Archival Summary Report: Departmental Learning Outcomes Assessment
(Please complete this form for each academic PROGRAM that is assessed.)

Program: ___Biology Major_____ Department: ___Biology_______ Division: ___Natural Sciences____

Department contact: ___Erin Baumgartner___________ Date: ___8/15/2014_________________________

1. What learning outcome(s) was assessed?

1. Demonstrate mastery of key concepts from the many disciplines within the biological sciences.
2. Demonstrate critical thinking by engaging in laboratory experimentation, field research, data analysis and interpretation at multiple course levels.
3. Demonstrate application of course concepts and skills by engaging in advanced studies and research within areas of particular interest.

2. Where did you get the data for assessment? (e.g., employer survey, embedded assessment, capstone or thesis project, class presentation)

The Department of Biology supports and administers the national Educational Testing Service’s (ETS) Major Field Test (MFT) in Biology, including paying for this instrument. Additionally, we have developed an in-house Exit Survey designed to collect demographic, attitudinal information related to career/training placement, basic skills, research, and advising satisfaction. Faculty annual reports are also aggregated to determine how many undergraduate students are engaging in laboratory experimentation, field research, and data analysis in class and through Independent directed study.

3. What were the findings of the assessment? What did faculty learn about student learning from reviewing the data?

2011 through 2014 ETS-MFT data are summarized in Appendix 1.

The 2014 data has only recently been received from ETS in August 2014, and the department is still reviewing it, so our discussion of ETS trends includes 2014 data, but we anticipate a more thorough review of that data during the upcoming academic year. Generally, we found that WOU biology students continue to perform above the median. However, there has been a slight decline in student performance over the duration of the current version of the Biology MFT (Figure 1). Performance on the four content sections of the exam has been summarized in figures 2 through 5. These performance results show an increasing trend in molecular biology and genetics (Figure 3), and in population biology, evolution, and ecology (Figure 5). Declining trends are seen in cell biology (Figure 2) and organismal biology (Figure 4). Faculty will continue to evaluate MFT results and will consider ways to implement changes based on these data.

Exit Survey data are summarized in Appendix 2.

Overall, we found that students reported their scientific skills as satisfactory and that they found they had ample opportunity to engage in scientific activities, particularly in our core courses of Cell Biology, Ecology, Evolution, and Microbiology. This year saw an increase in Cell Biology, in particular, as emphasizing scientific skills in all categories. We also doubled the number of graduating students who had taken part in Academic Excellence Showcase.
Faculty Report data are summarized in Appendix 3.

Nine Biology Faculty served as mentors for 19 undergraduates engaged in research projects. A total of thirteen projects were presented at the Academic Excellence Showcase. Current and former WOU undergraduate students participated in one peer-reviewed publication and five scholarly presentations with faculty.

4. What changes, if any, will faculty make to curriculum as a result of assessment?

Since we have found that our core courses are perceived by students as providing opportunities to engage in scientific activities, we have continued our focus on the 211-12-13 and 314-15-16 + 331 and 357 Core. Several faculty noted in their annual reports instructional adjustments they have made to enhance opportunities for students. Dr. Baltzley has added laboratory exercises in BI 315 to engage students in practicing basic lab and analytical skills. Dr. Haberman has engaged students in locally relevant “Write to Learn” activities and engaged students in ongoing ecological research in BI 357. Dr. Boomer has enhanced the BI 331 curriculum with inquiry-driven activities and an emphasis on quantitative literacy. Dr. Dutton has included scientific paper reading and discussion into BI 316 to engage students in working with interpretation of real data.

In the next year, we hope to engage in a targeted examination of how faculty view the specific skills emphasized in their courses compared to the student perceptions of specific skills emphasized in those same courses. This should also allow us to identify areas where there are gaps or overlap in particular scientific skills, and to communicate more clearly to students which courses they might select as electives so that they can engage in the full suite of scientific skills. We have also continued our discussion about helping students engage more effectively in directed independent research. Dr. Howard, who already runs formal lab meetings with her undergraduate research students, is currently preparing a temporary course proposal to try developing a “communication of scientific study” class that focuses on experiment design, organization and completion and statistical data analysis. This may provide a good opportunity for our department to begin to examine the utility of such a course to help all of our students gain research experience.
### Appendix 1: 2011 through 2014 ETS Data

<table>
<thead>
<tr>
<th>YEAR</th>
<th>TOTAL TEST SCALED SCORE</th>
<th>MEAN PERCENT CORRECT</th>
<th>MEAN PERCENT CORRECT</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011 (n=34)</td>
<td>157</td>
<td>56</td>
<td>52</td>
</tr>
<tr>
<td>2012 (n=32)</td>
<td>159</td>
<td>57</td>
<td>56</td>
</tr>
<tr>
<td>2013 (n=22)</td>
<td>159</td>
<td>54</td>
<td>58</td>
</tr>
<tr>
<td>2014 (n=26)</td>
<td>156</td>
<td>52</td>
<td>54</td>
</tr>
</tbody>
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### LEGEND/NOTES:
- * = Based on 2010-2014 Comparative Institutional Data (based on 509 institutions; n = 509)
- Subscore 1 = Cell Biology; Subscore 2 = Molecular Biology and Genetics; Subscore 3 = Organismal Biology; Subscore 4 = Population Biology, Evolution, and Ecology
- Assessment Indicator 1 = Biochemistry and Cell Energetics; Assessment Indicator 2 = Cellular Structure, Organization, Function; Assessment Indicator 3 = Molecular Biology and Molecular Genetics
- Assessment Indicator 4 = Diversity of Organisms; Assessment Indicator 5 = Organismal - Animals; Assessment Indicator 6 = Organismal - Plants; Assessment Indicator 7 = Population Genetics and Evolution
- Assessment Indicator 8 = Ecology; Assessment Indicator 9 = Analytical Skills

(Rev. 2/2014)
Figure 1. Total test (i.e., cumulative results for the four content sections of the Biology MFT) results reported as percentiles ($n = 509$ institutions). Results are based on the current version of the Biology MFT exam.

Figure 2. Cell biology (subscore 1) results.

Figure 3. Molecular biology and genetics (subscore 2) results.
Figure 4. Organismal biology (subscore 3) results.

Figure 5. Population biology, evolution, and ecology (subscore 4) results.
Appendix 2: Student Exit Data Summary

26 graduates completed (100%) ETS and Exit Survey, with 57% FEMALE and 43% MALE (more males this year).

Pre-professionals represented the majority.

The average reported degree-completion time was 4.72 years (.22 above last year). 58% stated this was a reasonable amount of time (up 22% from last year). The rest were non-committal – with the majority (5) stating that being a transfer student lengthened college, or that they did not feel they understood the requirements or had a good plan.

For the third time, we asked students to self-assess their ability to perform several cross-cutting skills we defined as important. For this assessment 5 = EXCELLENT, 3 = SATISFACTORY, 1 = NEEDS IMPROVEMENT. This graph was nearly identical to that from last year – EXCEPT students ranked “using technical equipment” 0.7 points higher.

We then asked students to check or write-in the top 3 courses that most prepared them for the following related skills. Our core – especially cell, evolution, ecology, and micro – were the most WELL-represented. Cell increased in all categories across the board. Adv. Human A&P had a majority of write-in’s, and increased across the board as well.
38% of this cohort reported doing independent study (up 2% from last year) with 8 reported doing showcase presentations (double last year!), and 1 receiving Walker support. There were three off-campus presentations. Only 57% graduates (down 3% from last year, and down from 21% from two years ago!) reported doing class-based research, with a fairly equal distribution among Plant Phys, Ecology, Field Botany, and Animal Behavior. As with previous years, however, student interpretation of “research” seemed sketchy – with many students not recognizing research (many students who I know took Ecology and Field Botany).
Appendix 3. Summary of Faculty Reports re: Student Research

Nine Biology Faculty served as mentors for 19 undergraduates engaged in research projects. Biology Faculty in collaboration with current or former WOU students published one paper in peer-reviewed journal and were involved in five refereed presentations at state or national meetings and workshops. A total of thirteen projects were presented at the Academic Excellence Showcase.

Peer Reviewed Publications:


Presentations:


Academic Excellence Showcase:

Presentations:

   Faculty Sponsor: Jeffrey Snyder

Harding, Alexandra, and Leet, Aquilegia. The Street Tree Inventory Project.
   Faculty Sponsor: Bryan Dutton

Posters:

Caudill, Brittney. Growth of Urban Trees in Response to Rainfall and Temperature. Faculty Sponsor: Ava Howard

Davis, Spicie, James, Taylor, and Zachary, Eli. Directional preference in *Drosophila*. Faculty Sponsors: Kristin Latham and Michael Baltzley

Grindstaff, Tyler. Effects of Shading on *Zea mays* (Corn). Faculty Sponsor: Ava Howard

Herrera, Nicole. The Effect of Stream Size on Enteric and Pseudomonad Bacteria Concentrations.
   Faculty Sponsor: Sarah Boomer
Hoda, Anusha. Intraspecies Variability in GABA-Immunoreactive Neurons in the Central Nervous System of Helix aspera. Faculty Sponsor: Michael Baltzley

Kohen, Max. Effects of Bacterial Metabolism on Fruit Fly Development. Faculty Sponsor: Kristin Latham

McCurdy, Kevin. Tomato (Solanum lycopersicum) Response to Hypoxic Stress. Faculty Sponsor: Ava Howard

Meler, Holly. The Effects of UV-B Radiation on the Growth and Functionality of Kale (Brassica oleracea acephala). Faculty Sponsor: Ava Howard

Pettit, Adam. Determining the Effects of Pseudomonas fluorescens on Drosophila melanogaster. Faculty Sponsor: Kristin Latham

Romero, Aaron. Drosophila melanogaster development after ingestion of Pseudomonas fluorescens bacterial strains. Faculty Sponsor: Kristin Latham

Yost, Joel. Identification of GABA Producing Cells in the Nervous System of Hirudo verbena. Faculty Sponsor: Michael Baltzley.