

Assurance of Student Learning Reflection 2024-2025

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<i>Geological Sciences #5008</i>	
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Is this an online program? ☐ Yes ☒ No	Please make sure the Program Learning Outcomes listed match those in CourseLeaf. Indicate verification here ☒ Yes, they match! (If they don't match, explain on this page under Evaluation)

Instructions: For the 2024-25 assessment, we are asking you to reflect on the last three-year cycle rather than collect data. It's important to take time to look over the results from the last assessment cycle and really focus on a data-informed direction going forward. In collaboration with your assessment team and program faculty, review each submitted template from 2021-2024 and consider the following for each Program Learning Outcome, add your narrative to the template, and submit the draft to your **ASL Rep** by **May 15, 2025**.

Program Student Learning Outcome 1	
Program Student Learning Outcome	Students will be able to apply fundamental geological principles in solving problems.
Evaluation	Faculty reaffirmed the centrality of this outcome during the recent program review. The wording is concise, single-barreled, and uses an upper-Bloom verb ("apply"). It remains fully relevant to the revised curriculum; no textual change is proposed for 2025-26.
Measurement Instruments	Direct measure: In the final senior year, all graduating students must take the capstone course, GEOL 499 Professional Preparation. As part of this course, students take a comprehensive ASL exam, which consists of 25 questions in total, combining short-answer and multiple-choice formats. This exam is not part of the course grading and is specifically designed to assess the three SLOs. In the ASL exam, there are 10 questions related to SLO 1, which represent key concepts from the five core courses in the Geological Sciences B.S. degree curriculum. Because students complete the timed ASL exam in the classroom under the instructor's supervision, AI use is not a concern. From AY 2025-26 forward, answers will be scored with the newly adopted analytic rubric (copied at the end of the document) rather than raw percent correct. The instrument aligns well with the outcome; rubric use will increase inter-rater reliability.
Criteria & Targets	2021-24 benchmark: individual scoring $\geq 60\%$ on the SLO-specific portion and $\geq 70\%$ of the cohort meeting that benchmark. Because the target has been exceeded two years running, we will raise it to $\geq 65\%$ individual and $\geq 75\%$ cohort beginning 2025-26.
Results & Conclusion	• 2021-22: 56 % met the 55 % target (Met). Performance in Mineralogy lagged amid pandemic disruptions. • 2022-23: 78 % met the 60 % target (Met). Post-pandemic rebound. • 2023-24: 75 % met the 60 % target (Met). Consolidation of Mineralogy & Petrology yielded modest gains.

	Trend: upward and stable; goals achieved in all three years.
<u>**IMPORTANT - Plans for Next Assessment Cycle:</u>	- Revise the ASL exam (e.g., replacing multiple-choice questions with essay/short-answer questions) and curriculum map to reflect the new grading rubric and to align with the upcoming curriculum revision of the program. - Implement rubric scoring with a calibrated norming session for faculty. - Monitor the newly revamped Mineralogy & Petrology course; trigger intervention if < 70 % cohort success.

Program Student Learning Outcome 2	
Program Student Learning Outcome	Students will recognize and articulate the integrative nature and deep-time connection of various earth system components, including lithosphere, hydrosphere, atmosphere, and biosphere.
Evaluation	Outcome remains essential to an Earth-systems-oriented curriculum and is measurable via explanation and synthesis tasks. Faculty judged it sufficiently specific; no wording change needed.
Measurement Instruments	Direct measure: In the final senior year, all graduating students must take the capstone course, GEOL 499 Professional Preparation. As part of this course, students take a comprehensive ASL exam, which consists of 25 questions in total, combining short-answer and multiple-choice formats. This exam is not part of the course grading and is specifically designed to assess the three SLOs. In the ASL exam, there are 10 questions related to SLO 2, which represent key concepts from the five core courses in the Geological Sciences B.S. degree curriculum. Beginning 2025-26, each response will receive rubric-based scores for accuracy and depth.
Criteria & Targets	2021-24 benchmark: individual scoring $\geq 60\%$ on the SLO-specific portion and $\geq 70\%$ of the cohort meeting that benchmark. Having achieved 87–100 % cohort success the past two years, the target will increase to $\geq 65\%$ <i>individual</i> and $\geq 75\%$ <i>cohort</i> for 2025-26.
Results & Conclusion	2021-22: 78 % met goal (Met). 2022-23: 100 % met goal (Met). 2023-24: 87 % met goal (Met). Integration skills strengthened as students progressed through revised upper-division sequence.
<u>**IMPORTANT - Plans for Next Assessment Cycle:</u>	- Revise the ASL exam (e.g., replacing multiple-choice questions with essay/short-answer questions) and curriculum map to reflect the new grading rubric and to align with the upcoming curriculum revision of the program. - Adopt rubric to capture quality gradations, not just correctness. - Monitor whether biennial offering of upper-division courses affects longitudinal mastery.

Program Student Learning Outcome 3

Program Student Learning Outcome	Students will be able to demonstrate an understanding of current societal issues related to earth science.
Evaluation	With growing public attention to climate resilience, resource security, and geologic hazards, this outcome remains timely. It is measurable and single-barreled.
Measurement Instruments	Direct measure: In the final senior year, all graduating students must take the capstone course, GEOL 499 Professional Preparation. As part of this course, students take a comprehensive ASL exam, which consists of 25 questions in total, combining short-answer and multiple-choice formats. This exam is not part of the course grading and is specifically designed to assess the three SLOs. In the ASL exam, there are 5 questions related to SLO 3, which represent key concepts from the five core courses in the Geological Sciences B.S. degree curriculum. Rubric categories (accuracy, relevance, societal linkage) will be introduced in 2025-26.
Criteria & Targets	2021-24 benchmark: individual scoring $\geq 60\%$ on the SLO-specific portion and $\geq 70\%$ of the cohort meeting that benchmark. Having achieved 78–87% cohort success the past two years, the target will increase to $\geq 65\%$ <i>individual</i> and $\geq 75\%$ <i>cohort</i> for 2025-26.
Results & Conclusion	• 2021-22: 78 % met goal (Met). • 2022-23: 78 % met goal (Met). • 2023-24: 87 % met goal (Met). Students demonstrate growing ability to link geological sciences to societal decisions, particularly in climate and natural hazard issues.
<u>**IMPORTANT - Plans for Next Assessment Cycle:</u>	• Revise the ASL exam (e.g., replacing multiple-choice questions with essay/short-answer questions) and curriculum map to reflect the new grading rubric and to align with the upcoming curriculum revision of the program. • Add an additional direct instrument from an upper-level course (GEOL 301, GEOL 360 or GEOL 408) to measure SLO 3. Embedded questions in the GEOL 301 assignment, or a lab from GEOL 360 or GEOL 408 will be used as an artifact. Which course is used annually will be based on the course offered in the AY since they are taught on an every third or fourth semester rotation. • Adopt rubric to capture quality gradations, not just correctness.

Rubric for ASL Exam

SLO 1 – Apply fundamental geological principles in solving problems

Rank	Performance Description	Typical Evidence
3 – Exemplary	Correctly identifies all relevant principles, applies them logically, and reaches a sound solution. Shows clear reasoning and, where appropriate, quantitative work that is accurate.	Answer is fully correct, includes clear explanation of principle(s) used, and demonstrates how they lead to the conclusion.
2 – Proficient	Identifies most relevant principles and applies them with minor slips or incomplete justification. Solution is essentially correct but lacks depth, precision, or clear linkage to every principle invoked.	Answer is mostly accurate; minor conceptual error, or explanation is brief/partially tied to the principle.
1 – Developing	Misidentifies or omits key principles, applies them incorrectly, or provides an unsupported/incorrect solution.	Answer shows significant misunderstanding or leaves reasoning undocumented.

SLO 2 – Recognize and articulate the integrative nature and deep-time connection of Earth-system components, including lithosphere, hydrosphere, atmosphere, and biosphere

Rank	Performance Description	Typical Evidence
3 – Exemplary	Clearly explains interactions among ≥ 3 spheres, places them within an appropriate geologic-time framework, and uses accurate terminology. Cites specific processes/events to illustrate integration.	Presents a coherent, well-supported narrative linking spheres over geologic time with examples.
2 – Proficient	Describes interactions among at least 2 spheres and attempts to reference time scale. Discussion may be somewhat general or omit key details, but relationships are mostly correct.	Provides accurate but surface-level explanation (e.g., links weathering to carbon cycle but time dimension is vague).

1 – Developing	Lists spheres without explaining interactions, confuses processes, or ignores time scale.	Fragmented or erroneous statements (e.g., treats biosphere in isolation, no temporal context).
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SLO 3 – Demonstrate an understanding of current societal issues related to earth science

Rank	Performance Description	Typical Evidence
3 – Exemplary	Accurately explains an earth-science issue (e.g., groundwater contamination, climate change, critical-mineral supply), integrates scientific data, and explicitly links implications to society. Offers nuanced insight or potential solutions.	Cites up-to-date statistics, articulates cause–effect, and discusses stakeholders or mitigation strategies.
2 – Proficient	Correctly describes the scientific basis of the issue and notes at least one societal implication, but analysis is limited in scope or lacks supporting detail.	Mentions sea-level rise and coastal impacts but provides few specific data or no mitigation strategies.
1 – Developing	Provides inaccurate, incomplete, or purely anecdotal discussion; fails to connect science to societal relevance.	Misstates the science (e.g., confuses ozone depletion with greenhouse effect) or omits human dimension.