

Biology B.S. (BBS) and B.A. (BBA)
Program Learning Outcomes, F2023-S2024

Learning Outcome: PLO#1

Demonstrate an understanding of the process of science and of the concepts and theories of biology across a broad range of organizational levels, as defined by the Vision and Change nationally-validated set of core biology concepts (AAAS, 2011).

Outcome Measure: Bio-MAPS Assessment (<https://cperl.lassp.cornell.edu/bio-maps>)

Criteria for Success: The overall group mean on the exam will be $\geq 70\%$ correct, and at least 50% of our students will have an overall score $\geq 60\%$ correct. Additionally, the same criteria established for the overall ETS score will be applied to each of the 8 sub-disciplines, which are 1) Evolution, 2) Information Flow, 3) Structure/Function, 4) Energy & Matter, 5) Systems, 6) Cellular & Molecular Biology, 7) Physiology, and 8) Ecology and Evolution.

Aligned with DQP Learning Areas:

1. Specialized Knowledge
2. Broad Integrative Knowledge
3. Intellectual Skills/Core Competencies
4. Applied and Collaborative Learning, and
5. Civic and Global Learning

Longitudinal Data:

	2024, n=43	
	Mean % correct	% of students scoring above 60%
Overall group mean	75%	73%
Evolution mean	74%	65%
Information Flow mean	72%	62%
Structure/Function mean	79%	73%
Energy & Matter mean	74%	65%
Systems mean	75%	65%
Cell. & Molec. Mean	73%	69%
Physiology mean	74%	65%
Ecology & Evolution mean	79%	69%

Conclusions Drawn from Data:

This year we changed our assessment from the ETS major field test in Biology to the Bio-MAPS assessment. We wanted an assessment that is aligned with nationally-validated concepts in Biology, and that also measures overarching concepts instead of extremely specialized knowledge. All assessment goals were met.

Changes to be Made Based on Data: No changes are planned currently. However, we also tested our incoming freshmen with this assessment. The plan is to compare the scores of individuals from freshman year to senior year in order to assess the change in each sub-discipline. This information will allow us to specifically target sub-disciplines in which the pedagogy/content may need to be modified.

Learning Outcome: PLO#2

Participate in the life of the department in Biology/Chemistry clubs or in various positions of responsibility such as graders, tutors, and teaching assistants.

Outcome Measure: Self-reported data of participation.

Criteria for Success: At least 80% of our students will participate in one of these positions during their time at PLNU.

Aligned with DQP Learning Areas (circle one or more but not all five):

1. Specialized Knowledge
2. Broad Integrative Knowledge
3. Intellectual Skills/Core Competencies
4. Applied and Collaborative Learning
5. Civic and Global Learning

Longitudinal Data:

	Number of students responding of total	% participated in life of dept	Criteria met?	Notes
Sp 2024	36 of 42	86%	Yes	For those who reported no participation, some factors mentioned were sports, commuting, and scheduling issues (esp. for transfer students).
Sp 2023	37 of 41	90%	Yes	For those who reported no participation, some factors mentioned were finances (need for a job), sports, family, lack of motivation, and ROTC.
Sp 2022	39 of 41	85%	Yes	For those who reported no participation, some factors mentioned were outside jobs, sports, and commuting.
Sp 2021	51 of 51	84%	Yes	
Sp 2020	44 of 49	77%	Almost	For those who reported no participation, some factors mentioned were outside jobs and involvement in sports.
Sp 2019	31 of 41	80%	Yes	
Sp 2018	NA	NA	NA	Survey not given
Sp 2017	30 of 32	93%	Yes	

Conclusions Drawn from Data:

The BBS/BBA majors are generally participating in the life of the department.

Changes to be Made Based on Data:

No changes to the program.

Rubric Used: Not applicable to self-reported data.

Learning Outcome: PLO#3

Develop a rationally defensible integration of science and faith.

Outcome Measure: During their senior year, students will defend the integration of their faith with various scientific topics via a written essay.

Criteria for Success: At least 80% of our students will score at a level of 3 or higher on the science/faith integration essay rubric, which considers both science/faith integration and critical thinking.

Aligned with DQP Learning Areas (circle one or more but not all five):

1. Specialized Knowledge
2. Broad Integrative Knowledge
3. Intellectual Skills/Core Competencies
4. Applied and Collaborative Learning
5. Civic and Global Learning

Longitudinal Data:

	Number of students	% scoring 3 or above	Criteria met?
Sp 2024	41	90%	Yes
Sp 2023	44	95%	Yes
Sp 2022	41	83%	Yes
Sp 2021	45	93%	Yes
Sp 2020	32	94%	Yes
Sp 2019	41	96%	Yes
Sp 2018	25	96%	Yes
Sp 2017	33	85%	Yes

Conclusions Drawn from Data:

The BBS/BBA majors are able to develop a rationally defensible integration of science and faith.

Changes to be Made Based on Data:

No changes to the program.

Rubric Used: See attached.

BIO 4097 Grading Rubric for *Integration of Science & Faith* Essay (100 points)

Grading aspect	Capstone 4	Milestone 3	Milestone 2	Benchmark 1
Integration of science and faith (evolution or creation care) 0 -20 points	<input type="checkbox"/> Deep personal reflection is evident <input type="checkbox"/> Question for this assignment was <u>clearly answered</u> <input type="checkbox"/> Clear statement of position. <input type="checkbox"/> Well-defended position that merges faith and scientific reasoning (note: the exact position is not important, but rather the evidence of reflection, understanding, and ability to defend that position)	Meets 3 of the criteria for a Capstone 4. Comments:	Meets 2 of the criteria for a Capstone 4. Comments:	Meets 1 or none of the criteria for Capstone 4 Comments:
Critical Thinking 0 – 20 points	<input type="checkbox"/> Issue is stated clearly & position is well-supported with evidence & sources. <input type="checkbox"/> Alternate position(s) is/are clearly addressed in a manner that flows well with the author’s argument <input type="checkbox"/> Clear arguments against these alternate positions using personal reflection and scientific information <input type="checkbox"/> Evaluation of altering position(s) demonstrate(s) grace and understanding	Meets 3 of the criteria for a Capstone 4. Comments:	Meets 2 of the criteria for a Capstone 4. Comments:	Meets 1 or none of the criteria for Capstone 4 Comments:
Incorporation of concepts discussed in PLNU classes 0 – 20 points	<input type="checkbox"/> Specific concepts from specific PLNU classes, including science and/or religion classes, are included as part of reflection and defense of position. <input type="checkbox"/> Includes a clear reflection of how the position has changed while at PLNU. If his/her position has not changed, essay still includes a clear explanation of why it did not change, that demonstrates personal reflection.	Meets 1 of the criteria for a Capstone 4. Comments:		Meets none of the criteria for a Capstone 4. Comments:
Written Communication 0 – 20 points	<input type="checkbox"/> No, or very few, grammatical and spelling errors. <input type="checkbox"/> Essay flow is excellent with a clear introduction, argumentative reasoning, and a strong conclusion. <input type="checkbox"/> Writing effectively communicates with a coll. sci. audience. <input type="checkbox"/> Sufficient length to make a good, complete defense (1200 – 1600 words)	Meets 3 of the criteria for a Capstone 4. Comments:	Meets 2 of the criteria for a Capstone 4. Comments:	Meets 1 or none of the criteria for Capstone 4 Comments:
Information Literacy 0 – 20 points	<input type="checkbox"/> Sources are current, authoritative, and relevant to the topic <input type="checkbox"/> Communicates, organizes and synthesizes information from sources to achieve a specific purpose, with clarity and depth <input type="checkbox"/> Use of in-text citations as well as the annotated bibliography <input type="checkbox"/> Excellent choice of paraphrasing, summarizing, or quoting to enhance the essay and support the author’s argument <input type="checkbox"/> Distinguishes between common knowledge and ideas requiring attribution <input type="checkbox"/> Source for the alternate view actually holds that viewpoint	Meets 3 of the criteria for a Capstone 4. Comments:	Meets 2 of the criteria for a Capstone 4. Comments:	Meets 1 or none of the criteria for Capstone 4 Comments:

Learning Outcome: PLO#4

Be prepared for post-graduate studies or science-related careers.

Outcome Measure: After graduation, alumni will be tracked and data regarding their postgraduate education and profession will be recorded.

Criteria for Success: Success rates for alumni who apply for graduate or professional schools will be > 75% and the percentage of graduates who obtain jobs in science-related occupations will be >70%.

Aligned with DQP Learning Areas (circle one or more but not all five):

- 1. Specialized Knowledge
- 2. Broad Integrative Knowledge
- 3. Intellectual Skills/Core Competencies
- 4. Applied and Collaborative Learning
- 5. Civic and Global Learning

Longitudinal Data:

- 1) The success rate for alumni who apply to graduate or professional schools has been well over 90% for at least 20 years.
- 2) In addition, an alumni survey is conducted by the Office of Institutional Research at PLNU every year. This survey is sent to alumni who graduated 5 years previously. These data are not disaggregated by specific degree, but are applicable to all Biology Department majors..

Year of Summary	2023	2022
Population Surveyed	264	262
Response Rate	41%	44%
Year of Graduation	2014-2018	2012-2016
Employed Full-Time OR Currently in Graduate School Full-Time	82%	85%
Went to graduate school and graduated (of those who are employed full-time)	59%	55%
Satisfied or Very Satisfied with PLNU Education	92% \pm 7%(SD)	94% \pm 6%(SD)

Conclusions Drawn from Data:

The Biology Department majors are successful at obtaining jobs and entering graduate/professional schools. They also seem to be highly satisfied with their PLNU education.

Changes to be Made Based on Data:

No changes to program but we continue to reach out to local biotech companies in order to establish relationships and allow our students to get jobs.

Rubric Used: Not applicable to self-reported data.