**GE Area 2 Assessment**

**Semester:** Fall 2019

**GELO:** Apply scientific principles to measure and observe the physical world.

**Method of Assessment:** Analysis of activities across multiple semesters in BIO ~~110~~, ~~120~~, 220, CHEM 110, ~~111~~, 120, PHYS 110, PHYS 120, 140, EART 110, GEOL 110, ENGI 240 courses

**Criteria:** 70% of students will earn a \_70%\_\_% or higher on the activity

**Results**

Quantitative: 78% average on activities across courses over a 5-year period

Reflections:

Students demonstrated excitement for applying scientific principles when moving from theory to hands-on practices. They improved by realizing the role of error in experimentation and displayed enthusiasm for lab techniques regarding safety. Degree reasoning in relation to other chemicals and substances was typically an area of strength, in addition to lab reports (communication). Understanding systems are interrelated increases engagement as students start thinking about applications outside of class.

Student displayed difficulties applying labs to circumstances, hypotheticals, order of magnitude and estimating reasonable values. Other challenges included categorizing, extrapolating data, figuring out what model to use, integrating experiences across disciplines, and math calculations. The change of math approaches in K-12 curriculum disrupted current students’ abilities as they were switched partway rather than experiencing new math from start to finish. Going from atomic to macro proved challenging. Following instructions is sometimes an issue.

Introductory courses hep students understand what circumstances require careful calculations.

Other possible assessment methods: pulling data from labs and lab reports for Biology; pre-lab questions; adding a practicum for ENGI, EART/GEOL, CHEM

Future GE assessment should include: BIO 219, CHEM 121, and GEOL 111

Planned Action:

Individual instructors can incorporate more visuals and stories into teaching methods, adding case studies in Biology where students determine the conclusion, include more real-world problems to solve related to careers, and more consideration for ethics in problem solving. Building estimation into labs before experiments would encourage critical thinking, help with visualizing, and add points of reference prior to labs.

Institutional support is needed for Math Center Modules (in Canvas) on the metric system or through a mastering biology platform to help make online information more concrete.

Equipment needs: Engineering industrial equipment to measure