

2021-2022 Assessment Cycle

## Assessment Findings

### Program Assessment Accomplishments

The introduction of a new B.Ed. in Biology degree to the department created some confusion in terms of assessment because this degree has the same core courses as the existing B.S. in Biology (Sec Ed Emphasis). The confusion, along with the re-structuring of several courses, meant that an assessment report was not completed and submitted last year. Since that time, we have combined both degrees into a single assessment. We have also revisited and updated the Mission Statement, Curriculum Map, and Program Student Learning Outcomes to ensure accurately reflect both degree programs. We have also modified the modified the assessment cycle to make the process of data collection more efficient and to make the analyses and reporting more efficient and informative.

### Finding per Measure

#### BS in Secondary Biology Education Outcome Set

BS Biology (Ed Emph)

##### Outcome: PSLO 1

Describe or distinguish major biological principles in cell biology, genetics, organismal biology, ecology, and evolution.

▼ **Measure:** Course Grades  
*Course level Direct - Student Artifact*

Details/Description:

BI 102 (General Cellular Biology) and BI 103 serve as the introductory sequence for all biology majors and thus set the stage for all other courses. BI 102 covers the major principles of the chemical, genetic, and microscopic properties and processes of cells. BI 103 introduces major topics of ecology, evolution, biodiversity, anatomy, and physiology.

The upper division core classes BI 301 (General Microbiology), BI 310 (General Ecology), BI 333

(General Genetics), and BI 340 (Evolutionary Biology) cover the main biological disciplines in more depth and develop the students' critical thinking, scientific reasoning, and quantitative skills.

**Acceptable Target:**

75% of students in the BS Biology (Secondary Ed Emphasis) and BEd Biology programs earn an overall grade of B or higher in BI 102 and BI 103.

90% earn a grade of B or higher in the upper division core courses.

**Findings for Course Grades**

**Summary of Findings:**

Data for the introductory courses was only collected from two students in this cycle, and only one of these students has completed both courses. The target of >75% of students was met only for BI 103.

The course grades in the upper division courses were more varied but the having 90% of students earning a B or better was met in all but two of the courses. While all students enrolled in BI 301 and BI 340 met the minimum grade threshold of C for completing the course, only 67% in each course earned a grade of B or higher.

**Results :**

Acceptable Target Achievement: Not Met

**Recommendations:**

BI 301 and BI 340 can both be taken in the first semester of a students sophomore year. The expectations of both courses exceed those of the introductory courses so this should be made clear to students who enter these courses. Faculty responsible for teaching these courses may also consider if the expectations exceed students development. If so, then the faculty may also consider different delivery methods and/or assessment practices within those courses to account for student development.


**Reflections/Notes:**

The department as whole may wish to

discuss common expectations in the core classes. If some 300 level classes are typically take early perhaps they could be used to build a stronger framework of understanding rather than having expectations that are identical to those of classes typically taken by only juniors and seniors.

We may also consider whether each course should be it own measure so that the minority of course that do not meet target do not adversely affect an entire measure.

Substantiating Evidence:

 SLO 1 - Course Grades (Adobe Acrobat Document)

▼ **Measure:** Major Field Test  
*Program level Direct - Exam*

Details/Description:

The ETS Major Field Test for Biology is a comprehensive outcomes assessment. The questions are presented in a way to evaluate students' understanding of biological processes as well as their analytical and problem solving abilities. The four sub scores represent the major disciplines within the biological sciences:

- 1) Cellular Biology
- 2) Molecular Biology & Genetics
- 3) Organismal Biology
- 4) Population Biology, Ecology, & Evolution.

The Major Field Test is administered using an online format. This provides immediate feedback to all students by listing their overall score and sub scores as well as those of the department and national averages. It also lists the percentile rank

Acceptable Target:

for the individual student and the average rank of Washburn graduates for the score and sub scores.

≥50% of students in the program have an overall score in the 75th percentile or higher. All students score above the national average in at least two of the four sub scores of the exam.

Supporting Attachments:

 Major Field Test - Biology (Web Link)  
<https://www.ets.org/mft/about/content/biology>

Findings for Major Field Test

Summary of Findings:

The programs graduated four students in this time frame. However, The Major Field test was waived for all graduates of the Spring 2020 pivot semester. Therefore, only three of the graduating seniors in the biology education programs completed the major Field Test during this assessment cycle.

Two of the three students had total scores that placed them in the the top 25% of test takers. All students had scores that were higher than the national average in at least two of the subsections.

Results :

Acceptable Target Achievement: Met


Recommendations:

The student with the lowest scores was a returning student. As a result, this student had a substantial amount of time pass between some when the material was presented in class and when the Major Field Test was taken.

To minimize this gap and to reduce the stress of taking another test in the final month before graduating. I would recommend that students take this exam between their junior and senior years.

Reflections/Notes:

Substantiating Evidence:

 Major Field Test (PSLO 1) (File)

▼ **Measure:** Senior Exit Survey  
*Program level Indirect - Survey*

Details/Description:

Exit surveys are completed by every student graduating from the department. Three questions align most closely with PSLO 1.


- 1) How would you rate the overall quality of instruction in the Department of Biology?
- 9) How effective was the Biology course at helping you develop your analytical skills?
- 10) How effective was the Department of Biology at providing you with a broad understanding of biological principles?

Students can score each question as Excellent (1), Very Good (2), Satisfactory (3), Unsatisfactory (4), or Poor (5). The average score of the three questions listed above is determine for each student in the programs.

Acceptable Target:

100% of students have an average score of satisfactory or higher for the senior exit survey questions pertaining to PSLO 1.

Supporting Attachments:

 Senior Exit Survey (Word Document (Open XML))

Findings for Senior Exit Survey

Summary of Findings:

All graduates who completed the exit survey

responded positively to the three questions that were relevant to this PSLO (very good or excellent).

Results :

Acceptable Target Achievement: Met

Recommendations:

Two of the three students who completed the survey had a lower mark for Question 9. Their written comments alluded to the fact that some classes focus more attention on foundational knowledge and less attention to how that knowledge was obtained.

The department should revisit how information is presented, particularly in introductory courses. An effort should be made to teach scientific inquiry and process even when first introducing a topic.

Reflections/Notes:

Substantiating Evidence:

 Senior Exit Survey (File)

### Outcome: PSLO 2

Demonstrate the complex interrelationships amongst ecological and evolutionary forces and how they influence organisms, populations, and community function.

▼ **Measure:** Course Embedded Assignments (Ecol/Evol)  
*Course level Direct - Student Artifact*

Details/Description:

BI 103 introduces students to the major principles of organismal biology (ecology, evolution, diversity,

anatomy and physiology). Four labs in BI 103 introduce student to the process of collecting, analyzing, and interpreting ecological and/or evolutionary data. Assignments and quizzes are used to evaluate the students understanding of this a material. The average score on these assignments and quizzes is used a formative assessment for this PSLO.

BI 310 provides a deeper investigation into ecological processes and how those processes lead to changes in populations and communities. BI 340 explores the mechanisms of biological evolution and how they can lead to short- and long-term changes in populations and biodiversity. These courses include assignments and lab activities in which students perform more in-depth investigations of ecological and evolutionary processes. The average of these assignments provide additional formative assessments that measures the development of students' analytical skills and how they are being applied to ecological and evolutionary data.

**Acceptable Target:**

90% earn an average grade of C or higher for 4 labs and associated quizzes in BI 103.  
90% earn an average grade of B or higher for the lab assignments in BI 310.  
90% earn an average of B or higher for the assignments in BI 340.

**Findings for Course Embedded Assignments (Ecol/Evol)**

**Summary of Findings:**

Only one student completed BI 103 during this cycle, and this student earned an average of D on the relevant labs.

Both students who took BI 310 during this cycle earned an average grade of A on their lab assignments.

Two of the three students (67%) in BI 340 earned at least of B.

**Results :**

Acceptable Target Achievement: Not Met

#### Recommendations:


Each course had relatively low enrollment during this cycle so concrete conclusions are difficult to make.

However, we have noticed that students have struggled in BI 103 and added assignments to the lab portion of the course improve understanding of what is often the most difficult material in the class.

Again, BI 340 is a course that is often taken by students in the first semester of their sophomore year. Because these students have not fully developed their analytical skills and do not have as much background knowledge they often struggle with the finer points of evolutionary biology. An effort should be made to provide a scaffolding set of lessons to help students overcome these obstacles.

#### Reflections/Notes:

#### Substantiating Evidence:

 Assignment Scores (File)

#### ▼ **Measure:** Major Field Test (Ecol & Evol) *Program level Direct - Exam*

#### Details/Description:

The ETS Major Field Test for Biology is a comprehensive outcomes assessment. The questions are presented in a way to evaluate students' understanding of biological processes as well as their analytical and problem solving abilities. The four sub scores represent the major disciplines within the biological sciences:



- 1) Cellular Biology
- 2) Molecular Biology & Genetics
- 3) Organismal Biology
- 4) Population Biology, Ecology, & Evolution.

Acceptable Target:

≥50% of students in the program score at or above the Above the national average in the “Population Biology, Ecology & Evolution ” subsection of the exam

#### Findings for Major Field Test (Ecol & Evol)

Summary of Findings:

Two of the three students scored higher than the national average on the Population Biology, Ecology, and Evolution section of the Major Field Test.

For supporting evidence, please refer to the Major Field Test documentation attach to PSLO 1.

Results :

Acceptable Target Achievement: Met

Recommendations:

Reflections/Notes:

### Overall Recommendations

The relatively low course grades in the introductory courses compared to those in the upper division courses indicates an overall improvement in students scientific literacy, reasoning abilities, and quantitative skills. A similar trend in course assignment provides further evidence of students' growth as scientists. All questions in the exit survey received positive responses. However, question that received the lowest score was the one that asked, "How effective were the Biology courses at helping you develop analytical skills?" The highlighted course specifically assess analytical skills. Either, the students do not think that their analytical skills are being fully developed in these (or other) courses, or they are not aware that this is being assessed and how it is being assessed.

The department should address this in at least two ways. First, we should revisit our course content to ensure that it is truly helping students develop their higher-level skills. Second, we should also communicate how these course are meant to improve these skills to the students. We could also incorporate self-assessment components in various courses to help students see their own progress and growth.

### Overall Reflection

This assessment included several courses that transitioned from one delivery method to another both between and within semesters. Considering those difficulties, the department and our students weathered the storm to meet many of our assessment goals. Most of the assessments were based on 1-4 students, and such low numbers continue to present challenges as we try to draw conclusions. The department should increase our efforts to attract a retain students interested in biology education.

### Faculty Collaboration

The introductory courses of BI 102 and BI 103 are taught by several faculty. Faculty who teach one course revisit the material each semester to ensure that it is presented in a consistent manner and that any recent discoveries and/or advances in biology that are relevant to the course are incorporated into the curriculum. Faculty teaching each course also collaborate with ones teaching the other intro course to ensure that no gaps in foundational knowledge are present.

BI 310 and BI 333 follow a similar model as the 102/103 sequence as each of these courses are taught by at least two faculty members. BI 310 and BI 340 are each only taught by one faculty member, but assignments and course content are designed to complement each other no matter which course students take first.

### Communication & Collaboration with Students

As noted in the "Overall Recommendations" section, student may not be fully aware of all PSLO's, measures, and rubrics used for the evaluation of student learning. Rubrics and grade reports are given to students during the different classes, but the overall assessment process has not been made clear. We will emphasize the relevant parts of the program assessment during regular fall and spring advising appointments to inform students about how assessment is used to improve student learning. We will also being discussing how students may practice self-assessment to improve their individual learning outcomes and goals.

### Communication & Collaboration with External Stakeholders

The primary external stakeholders for students in the biology education degree programs would be the state department of education, state and local school boards, and the school districts where the students will be

completing their student teaching and pursuing their careers.

Communication with the department of education is primarily done via the program review which is completed every six years. During this process the department outlines how the curriculum at Washburn aligns with state standards and reports the learning outcomes of students enrolled in the programs. After a period of review, the board then sends an assessment of what aspects of the program are on target and which aspects need improvement. We then submit action plans to address any areas of improvement.

Communication with school districts is informal, mainly occurring through interactions with our students' mentor teachers during their student teaching semester. These recommendations are primarily one way in that they inform us of the specific strength and weaknesses of the students once they have completed all of their coursework. Such interactions are what prompted us to include more writing and lesson planning in their core courses.

No formal or informal communications currently take place between the department and the state or local school boards.

### **Communication & Collaboration with University**

The teaching schedules of the biology faculty have made it difficult to attend faculty members have begun coordinating with each other to ensure that at least one faculty member can attend various workshops and report to other faculty members who could not attend. We will also be emphasizing and encouraging faculty to participate in various online workshops presented by CTEL. These strategies will help us to improve the coordination and communication between biology faculty. They will also increase our collective awareness of the design and implementation of different assessment techniques.

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