports, presentations, etc.)

5.0

5

III. ASSESSMENT RESULTS/INFORMATION:

Assessment

Summary and Analysis in Relation to Learning Outcome

Students will demonstrate foundational knowledge of biology in areas consistent with cells and genes through organisms and ecosystems.

Overall, students demonstrated proficiency in foundational knowledge with an average score of 82% for key exams/questions. While this number is adequate, additional time should be spent investigating alternative assignments to improve learning of these major tenets.

Students will demonstrate fundamental laboratory techniques fundamental to biology.

Overall, students scored well in basic lab techniques, approaches, and applications – averaging an 85% across the rubric. This indicates a solid comprehension and approach to lab studies but leaves room for improvement – suggest additional practice with lab reports and communication.

Students will demonstrate effective communication related to scientific findings.

Only one artifact out of three students for the 21 – 22 report was able to be documented as the other two students did not have a record of completing the course at Lake Campus. However, speaking at a larger level for all the students that have taken that course, it can be said that a score of 95% on that final assignment is very much in keeping with the overall accomplishments of students enrolled in BIO2310 and indicates attainment of this learning objective.

On a larger scale, this program has realized a total of 8 graduates over the past decade. See table below. It is worth noting that this is not a large number of graduates and it is also worth noting that there is not a large number of

students enrolled in the program at any given time. Despite these enrollment notes, however, this program carries a minimal cost to WSU as it is a repackaging of existing courses in a shorter two-year format that would still be offered independent of this degree's existence. Moreover, from experience at open houses, recruiting events, and conversations with students, it is clear that this degree has often served as an on road to college itself and is commonly something that is started off in and then transitioned from in favor of a four-year program, such as the ISS. Lastly, given the appropriate circumstances, this program could serve as a credential for those students that could not finish a four-year program (for whatever reason) – this has tremendous implications for the Dayton Campus.

BIO AS Biology Graduates

Last Name

First Name

UID

Graduation Year

Warner

Sarah

U00545685

2013

Weddle

Nicole

U00685781

2014

Christman

Rachel

U00703279

2017

Danylchuk

Harley

U00786018

2018

Posada

Abigail

U00860722

2019

Stampfli

Kayli

U00820219

2019

Patterson

Margaret

U00892355

2021

Zehringer

Marie

U00854818

2021

[Analysis]

IV. ACTIONS TO IMPROVE STUDENT LEARNING

Information from assessments will be reviewed by all faculty teaching in the Biology AS degree. We will continually monitor assessments to make sure they are still relevant as we gather artifacts from students.

There are many steps that can be taken to improve or maintain the excellent student learning in the AS of Biology Degree Program. Some potential strategies to continue on with or begin include:

1. Continuing to provide students with a clear and well-defined curriculum that outlines the goals and objectives of the program, along with specific knowledge and skills.
2. Ensuring that students continue to have access to high-quality instructional materials, such as textbooks, lectures, and online resources, that are relevant to the field of biology.
3. Providing students with additional opportunities beyond the few experiences that currently exist to engage in hands-on learning activities and experiments that allow them to apply the concepts and principles they are learning in the classroom outside of the classroom through internships, jobs, volunteer opportunities, etc.
4. Continuing to encourage students to develop critical thinking and problem-solving skills, which are essential for success in the field of biology.
5. Providing students with more opportunities to interact with practicing biologists and other experts in the field, so that they can learn from their experiences and insights.
6. Expanding students access to state-of-the-art technology and equipment, such as advanced laboratory equipment and computer simulations, to enhance their learning experiences.

V. SUPPORTING DOCUMENTS

Additional documentation, when provided, is stored in the internal Academic Program Assessment of Student Learning SharePoint site.