

**Biology-Chemistry B.S. (BCHM)**  
**Program Learning Outcomes, F2022-S2023**

**Learning Outcome: PLO1**

Demonstrate an understanding of the process of science and of the concepts and theories of biology across a broad range of organizational levels: cellular, molecular, and organismal.

**Outcome Measure:** ETS Major Field Test in Biology

**Criteria for Success:** The overall group mean on the ETS exam will be  $\geq$  75th percentile and at least 50% of our students will have an overall score  $\geq$  60th percentile. Additionally, the same criteria established for the overall ETS score will be applied to each of the 3 sub-disciplines, which are 1) Cell, 2) Genetic & Molecular, and 3) Organismal Biology.

**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:**

	<b>2023, n=14</b>	<b>2022, n=11</b>	<b>2021, n=15</b>	<b>2018, n=17</b>	<b>2017, n=21</b>	<b>2016, n=12</b>
<b>Overall group mean</b>	76 <sup>th</sup> %ile	81 <sup>st</sup> %ile	70 <sup>th</sup> %ile	70 <sup>th</sup> %ile	83 <sup>rd</sup> %ile	95 <sup>th</sup> %ile
% above 60 <sup>th</sup> %ile	43%	55%	76%	53%	67%	83%
<b>Cell Biology mean</b>	74 <sup>th</sup> %ile	90 <sup>th</sup> %ile	47 <sup>th</sup> %ile	77 <sup>th</sup> %ile	82 <sup>nd</sup> %ile	96 <sup>th</sup> %ile
% above 60 <sup>th</sup> %ile	64%	64%	59%	41%	67%	67%
<b>Genetics/Molecular mean</b>	54 <sup>th</sup> %ile	62 <sup>nd</sup> %ile	68 <sup>th</sup> %ile	63 <sup>rd</sup> %ile	86 <sup>th</sup> %ile	95 <sup>th</sup> %ile
% above 60 <sup>th</sup> %ile	29%	45%	47%	47%	57%	75%
<b>Organismal mean</b>	73 <sup>rd</sup> %ile	85 <sup>th</sup> %ile	79 <sup>th</sup> %ile	65 <sup>th</sup> %ile	80 <sup>th</sup> %ile	93 <sup>rd</sup> %ile
% above 60 <sup>th</sup> %ile	50%	27%	71%	47%	57%	75%

**Conclusions Drawn from Data:**

From 2021-23, most criteria were met or close to being met. (Gray numbers indicate criteria not met.) In 2021, although the overall mean percentile was lower than expected for several areas, 50% or more of the students often scored above the 60<sup>th</sup> percentile. This suggests that some lower scores are pulling down the group means.

In 2019 and 2020, the exam was not administered due to various complications. Since 2018, the data have been so variable that it is difficult to predict whether this is a concerning trend or whether there is another effect, e.g. COVID. From 2015-2017, all criteria were met.

Biology: PLO Data – BCHM, 2022-23

**Changes to be Made Based on Data:** We are considering the use of an alternative exam, as the ETS exam is heavily weighted on content knowledge rather than on critical thinking and scientific process skills.

**Rubric Used:** ETS Comparative Data Guides – MFT for Biology

**Learning Outcome: PLO2**

Apply key concepts and principles in quantitative analysis, biochemistry, bioinorganic chemistry, organic chemistry, and physical chemistry (thermodynamics and kinetics).

**Outcome Measure:** ETS Major Field Test in Chemistry and Senior Exit Survey

**Criteria for Success:** The overall group mean on each subsection of the ETS exam (Analytical, Biochemistry, Inorganic, Organic, Physical) will be at or above the 50<sup>th</sup> percentile. At least 80% of students surveyed will feel prepared or better in meeting this PLO.

**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:**

<b>ETS – MFT Chemistry</b>	2023 n= 12	2022 n = 13	2021, n= 8	2019, n=12	2018, n=17	2017, n=20	2016, n=11
Overall group mean	50 <sup>th</sup> %ile	25 <sup>th</sup> %ile	70 <sup>th</sup> %ile	47 <sup>th</sup> %ile	59 <sup>th</sup> %ile	65 <sup>th</sup> %ile	75 <sup>th</sup> %ile
Analytical mean	71 <sup>st</sup> %ile	33 <sup>rd</sup> %ile	58 <sup>th</sup> %ile	49 <sup>th</sup> %ile	54 <sup>th</sup> %ile	56 <sup>th</sup> %ile	78 <sup>th</sup> %ile
Biochemistry mean	55 <sup>th</sup> %ile	55 <sup>th</sup> %ile	53 <sup>th</sup> %ile	52 <sup>nd</sup> %ile	52 <sup>nd</sup> %ile	64 <sup>th</sup> %ile	52 <sup>nd</sup> %ile
Inorganic mean	56 <sup>th</sup> %ile	37 <sup>th</sup> %ile	68 <sup>th</sup> %ile	40 <sup>th</sup> %ile	55 <sup>th</sup> %ile	52 <sup>nd</sup> %ile	75 <sup>th</sup> %ile
Organic mean	34 <sup>th</sup> %ile	18 <sup>th</sup> %ile	72 <sup>nd</sup> %ile	44 <sup>th</sup> %ile	64 <sup>th</sup> %ile	60 <sup>th</sup> %ile	71 <sup>st</sup> %ile
Physical mean	45 <sup>th</sup> %ile	25 <sup>th</sup> %ile	67 <sup>th</sup> %ile	52 <sup>nd</sup> %ile	58 <sup>th</sup> %ile	70 <sup>th</sup> %ile	78 <sup>th</sup> %ile

\*ETS-MFT not administered in spring 2020 due to COVID-19.

<b>Senior Exit Survey*</b>	2023 n= 5	2022 n= 11	2021 n=5	2019 n=8	2017 n=11	2016 n=7
% feel prepared or better in quantitative analysis	100%	90.9%	100%	100%	100%	100%
% feel prepared or better in biochemistry	100%	81.8%	100%	100%	100%	100%
% feel prepared or better in bioinorganic chemistry	100%	63.6%	100%	100%	100%	100%
% feel prepared or better in organic chemistry	100%	63.6%	100%	100%	100%	86%
% feel prepared or better in physical chemistry (thermodynamics and kinetics)	60%	36.4%	80%	100%	100%	57%

\*Senior exit survey not administered in Chemistry Senior Seminar during spring 2018 and spring 2020 (COVID-19).

**Conclusions Drawn from Data:** When looking at the data we see that in 2022 our students did not meet the criteria for success (50<sup>th</sup> percentile) in any subdiscipline of chemistry except in biochemistry. This is quite concerning given that the numbers are the lowest they have ever been since we started assessing our majors. It is worth noting that a few students did really poorly on

the ETS MFT exam perhaps indicating that they did not take it seriously. Moreover, we question whether having taken online classes during COVID may have affected how our students learned the concepts. We will continue to monitor this closely.

The student survey yielded mixed results. Our students met the criteria for success in quantitative analysis and biochemistry which is encouraging. Since Bioinorganic chemistry is not required for the biology-chemistry major anymore, it is not surprising that the criteria for success was not met. We will have to remove it from our survey. With regards to Organic chemistry, the students did not meet the criteria for success and we believe they may have not felt prepared due to having taken this course online in the Fall 2020 and in a hybrid format in the Spring 2021. Finally, in Physical chemistry, the students did not meet the criteria for success which can be attributed to having an inexperienced adjunct teach the course.

**Changes to be Made Based on Data:** There are no substantial changes that need to be made at this point even though this year students obtained particularly low scores. However, while we have tried to offer the ETS MFT exam at a time where students take it seriously, it appears as if that is not always the case which brings into question the validity of the information collected.

**Rubric Used:** ETS Comparative Data Guides – MFT for Chemistry

**Learning Outcome: PLO3**

Use standard instrumentation and laboratory equipment to conduct scientific experiments and perform chemical characterization and analyses.

**Outcome Measure:** Faculty laboratory instructors' observation of students' use of various standard instruments in different courses (see below) and Senior Exit Survey.

GC: Chemistry 2096 (Organic Chemistry II, formerly CHE 304)

IR: Chemistry 2096 (Organic Chemistry II, formerly CHE 304)

UV-vis: CHE3025 (Physical Chemistry I)

**Criteria for Success:** At least 80% of students will be able to use each of the various instruments with little or no guidance. At least 80% of students surveyed will feel prepared or better in meeting this PLO.

**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:**

% students able to use instrument with little or no guidance	2022-2023	2021-2022	2020-2021	2019-2020	2018-2019	2017-2018	2016-2017
GC CHE2096	89% (n=15)	Not assessed	COVID-19	COVID-19	100% (n=18)	96.6% (n=29)	100.0% (n=16)
IR CHE2096	89% (n=15)	Not assessed	COVID-19	COVID-19	57.9% (n=19)	96.6% (n=29)	93.8% (n=16)
UV-vis CHE325	87% (n=15)	100% (n=13)	100% (n=16)	COVID-19	91.7% (n=12)	100% (n=22)	100% (n=21)

Senior Exit Survey*	2023, n= 5	2022, n= 11	2021, n=5	2019, n=8	2017, n=11	2016, n=11
% feel prepared or better	100%	81.8%	100%	100%	100%	100%

\*Senior exit survey not administered in Chemistry Senior Seminar during spring 2018 and spring 2020 (COVID-19).

**Conclusions Drawn from Data:** Our Biology-chemistry students met the criteria for success in 2022-2023.

**Changes to be Made Based on Data:** No changes needed at this point but we are still actively considering better ways to assess instrument use to make sure we collect accurate data.

**Rubric Used:** The following scale will be used.

<b>Instrument</b>	<b>4</b>	<b>3</b>	<b>2</b>	<b>1</b>
<b>GC (CHE2096)</b>	Able to use instrument independently.	Able to use instrument with little guidance.	Able to use instrument with guidance.	Unable to use instrument even with guidance.
<b>IR (CHE2096)</b>	Able to use instrument independently.	Able to use instrument with little guidance.	Able to use instrument with guidance.	Unable to use instrument even with guidance.
<b>UV-vis (CHE3025)</b>	Able to use instrument independently.	Able to use instrument with little guidance.	Able to use instrument with guidance.	Unable to use instrument even with guidance.

**Learning Outcome: PLO4**

Participate in the life of the Biology and/or Chemistry Department by involvement in one or more of the following areas: research, biology and/or chemistry clubs, and/or various positions of responsibility serving as graders, tutors, stockroom workers and/or teaching assistants.

**Outcome Measure:** Self-reported data of participation and Senior Exit Survey

**Criteria for Success:** At least 80% of our students will participate in one or more department related activities (research, science clubs, positions of responsibility) during their time at PLNU. At least 80% of students surveyed will feel prepared or better in meeting this PLO.

**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 2023	2 of 2	100%	Yes	Small sample size
Sp 2022	7 of 8	100%	Yes	
Sp 2021	7 of 7	85%	Yes	
Sp 2020	NA	NA	NA	Survey not given (Covid)
Sp 2019	8 of 9	89%	Yes	
Sp 2018	NA	NA	NA	Survey not given
Sp 2017	20 of 20	100%	Yes	
Sp 2016	9 of 12	75%	Almost	
Sp 2015	15 of 16	94%	Yes	

<b>Senior Exit Survey*</b>	2023 n=5	2022, n=11	2021, n=5	2019, n=8	2017, n=11
% feel prepared or better	100%	81.8%	100%	100%	100%

\*Senior exit survey not administered in Chemistry Senior Seminar during spring 2018 and spring 2020 (COVID-19).

**Conclusions Drawn from Data:** The BCHM majors are participating in the life of the department. Our criteria for success has been met.

**Changes to be Made Based on Data:** No changes to the program.

**Rubric Used:** Not applicable to self-reported data.

**Learning Outcome: PLO5**

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 achieve a level of 3 or higher on each area of 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?	Notes
SP 2023	2	100%	Yes	Small sample size
SP 2022	8	100%	Yes	
SP 2021	4	100%	Yes	Small sample size
Sp 2020	9	100%	Yes	
Sp 2019	8	100%	Yes	
Sp 2018	9	100%	Yes	
Sp 2017	8	75%	Almost	criteria met within statistical bounds

**Conclusions Drawn from Data:** The BCHM 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* annotated bibliography (Info Literacy Assign #2) (25 points)**

Grading aspect	Capstone 4	Milestones 3	Milestones 2	Benchmark 1
<b>Number of references 0 – 10 points</b>	<input type="checkbox"/> At least 5 references <input type="checkbox"/> At least 3 references are journal articles or books.	<input type="checkbox"/> 3-4 references <input type="checkbox"/> 2 or fewer references are journal articles or books.	<input type="checkbox"/> 2 or fewer references, <input type="checkbox"/> No references are journal articles or books	<input type="checkbox"/> No references
<b>Choice of references 0 – 15 points</b>	<input type="checkbox"/> Annotated bibliography includes 1 – 2 sentences describing choice, use, and purpose of each reference (including bias) <input type="checkbox"/> Particular aspects (chapter, pages, figures) of each source are indicated for which the student anticipates using. <input type="checkbox"/> Sources are of more than one type such as websites, books, and journal articles. <input type="checkbox"/> Credibility of the author is verified <input type="checkbox"/> References are properly formatted <input type="checkbox"/> Includes at least one source from an alternate viewpoint, <u>written</u> by an author that holds that viewpoint.	<input type="checkbox"/> Missing 2 of the details	<input type="checkbox"/> Missing 3 of the details	<input type="checkbox"/> Little evidence of thought and consideration towards the use, purpose, and ideas derived from each source.

**BIO 4097 Grading Rubric for *Integration of Science & Faith* outline (25 points)**

Grading aspect	Capstone 4	Milestones 3	Milestones 2	Benchmark 1
<b>Thesis and direction of the paper 0 – 15 points</b>	<input type="checkbox"/> Thesis is clear <input type="checkbox"/> The outline reflects a clear organization of the paragraphs with supporting ideas, as well as reference to how each source will be used.	<input type="checkbox"/> Thesis is somewhat clear <input type="checkbox"/> Overall organization of outline is somewhat clear	<input type="checkbox"/> Thesis is unclear <input type="checkbox"/> No real indication of any thought towards organization of the ideas and supporting evidence within the paper.	<input type="checkbox"/> No outline
<b>Ideas and organization of the individual supporting paragraphs 0 – 10 points</b>	<input type="checkbox"/> Thoughtful and organized flow of ideas <input type="checkbox"/> Sub-bullets for each main paragraph / supporting idea show evidence of deep thought about the paper <input type="checkbox"/> Mention of multiple concepts from PLNU courses that have influenced position	<input type="checkbox"/> Evidence of overall structure, but student has not yet thought deeply about how to put the main ideas together <input type="checkbox"/> Outline has main ideas, but has few sub-bullets <input type="checkbox"/> Mention of 1-2 concepts from PLNU courses that have influenced position.	<input type="checkbox"/> Very little evidence of thought towards organization, main ideas, and structure for the paper. <input type="checkbox"/> Outline is highly incomplete. <input type="checkbox"/> No mention of how PLNU courses have influenced position.	<input type="checkbox"/> No outline

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

Grading aspect	Capstone 4	Milestone 3	Milestone 2	Benchmark 1
<b>Integration of science and faith (evolution or creation care)</b> <b>0 -20 points</b>	<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:
<b>Critical Thinking</b> <b>0 – 20 points</b>	<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:
<b>Incorporation of concepts discussed in PLNU classes</b> <b>0 – 20 points</b>	<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:
<b>Written Communication</b> <b>0 – 20 points</b>	<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:
<b>Information Literacy</b> <b>0 – 20 points</b>	<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: PLO6**

Be prepared for post graduate studies or a science-related career.

**Outcome Measure:** Tracking of alumni data regarding their postgraduate education and profession along with Senior Exit Survey.

**Criteria for Success (if applicable):** 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%. At least 80% of students surveyed will feel prepared or better in meeting this PLO.

**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. The same can be said about Chemistry Department Majors and the data is shown in the table below.

Year of Summary	2022 (Biology)	2022 (Chemistry)
Population Surveyed	262	122
Response Rate	44%	41%
Year of Graduation	2012-2016	2012-2016
Employed Full-Time OR Currently in Graduate School Full-Time	85%	88%
Went to graduate school and graduated (of those who are employed full-time)	55%	67%
Satisfied or Very Satisfied with PLNU Education	94% ± 6%(SD)	96% ± 4.8%(SD)

- 3) Senior exit survey administered in Chemistry Senior Seminar (not administered during spring 2018 and spring 2020 (COVID-19).)

Senior Exit Survey*	2023 n=5	2022, n=11	2021, n=5	2019, n=8	2017, n=11
% feel prepared or better	100%	100%	100%	100%	100%

**Conclusions Drawn from Data:**

The Biology Department majors and Chemistry 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.

Chemistry Seminar Exit Survey 2023 (Biology-Chemistry Major)

1) What is your current career goal?

- a) Professor
- b) Teacher
- c) Health professional – please specify
- d) Biotechnology or pharmaceutical industry
- e) Academic or government lab
- f) Graduate student – please specify field or specialty
- g) Other – please specify

2) Rank how well prepared you were to meet the following program learning outcomes (goals) that were set for your major.

I. Students will demonstrate an understanding of the process of science, and of the concepts and theories of biology across a broad range of organizational levels: molecular, cellular, and organismal.

unprepared / somewhat unprepared / prepared / well prepared / extremely well prepared

II. Students will apply key concepts and principles in quantitative analysis.

unprepared / somewhat unprepared / prepared / well prepared / extremely well prepared

III. Students will apply key concepts and principles in biochemistry.

unprepared / somewhat unprepared / prepared / well prepared / extremely well prepared

IV. Students will apply key concepts and principles in bioinorganic chemistry.

unprepared / somewhat unprepared / prepared / well prepared / extremely well prepared

V. Students will apply key concepts and principles in organic chemistry.

unprepared / somewhat unprepared / prepared / well prepared / extremely well prepared

VI. Students will apply key concepts and principles in physical chemistry (thermodynamics and kinetics).

unprepared / somewhat unprepared / prepared / well prepared / extremely well prepared

VII. Students will use standard instrumentation and laboratory equipment to conduct scientific experiments and perform chemical characterization and analyses.

unprepared / somewhat unprepared / prepared / well prepared / extremely well prepared

VIII. Students will participate in the life of the Biology and/or Chemistry Department by involvement in one or more of the following areas: research, biology and/or chemistry clubs, and/or various positions of responsibility serving as graders, tutors, stockroom workers and/or teaching assistants.

unprepared / somewhat unprepared / prepared / well prepared / extremely well prepared

IX. Students will develop a rationally defensible integration of science and faith.

unprepared / somewhat unprepared / prepared / well prepared / extremely well prepared

X. Students will be prepared for post graduate studies or a science-related career.

unprepared / somewhat unprepared / prepared / well prepared / extremely well prepared

3) Were you involved in the PLNU chemistry summer research program?

Biology: PLO Data – BCHM, 2022-23

- a) Yes – describe what role this experience played in your learning of chemistry
  - b) No – describe why not
- 4) Do you have any suggestions related to the summer research program?
- 5) What were one or two aspects of the chemistry curriculum that might have been improved?
- 6) Do you feel prepared to take the next step academically?
- a) Yes – describe what experiences (classes) helped you to get there
  - b) No – describe what additional or different experiences would have helped
- 7) If you were starting over as a freshman next fall, would you make any different decisions about your major, or about elective course choices, etc.?
- 8) Are there chemistry courses that PLNU does not offer that you would have liked to take?
- 9) Do you feel like you are a part of the chemistry department community? Why or why not?