**Department of Ecology Assessment Report**

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**1. Assessment Plan, Schedule and Data Source.**

The Department of Ecology manages four options for students majoring in Biological Sciences:

* Biology Teaching
* Conservation Biology and Ecology
* Fish and Wildlife Ecology and Management
* Organismal Biology

In Fall 2021, the Department of Ecology began a new assessment plan for students in these options. The most important component of this plan was creating two new assessment courses and adding these courses to the required programs of study for these majors. Starting in the Fall of 2021, students entering these four majors were required to take a pre-instructional assessment test to assess their scientific reasoning skill. When these students begin to graduate in 2025, they will complete a post-instructional assessment test. These tests will measure what students know at the time of graduation and permit the Department of Ecology to measure how much they learned while at MSU.

**2. What Was Done**

This fall, the Ecology Department administered its pre-instructional test for the third year running and the test was completed by 133 incoming students. The data has been archived with data from 2021 and 2022.

As mentioned above, the Ecology Department will begin post-instructional assessment of graduating students in the Spring of 2025. The Assessment Committee is using the intervening time to study the progress of students toward their degrees. During this past year, the Assessment Committee did this by comparing students’ grades in their first important biology course, BIOB170 – Principles of Biological Diversity, with subsequent courses required by their major. BIOB170 is a high-enrollment introductory biology course required by students in the four options above. Faculty in the Ecology Department are concerned that students completing BIOB170 with relatively low grades are not succeeding in subsequent science or math courses. The Assessment Committee studied this by obtaining from the MSU Registrar all the grades of all the students who have taken BIOB170 since the Fall of 2015. This data included grades for these students in all of their subsequent courses. From this data, the Assessment Committee calculated a variety of descriptive statistics that measured the performance of BIOB170 students in subsequent courses. In particular, the Assessment Committee wanted to know how students who received poor grades in BIOB170 did in later courses.

**3. What Was Learned**

During the timeframe studied (Fall 2015 through Spring 2022), 4109 students took BIOB170 (Table 1). This course has been taught by several faculty during this timeframe, but grades in the course remained relatively stable (Table 2). The median grade most semesters was a B or B-.

The median DFW rate in BIOB170 (Table 3) was 0.25 with a standard deviation of 0.07. The lowest DFW rate observed was 0.08 and the highest was 0.34.

The analysis showed that students who received a straight C in BIOB170 had a high probability of DFW in subsequent science courses (Table 4, 5, 6). For example, almost 40% of students who received a C in BIOB170 received a DFW in BIOB160, and almost 50% received a DFW in subsequent physics, chemistry, and statistics courses. C students in BIOB170 had low probabilities of earning B’s in some later courses. For example, only 6% of students who earned a C in BIOB170, earned a B or better in BIOB160 (in later semesters).

**4. How we responded**

The Assessment Committee presented the data contained in this report to the Ecology Department during a faculty meeting in September 2023. The Department discussed the implications of this data for an hour. This discussion revealed diverse opinions. Some faculty believed this data was evidence that students who were earning C’s in their Freshmen and Sophomore years should probably transfer to a less demanding major. The justification for this view was that a profession in Fish & Wildlife Management or a related discipline requires strong grades and that students with a C average have little chance of getting into graduate school to earn terminal degrees. Other faculty expressed dissenting opinions. Faculty discussed the potential of providing additional help to students in order to improve their grades and the potential for creating a less rigorous option for students interested in biology but not planning to go to graduate school. All faculty agreed this data was useful for advising students who were receiving C’s during their first semesters.

**5. Closing the Loop**

The Department of Ecology is ramping up its assessment of its majors. So far, the department has not formally changed any of its courses, but the assessment program is sparking conversations among faculty and appears to be cultivating a culture of evidence-based decision-making. The next big step in the assessment program will be to begin testing graduating students in 2025. Data from those students will surely lead to conservations regarding what is working and what is not.

**Table 1.** Enrollment for BIOB170 by year, semester, and section. These data include the number of students who received a grade (including W’s).

|  |  |  |  |
| --- | --- | --- | --- |
| Year | Spring, Sec 1 | Fall, Sec 1 | Fall, Sec 2 |
| 2015 |  | 247 | 72 |
| 2016 | 201 | 279 | 108 |
| 2017 | 209 | 276 | 96 |
| 2018 | 204 | 279 | 114 |
| 2019 | 213 | 280 | 134 |
| 2020 | 201 | 207 | 156 |
| 2021 | 151 | 280 | 153 |
| 2022 | 249 |  |  |

**Table 2.** Median grade for BIOB170 sections.

|  |  |  |  |
| --- | --- | --- | --- |
| Year | Spring, Sec 1 | Fall, Sec 1 | Fall, Sec 2 |
| 2015 |  | B- | C |
| 2016 | C+ | B | B |
| 2017 | B- | B | C |
| 2018 | C+ | B | B |
| 2019 | B | B- | B- |
| 2020 | B | B- | B |
| 2021 | B- | B- | C+ |
| 2022 | B- |  |  |

**Table 3.** DFW rate for BIOB170 sections.

|  |  |  |  |
| --- | --- | --- | --- |
| Year | Spring, Sec 1 | Fall, Sec 1 | Fall, Sec 2 |
| 2015 |  | 0.18 | 0.25 |
| 2016 | 0.27 | 0.18 | 0.25 |
| 2017 | 0.21 | 0.16 | 0.29 |
| 2018 | 0.25 | 0.14 | 0.30 |
| 2019 | 0.08 | 0.17 | 0.26 |
| 2020 | 0.10 | 0.31 | 0.20 |
| 2021 | 0.34 | 0.22 | 0.30 |
| 2022 | 0.30 |  |  |

**Table 4.** The proportion of students who received a DFW in math or science courses taken *after* BIOB 170 (Sec 1) aggregated by BIOB170 grade. For example, 3% of students who received an A in BIOB170 received a DFW in BIOB160. The data do not include students who received grades with pluses or minuses. The sample size, *N*, is the total number of students who took each course after BIOB170.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | BIOB170 Grade | | |
|  | N | A | B | C |
| BIOB160 | 977 | 0.03 | 0.12 | 0.39 |
| BIOO230 | 336 | 0.04 | 0.29 | 0.33 |
| WILD301 | 287 | 0.02 | 0.02 | 0.15 |
| BIOE370 | 682 | 0.00 | 0.12 | 0.25 |
| BIOB375 | 534 | 0.04 | 0.11 | 0.29 |
| BIOB420 | 327 | 0.01 | 0.02 | 0.13 |
| M161 | 767 | 0.05 | 0.26 | 0.42 |
| STAT216 | 941 | 0.05 | 0.20 | 0.46 |
| CHMY143 | 647 | 0.03 | 0.30 | 0.39 |
| PHSX205 | 545 | 0.04 | 0.22 | 0.48 |

**Table 5.** The proportion of students who received a (straight) B or higher in math or science courses taken after BIOB 170 (Sec 1) aggregated by grade in BIOB 170. For example, 92% of students who received an A in BIOB170 received a B or higher in BIOB160. BIOB170 grades do not include students whose grade included a plus or minus. The sample size, *N*, is the total number of students who took each course after BIOB170.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | BIOB170 Grade | | |
|  | N | A | B | C |
| BIOB160 | 977 | 0.92 | 0.43 | 0.06 |
| BIOO230 | 336 | 0.78 | 0.19 | 0.06 |
| WILD301 | 287 | 0.82 | 0.65 | 0.50 |
| BIOE370 | 682 | 0.92 | 0.40 | 0.14 |
| BIOB375 | 534 | 0.87 | 0.36 | 0.23 |
| BIOB420 | 327 | 0.94 | 0.77 | 0.47 |
| M161 | 767 | 0.89 | 0.37 | 0.18 |
| STAT216 | 941 | 0.86 | 0.36 | 0.15 |
| CHMY143 | 647 | 0.84 | 0.33 | 0.04 |
| PHSX205 | 545 | 0.90 | 0.59 | 0.28 |

**Table 6.** The grades of straight “C” students in BIOB170 in subsequent math and science courses.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | N | Grade ≥ B | Grade = DFW | Median Grade |
| BIOB160 | 67 | 0.06 | 0.39 | C |
| BIOO230 | 18 | 0.06 | 0.33 | C |
| WILD301 | 20 | 0.50 | 0.15 | B |
| BIOE370 | 36 | 0.14 | 0.25 | C |
| BIOB375 | 31 | 0.23 | 0.29 | C |
| BIOB420 | 15 | 0.47 | 0.13 | B- |
| M161 | 62 | 0.18 | 0.42 | C |
| STAT216 | 67 | 0.15 | 0.46 | C |
| CHMY143 | 28 | 0.04 | 0.39 | C |
| PHSX205 | 25 | 0.28 | 0.48 | C- |