

Degree/Certificate: BAE

Major/Option: Earth & Space Science Major

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Part I – Program SLO Assessment Report for 2015-16

Part I – for the 2015-16 academic year:

1. **Student Learning Outcomes:**

Students will:

- A demonstrate an understanding of the principles and concepts of Earth and Space Science and apply supporting knowledge of chemistry, biology and physics;
- B demonstrate an understanding of various methods of science inquiry;
- C plan and implement Earth and Space Science lessons aligned with the national and state standards; construct and use effective assessment strategies.

2. **Overall evaluation of progress on outcome:** *Indicate whether or not the SLO has been met, and if met, to what level.*

SLO A)

- SLO is met after changes resulting from ongoing assessments, referencing assessment results from the previous year to highlight revisions;
- SLO is met, but with changes forthcoming;
- SLO is met without change required

SLO B)

- SLO is met after changes resulting from ongoing assessments, referencing assessment results from the previous year to highlight revisions;
- SLO is met, but with changes forthcoming;
- SLO is met without change required

SLO C)

- SLO is met after changes resulting from ongoing assessments, referencing assessment results from the previous year to highlight revisions;
- SLO is met, but with changes forthcoming;
- SLO is met without change required

3. **Strategies and methods:** *Description of assessment method and choices, why they were used and how they were implemented.*

Both internal and external program assessments were used to evaluate these SLOs.

Internal assessment:

Three assignments within GEOL 390 were used to assess the selected SLOs, since this class only ~~contains-enrolls~~ students who will be teaching Earth and Space Science and ~~and-the~~ course is taken during their senior year.

- i) SLO A
This objective is partly assessed with a content quiz created specifically to uncover student misconceptions in various earth and space science concepts. Numerous questions require understanding of related science domain concepts.
- i) SLO A & C
In a separate assignment, students create a formative assessment for an earth or space science Next Generation Science Standard (NGSS). The assessment is in the form of a probe made to uncover common misconceptions in their content area. The assignment assesses both parts of the SLO C by requiring them to construct an effective strategy for a standard. It also assesses the content of SLO A.
- ii) SLO B & C
Students are required to plan an earth and space science 5-E inquiry lesson that will meet a randomly selected NGSS. As part of this assignment they are required to create both formative and summative assessment strategies. This lesson is then implemented with their peers thereby providing assessment of the entire SLO C. Different aspects of the SLO were graded separately in two rubrics to allow better analysis of the various parts of the SLO.

External assessment:

- i) SLO A & B
West-E results were used because all students are required to take the exam before student teaching. The West-E exam assesses SLO A by having the students demonstrate their understanding of earth and space science concepts along with chemistry, biology and physics supporting knowledge. Domain 5 measures their science process and inquiry skills (SLO B).

ii) SLO A, B & C

The edTPA was also used as an external assessment tool. Individual rubrics measure different aspects of their teaching. Three were selected that align with our program SLOs. One rubric to assess planning for subject specific understanding (SLO A), a rubric that measures subject specific pedagogy (SLO A & C) and the last for planning assessment to monitor and support student learning (SLO B).

4. **Observations gathered from data:** *Include findings and analyses based on the strategies and methods identified in item #3.*

a. Findings:

Internal Assessment

SLO	Average Grade	Note
A	78%	n = 6
A & C	81%	n = 6
B & C	85%% planning lesson 90 % implementation	n = 6

External Assessment

From the 4 students taking the West-E exam last year, all 4 passed the test, with one student having to retake it after the first attempt. Results are reported as domains. Results exceeding 3.0 mean the student is proficient in this area. Domain 5 assesses science process and inquiry. The average score for this domain, including the failed attempt is, 3.2.

Three students from the program took the edTPa during the 2015-16 year with a 100% pass rate. The following is a summary of results pertinent to the SLOs being assessed.

Component of edTpa	Average for students *
Planning for subject specific understanding (SLO A)	3.67
Assessments (SLO B)	3.4
Subject specific pedagogy (SLO A & C)	2.3

* 2.0 up to 2.99 = represents the knowledge and skills of a candidate that is possibly ready to teach

3.0 and higher = represents the knowledge and skills of a candidate who is ready to teach

b. **Analysis of findings:**

In conclusion to the findings above;

SLO A Students will demonstrate an understanding of the principles and concepts of Earth and Space Science and apply supporting knowledge of chemistry, biology and physics;

Although the number of students is statistically small, the combination of external and internal assessments suggests the students are generally proficient in this area.

SLO B Students will demonstrate an understanding of various methods of science inquiry;

Both sets of data confirm that students have an understanding of science inquiry. Internal and external assessment shows they can create and implement inquiry lessons and demonstrate inquiry skills in an exam situation.

SLO C Students can plan and implement Earth and Space Science lessons aligned with the national and state standards; construct and use effective assessment strategies.

Internal assessment shows both parts of this SLO are being met by students. It is unclear from the external edTPA, since 2 students were proficient and one was not. The combined data suggests students are doing well with constructing and using assessments as well as planning lessons.

5. What program changes will be made based on the assessment results?

a) Describe plans to improve student learning based on assessment findings (e.g., course content, course sequencing, curriculum revision, learning environment or student advising).

During the 2015-16 school year the program was evaluated to make sure classes are aligning with the new 2014 Washington State earth and space science competences. This was completed as part of the re-approval of the program by PESB (Professional Education Standards Board), June 2016. Changes involved the expansion of the science methods classes to incorporate more engineering practices and DCIs from the NGSS as well as new updated SLOs to reflect those changes.

b) Provide a broad timeline of how and when identified changes will be addressed in the upcoming year.

The changes described are being implemented starting in Fall 2016. As a result, the consequences of these changes cannot be assessed until the end of the coming school year.

6. Description of revisions to the assessment process the results suggest are needed and an evaluation of the assessment plan/process itself.

One important consideration is that our data should be analyzed with caution since the number of students is low and one or two individuals can skew the data considerably.

As part of the alignment of our program to the new state earth and space science competences, we reviewed and modified our student learning outcomes, to be implemented fall 2016. Since we will be assessing different SLOs next school year (see new SLOs in section below), we need to develop new assessment tools. SLOs 1, 2 and 4 can be assessed using tools already developed. SLOs 3, 4 and 5 have been incorporated into new assessments. We will still be using the only two available external assessments to evaluate the new SLOs.

NEW: PART II – CLOSING THE LOOP
FOLLOW-UP FROM THE 2014-15 PROGRAM ASSESSMENT REPORT

In response to the university's accrediting body, the [Northwest Commission on Colleges and Universities](#), this section has been added. This should be viewed as a follow up to the previous year's findings. In other words, begin with findings from 2014-15, and then describe actions taken during 2015-16 to improve student learning along, provide a brief summary of findings, and describe possible next steps.

PLEASE NOTE: The College-Level Synthesis report includes a section asking Deans to summarize which programs/certificates have demonstrated "closing-the-loop" assessments and findings based on the previous year's assessment report.

Working definition for closing the loop: *Using assessment results to improve student learning as well as pedagogical practices. This is an essential step in the continuous cycle of assessing student learning. It is the collaborative process through which programs use evidence of student learning to gauge the efficacy of collective educational practices, and to identify and implement strategies for improving student learning.* Adapted 8.21.13 from <http://www.hamline.edu/learning-outcomes/closing-loop.html>.

1. **Student Learning Outcome(s)** assessed for 2014-15
Students will:
 - A demonstrate an understanding of the principles and concepts of Earth and Space Science and apply supporting knowledge of chemistry, biology and physics;
 - B demonstrate an understanding of various methods of science inquiry;
 - C plan and implement Earth and Space Science lessons aligned with the national and state standards; construct and use effective assessment strategies.
2. **Strategies implemented** during 2015-16 to improve student learning, based on findings of the 2014-15 assessment activities.

Last year's assessment indicated that the program was meeting SLO B in its entirety and that A and C were being met with 'changes forthcoming' as outlined below. Some changes in key assessments were already made in fall 2015 to reflect this. Data was collected in its raw form for the first internal assessment for SLO A.

Plans to improve student learning in last year's assessment involved changes to the science methods classes to incorporate and align with the Next Generation Science Standards adopted by Washington State. As part of the re-approval process for the state (PESB) last year, we went through CPAC changes to the science methods classes. SCED 390 was increased from 1 credit to 2 and GEOL 390 changed to SCED 391 and expanded from 1 to 3

credits. These class changes will allow the incorporation of the engineering DCIs and practices required by NGSS.

Another change made as indicated in last years' assessment were the student learning outcomes to reflect the new state competencies. The new SLOs are as follows:

Students will

1. explain the disciplinary core ideas of earth and space science and guide the learning of others in key principles of earth and space science outlined in the Next Generation Science Standards (NGSS);
2. apply science and engineering practices in NGSS;
3. incorporate instructional materials and teaching strategies to a community of diverse students;
4. explain how cross-cutting ideas bridge disciplinary boundaries, uniting core ideas throughout the fields of science and engineering;
5. appropriately respond to potential safety hazards in different learning environments, e.g. laboratory, classroom, field.

All these changes are being implemented starting fall 2016.

Summary of results (*may include comparative data or narrative; description of changes made to curriculum, pedagogy, mode of delivery, etc.*): Describe the effect of the changes towards improving student learning and/or the learning environment.

The West-E and edTpa data was used in this years program evaluation and in general supports our findings from this year and previous years that we are meeting our SLOs. As indicated above changes are being implemented this year and we will not be able to assess the effect of those changes until the end of the 2016-17 school year.

3. What **further changes to curriculum, pedagogy, mode of delivery, etc.** are projected based on closing-the-loop data, findings and analysis?

None warranted at this time.

Definitions:

1. **Student Learning Outcome:** The student performance or learning objective as published either in the catalog or elsewhere in your department literature.
2. **Overall evaluation of progress on outcome:** This checklist informs the reader whether or not the SLO has been met, and if met, to what level.

3. **Strategies and methods used to gather student performance data**, including assessment instruments used, and a description of how and when the assessments were conducted. Examples of strategies/methods: embedded test questions in a course or courses, portfolios, in-class activities, standardized test scores, case studies, analysis of written projects, etc. Additional information could describe the use of rubrics, etc. as part of the assessment process.
4. **Observations gathered from data**: This section includes findings and analyses based on the above strategies and methods, and provides data to substantiate the distinction made in #2. For that reason this section has been divided into parts (a) and (b) to provide space for both the findings and the analysis of findings.
5. **Program changes based on the assessment results**: This section is where the program lists plans to improve student learning, based on assessment findings, and provides a broad timeline of how and when identified changes will be addressed in the upcoming year. Programs often find assessment is part of an ongoing process of continual improvement.
6. **Description of revisions to the assessment process the results suggest are needed**. Evaluation of the assessment plan and process itself: what worked in the assessment planning and process, what did not, and why.

Some elements of this document have been drawn or adapted from the University of Massachusetts' assessment handbook, "Program-Based Review and Assessment: Tools and Techniques for Program Improvement" (2001). Retrieved from http://www.umass.edu/oapa/oapa/publications/online_handbooks/program_based.pdf