



Academic Program Assessment Report for AY 2018-2019

(Due: May 1, 2019)

Program: Biology MS

Date report completed: May 24th

Completed by: Claire Ramos

Assessment contributors (other faculty involved): _____

Please describe the 2018-2019 assessment activities and follow-up for your program below. Please complete this form for each undergraduate major, minor, certificate, and graduate program (e.g., B.A., B.S., M.S.) in your department. Please copy any addenda (e.g., rubrics) and paste them in this document, save and submit it to both the Dean of your college/school and to the Assistant Provost as an email attachment before June 1, 2018. You'll also find this form on the assessment website at <https://www.csupueblo.edu/assessment-and-student-learning/resources.html>. Thank you.

Brief statement of Program mission and goals:

The Biology Program provides the biological component of the liberal arts education. We promote student understanding of biological concepts relevant to the individual and society, and foster an appreciation of scientific inquiry. Biology is an integral subject for other majors' requirements and the Biology department is committed to fulfilling these service courses and general education for other departments.

The graduate program leading to the degree of Master of Science in Biology prepares students to apply basic scientific principles to the practical biological problems encountered in business, industry, government, and education. Graduates from the program will be able to apply the techniques of scientific research to real-world biological problems.

Our students obtain a broad education, covering a wide variety of biological disciplines. We focus on the student, facilitating hands-on experience, interactions with faculty, and opportunities for graduate research in topics of regional interest.

Upon completion of the MS in Biology, students will have achieved the following student learning outcomes as stated in the University Catalog:

SLO 1: **Mastery of the Scientific Method** – Independent development and mastery of problem solving skills including experimental design, execution, critical analysis, and interpretation of the results of original scientific experimentation (thesis) or experiential learning (internship).

SLO 2: **Dissemination of Scientific Products** – Persuasive communication and defense of significant results of original scientific investigation presented in both written and oral format at a graduate peer-professional level.

SLO 3: **Utilization of the Literature** - Critical evaluation of an independently accessed comprehensive body of scientific literature which is project relevant and foundational in supporting and explaining research findings in both written and oral format.

SLO 4: **Development of a Relevant Knowledge Base** - Development of intrinsically held fundamental field-specific knowledge which will be applied to explain and defend research findings at a level of mastery expected by peer-professionals.

SLO 5: **Professionalism and Self Responsibility** – Maintain a consistent professional work ethic of independently taking the initiative and motivation to produce tangible products of a quality commensurate with peer-standards in graduate or professional schools or in the career field being pursued.

I. Assessment of Student Learning Outcomes (SLOs) in this cycle. Including processes, results, and recommendations for improved student learning. Use Column H to describe improvements planned for 2018-2019 based on the assessment process.

A. Which of the program SLOs were assessed during this cycle? Please include the outcome(s) verbatim from the assessment plan.	B. When was this SLO <u>last</u> reported on prior to this cycle? (semester and year)	C. What method was used for assessing the SLO? Please include a copy of any rubrics used in the assessment process.	D. Who was assessed? Please fully describe the student group(s) and the number of students or artifacts involved (N).	E. What is the expected proficiency level and how many or what proportion of students should be at that level?	F. What were the results of the assessment? (Include the proportion of students meeting proficiency.)	G. What were the department's conclusions about student performance?	H. What changes/improvements to the <u>program</u> are planned based on this assessment?
SLO 1: Mastery of the Scientific Method – Independent development and mastery of problem solving skills including experimental design, execution, critical analysis, and interpretation of the results of original scientific experimentation (thesis) or experiential learning (internship).	AY 2017-2018	Rubric administered during thesis defense. (Appendix 1)	We have rubrics from 3 of 3 graduate defenses during AY 2018-2019.	It is expected that 100% of students are at least proficient at this SLO by thesis defense (i.e. average score is ≥ 3 , where 1=ineffective, 2=developmental, 3=proficient, 4=excellent. See assessment plan for scoring details)	100% of students were scored as proficient in this SLO (scores were 3.3, 3.9, 3.9)	The department is satisfied with the students' performance.	No changes to the program, however are some changes to program policies outlined below.

Comments on part I: Although all students met our standard for SLO 1, one student received a score below proficiency from a single faculty member. The low score for this student resulted from the student defending her thesis before her committee had agreed that her thesis was defensible through

the completion of the “advance to candidacy form”. The graduate handbook states that this form must be completed two week prior to thesis defense. In the future, we are enforcing this policy to increase communication between committee members and students and to prevent underprepared students from defending.

II. Closing the Loop. Describe at least one data-informed change to your curriculum during the 2018-2019 cycle. These are those that were based on, or implemented to address, the results of assessment from previous cycles.

A. What SLO(s) or other issues did you address in this cycle? Please include the outcome(s) verbatim from the assessment plan.	B. When was this SLO last assessed to generate the data which informed the change? Please indicate the semester and year.	C. What were the recommendations for change from the previous assessment column H and/or feedback?	D. How were the recommendations for change acted upon?	E. What were the results of the changes? If the changes were not effective, what are the next steps or the new recommendations?
SLO 2: Dissemination of Scientific Products – Persuasive communication and defense of significant results of original scientific investigation presented in both written and oral format at a graduate peer-professional level.	Unknown	Assess this SLO.	A new rubric was developed that simultaneously allows assessment of SLOs 1-5 (Appendix 2). This rubric will be administered both at the thesis defence and at all graduate committee meetings which occur every semester.	The rubric is in its second draft and will be receiving final faculty comments before implementation starting in Summer 19. An assessment report for this SLO will be included in the 19-20 assessment report.
SLO 3: Utilization of the Literature - Critical evaluation of an independently accessed comprehensive body of scientific literature which is project relevant and foundational in supporting and explaining research findings in both written and oral format.	Unknown	Assess this SLO.	A new rubric was developed that simultaneously allows assessment of SLOs 1-5 (Appendix 2). This rubric will be administered both at the thesis defence and at all graduate committee meetings which occur every semester.	The rubric is in its second draft and will be receiving final faculty comments before implementation starting in Summer 19. An assessment report for this SLO will be included in the 19-20 assessment report.
SLO 4: Development of a Relevant Knowledge Base - Development of intrinsically held fundamental field-specific knowledge which will be	Unknown	Assess this SLO.	A new rubric was developed that simultaneously allows assessment of SLOs 1-5 (Appendix 2). This rubric will be administered both at the thesis	The rubric is in its second draft and will be receiving final faculty comments before implementation starting in Summer 19. An


applied to explain and defend research findings at a level of mastery expected by peer-professionals.			defence and at all graduate committee meetings which occur every semester.	assessment report for this SLO will be included in the 19-20 assessment report.
SLO 5: Professionalism and Self Responsibility – Maintain a consistent professional work ethic of independently taking the initiative and motivation to produce tangible products of a quality commensurate with peer-standards in graduate or professional schools or in the career field being pursued.	Unknown	Assess this SLO.	A new rubric was developed that simultaneously allows assessment of SLOs 1-5 (Appendix 2). This rubric will be administered both at the thesis defence and at all graduate committee meetings which occur every semester.	The rubric is in its second draft and will be receiving final faculty comments before implementation starting in Summer 19. An assessment report for this SLO will be included in the 19-20 assessment report.

Comments on part II: Starting in 19-20, all 5 SLOs will be assessed every year. In addition, they will be assessed both in committee meetings and at thesis defence. This will allow for tracking student improvement across the program and to identify at what points in the program the curriculum may need to be modified.

Appendix 1

SLO: Mastery of the Scientific Method and Proficiency in Problem Solving ***Graduate Programs in Natural Sciences MS in Biology Program assessment rubric***

	Excellent	Proficient	Developmental	Ineffective
Independence and ownership of project	Fields questions intelligently without assistance; thorough understanding of project; complete ownership	Fields questions; demonstrates basic understanding of project	Needs help answering questions; lacks complete understanding of some aspects of project	Cannot answer basic questions; poor understanding of key aspects of project; no ownership
Quality of experimental design	Aims test the hypothesis; methods appropriately test the aims; justified choice of variables and controls; adequate sample size	Aims mostly test the hypothesis; methods test most of the aims; questionable choice of variables and controls; sample size questionable	Aims partially test the hypothesis; methods poorly test the aims; dubious choice of variables and controls; insufficient sample size	Aims do not adequately test the hypothesis; methods fail to test the aims; poor choice of variables and controls; sample size is deficient
Execution of experimentation	Very high quality data; completed by student	Good data; mostly completed by student	Adequate data; less than half completed by student	Poor quality of data; most data was not completed by the student
Critical analysis of results	Superb and clearly communicated data presentation; correct and valid statistical analysis	Adequately communicated data presentation; statistical analysis meets minimum standards for validity	Partial or incomplete communication of data; questionable or incomplete statistical analysis	Poorly communicated data presentation; invalid or missing statistical analysis
Interpretation of the results	Relates all results back to aims and hypothesis; communicates significance of results; appropriate comparisons to literature; extends knowledge in field; additional hypotheses generated	Relates some results back to aims and hypothesis; significance of results implied but not clearly stated; partial comparisons to literature; extends knowledge in field additional hypotheses implied	Results poorly linked to aims and hypothesis; weak communication of significance of results; little comparison to literature; insufficiently adds knowledge in field; no future direction generated	Results not linked to aims and hypothesis; does not communicate significance of results; no comparison to literature; merely repeats previous work; no future direction generated

 GPNS MS in Biology				
	Excellent	Proficient	Developmental	Ineffective
Independence and ownership				
Quality of experimental design				
Execution of experimentation				
Critical analysis of results				
Interpretation of results				

Date _____

Academic year _____

Semester _____


This form is to be completed by attending faculty of biology at an MS defense and the data is to be compiled by the program director for programmatic assessment of the student learning outcome (SLO).

Appendix 2

Student Learning Outcomes Evaluation

Graduate Programs in Natural Sciences MS in Biology Program assessment rubric

	Excellent	Proficient	Developmental	Ineffective
Mastery of Scientific Method	<ul style="list-style-type: none"> -Significance compelling -Hypothesis testable and fully supported by background -Aims/predictions fully test hypothesis -Methods achieve aims/test predictions entirely -Methods include robust controls and statistics -Interpretations elucidate hypothesis and significance 	<ul style="list-style-type: none"> -Significance clearly communicated -Hypothesis testable and mostly supported by background -Aims/predictions test the hypothesis -Methods achieve aims/test predictions -Methods include critical controls and adequate statistics -Interpretations elucidate hypothesis and touch on significance 	<ul style="list-style-type: none"> -Significance partially communicated -Hypothesis testable -Aims/predictions test the hypothesis are not compelling -Methods not fully connected to aims/predictions -Methods missing controls or use incorrect statistics -Interpretations relate to the hypothesis but not significance 	<ul style="list-style-type: none"> -Significance not clearly communicated -Hypothesis is trivial or untestable -Aims/predictions do not test hypothesis -Methods do not achieve aims/test predictions -Methods lack controls and statistics -Interpretations do not relate the hypothesis or significance
Dissemination of Scientific Products	<ul style="list-style-type: none"> -Written work is clear and concise -Presentation is dynamic and confident. -Graphs are informative -Products follow correct format. 	<ul style="list-style-type: none"> -Written work requires some editing -Presentation lacks flow -Graphs are unclear -Some incorrect formatting 	<ul style="list-style-type: none"> -Written work is rambling or lacks detail -Presentation is unclear or disorganized. -Graphs are incorrect -Incorrect formatting prevalent 	<ul style="list-style-type: none"> -Written work grammatically incorrect -Presentation is poor -Graphs are absent -Not in scientific format
Utilization of Literature	<ul style="list-style-type: none"> -Systematic review of literature -Can utilize and integrate multiple sources to answer questions 	<ul style="list-style-type: none"> -Some important literature missing -Can give individual sources without integration 	<ul style="list-style-type: none"> -Literature review is incomplete -Can give some but insufficient examples from the literature 	<ul style="list-style-type: none"> -Literature review missing -Does not have a grasp of the literature
Development of a Relevant Knowledge Base	<ul style="list-style-type: none"> -Easily draws on knowledge base to answer questions -Understands and utilizes methods in field of interest -Is an expert in the field 	<ul style="list-style-type: none"> -Can apply outside knowledge to answer questions -Understands common methods in field of interest -Is well versed in field 	<ul style="list-style-type: none"> -Can apply outside knowledge with coaxing -Is somewhat familiar with the field -Is familiar with methods from field of interest, but does not fully understand them 	<ul style="list-style-type: none"> -Cannot answer questions about research topic -Is unfamiliar with common methods in field of interest -Is not familiar with field
Professionalism and Self Responsibility	<ul style="list-style-type: none"> -Complete ownership -Conducts research independently -Schedules meetings without prompting from faculty -Makes and meets deadlines for products 	<ul style="list-style-type: none"> -Partial ownership -Conducts research with some oversight from faculty -Schedules meetings on request -Meets deadlines for products 	<ul style="list-style-type: none"> -Little ownership -Conducts research with faculty oversight -Fails to schedule meetings promptly -Does not meet deadlines for products 	<ul style="list-style-type: none"> -No ownership -Relies on others to conduct research -Does not have regular meetings -Does not produce products

 GPNS MS in Biology	Excellent	Proficient	Developmental	Ineffective	Not Evaluated
	Scientific Method				
Scientific Products					
Literature					
Knowledge Base					
Responsibility					

Student Name: _____

Setting Evaluated: Committee Meeting / Thesis Defense

Semester/Year: _____

This form is to be completed by graduate committee at each committee meeting and by attending biology faculty at thesis defense or internship seminar. Data is to be compiled by the program director for programmatic assessment of student learning outcomes (SLOs).