

**General Education Assessment
Natural Sciences Action Plan**

Part One: Results Discussion / Reflection

The final laboratory report in biology, chemistry and physics introductory labs was used for the assessment of the general education learning outcomes. This process began in concert with the overall transformation of the laboratory curricula, a process which involved pedagogical change, revision of instructional material and assessment design. Given that this process was on-going during the data sampling time, the data collected represents a preliminary evaluation of the curriculum. The criteria for success (CFS) was set as a score of greater than 2.0 by 80% of the students. The table below summarizes the percent of students scoring > 2.0 at the course level, the discipline level and natural sciences overall.

Summary Table for Students Scoring > 2.0

Course (N; TERM)	SLO1	SLO2	SLO3	SLO4
BIOL 1101 (N = 117; S18)	84%	91%	13%	NA
BIOL 1201 (N = 63; F18)	81%	77%	84%	100%
Discipline Scores	81%	87%	44%	100%
CHEM 1151 (N = 301; S18)	85%	84%	52%	NA
CHEM 1161 (N = 324; S18)	85%	87%	53%	NA
Discipline Scores	85%	86%	53%	NA
PHYS 1251 (N = 391; F18)	69%	88%	73%	NA
PHYS 1261	ND	ND	ND	ND
Discipline Scores	69%	88%	73%	NA
GEOL 1501	ND	ND	ND	ND
Natural Sciences	79%	86%	57%	100%

ND = NO DATA; NA = NOT ASSESSED

- The CFS for SLO1 is met in biology and chemistry at the course level; it was not met in physics (69%). It is not met for the Natural Sciences.
- The CFS for SLO2 is met in the chemistry and physics at the course level but only in the combined scores for biology, due to BIOL 1201 (77%). It is not met for the Natural Sciences.
- The CFS for SLO3 is not met in any discipline or for the Natural Sciences. It was met for BIOL 1201 (84%).
- SLO4 was assessed in for biology and the CFS was met. SLO4 was only assessed in Biology 1201 in Fall 2018 and there were only 63 lab report ratings collected. The smaller number of lab reports that were aligned to SLO4 may not reflect all students' capability with regard to GE Natural Science Outcome 4. In addition, the rubric only includes one item (Item 5.0 on the BIOL 1201 Rubric) to assess this SLO, and all students scored 3 out of 3 points on this item.

Part Two: Action Plan

a. Pedagogical / Curriculum

The curricular materials have been revised to include additional information on the nature of a scientific argument and the critical elements – claim, evidence and justification. These are the rubric items used to evaluate SLO3.

Geology will implement the revised curriculum in fall of 2020 which will include material directly related to SLO4. Biology 1201 and Geology 1501 will be used to assess SLO4. The rubric will be expanded to include at least three items related to societal impact. Using two courses and increased rubric detail will provide a more meaningful and generalizable assessment of SLO4. In addition, Chemistry 1161 will add an assessment item related to argument construction around social scientific issues. This can actually be conducted pre/post on a subset of students starting with Chemistry 1151.

b. Student Support Services

We are working with the University Writing Center to provide support for students struggling with writing the lab reports. Across the 3 disciplines the UWC saw 68 students over the course of a week. In order to meet this demand, the UWC is going to start offering 2-hours of walk-in appointments each week that'll be 15-20 min sessions. In addition, guidelines for assisting students with lab reports are being developed for the writing center staff. Additionally, Physics does peer review online in their lab courses, and has created peer review videos for students to use in order to calibrate their review, and support students as they revise their lab reports.

c. Faculty Development

The majority of the laboratory courses are taught by graduate teaching assistants (GTAs). In August, we hold training for 40+ graduate teaching assistants in biology, chemistry, geology, and physics. At this training, GTAs participate in a ample experiment, argumentation session, and evaluation of a sample lab report. They will receive additional instruction in writing the scientific argument (SLO3) as well as scoring the lab reports consistently. This process will be repeated during the semester with-in each discipline for each lab report. These interventions will facilitate consistent use of the rubric.

d. Other Areas

It is critical that the next round of data acquisition be consistent with the standard student path through the courses, which is a Fall and Spring for each two-semester sequence.

Fall 2021 BIOL 1101, CHEM 1151, PHYS 1251, GEOL 1501

Spring 2022 BIOL 1201, CHEM 1161, PHYS 1261, GEOL 1501

This is due to the fact that students in these courses are from different groups. Because of this, we expect different outcomes in each semester for the same course.