PROGRAM ASSESSMENT PLAN

Geology (GLY)

Part 1: Student Learning Outcomes (SLOs)

The goal of the Geology (GLY) program is to prepare students for entrance into graduate programs in the geological sciences and for careers in geology with private companies, industry, and state and federal agencies. The program also enables students to develop the writing, speaking, and independent learner skills expected of a baccalaureate major in the liberal arts.

- ***SLO 1: Knowledge***. *Students can understand and apply the fundamental terminology, concepts, and principles of geology and its sub-disciplines.*
- ***SLO 2: Skills***. *Students can use, understand, and apply the tools and methods of geology in field and laboratory settings.*
- ***SLO 3: Writing***. *Students can clearly communicate ideas and findings of geology in written reports and papers.*
- ***SLO 4: Speaking***. *Students can clearly communicate ideas and findings of geology in spoken presentations.*
- ***SLO 5: Application***. *Students can independently apply the knowledge and skills of geology to real world problems and settings.*

These SLOs are essentially the same as the learning outcomes developed for the program in 1999 and which have been used for program reviews in 2005 and 2012. SLOs 1 and 2 reflect the scope of the Fundamentals of Geology exam that is administered by National Association of State Boards of Geology (ASBOG), which is intended to test "...knowledge and skills acquired in an academic setting that leads to a baccalaureate degree"[1]. SLOs 3 to 5 are additional competencies that students are expected to develop through completion of this program.

[1] ASBOG Professional Geologists Candidate Handbook, Rev. August 2014.

Part 2: Curriculum Map

Coursework in the Geology (GLY) program can be conceptualized as forming three tiers. First, introductory courses at the 2xx-level provide an overview of the discipline and introduce key knowledge and skills of geology. Second, the knowledge and skills specific to the various sub-disciplines of geology are developed further in courses mostly at the 3xx-level, most of which also include assignments wherein students communicate ideas and findings in written and/or spoken formats. Third, a range of applied learning experiences at the 4xx-level enable students to apply what they've learned throughout their program in field and real world situations.

	SLO 1 Knowledge		**SLO 2 Skills**		**SLO 3 Writing**		**SLO 4 Speaking**		**SLO 5 Application**	
	Level I/R/E	Assess A	Level I/R/E	Assess A	Level I/R/E	Assess A	Level I/R/E	Assess A	Level I/R/E	Assess A
Required courses										
GLY 261: Physical Geology	I		I							
GLY 262: Historical Geology	I		I		I		I			
GLY 301: Mineralogy	R	A	R	A					I	
GLY 302: Ig. & Meta. Petrology	R	A	R	A	R	A	R	A	I	
GLY 359: Sedimentary Geology	R	A	R	A	R	A			I	
GLY 363: Inv. Paleontology	R	A	R	A	R	A			I	
GLY 367: Geomorphology	R	A	R	A	R	A	R	A	I	
GLY 390: Hydrogeology	R	A	R	A	R	A			I	
GLY 469: Structural Geology	R	A	R	A	R	A			I	
GLY 476: Geol. Field Methods or GLY 481: Field Geology	E		E						R/E	A
Elective courses										
GLY 371: Meteorology	R	A	R	A						
GLY 396: Aq. Geochemistry	R		R							
GLY 397: Phys. Oceanography	R	A					R	A		
GLY 400: Supp. Field Studies									I	
GLY 487: Intern. Applied Geol.									R	
GLY 494: Geol. Lab. Experience									R	
GLY 497: Research Experience									I	
GLY 498: Res. Investigation									R	
GLY 499: Research Thesis									E	

Notes: I = SLO introduced, R = SLO reinforced, E = SLO emphasized for mastery, A = SLO assessed

Part 3: Key Assessments

Assessment data are collected in all required 3xx and 4xx-level GLY courses as well as in the two elective 3xx-level GLY courses that are most frequently taken by students. This broad collection of data provides a comprehensive view of student learning across all of the sub-disciplines that comprise the Geology program. The types of SLO assessment data collected in each course are as follows:

- ***SLO 1: Knowledge.*** The final exam score for the course if the final exam is cumulative, or the average of unit exam scores if the course is taught as distinct sub-sections. These data reflect how well students demonstrate their retention and comprehension of factual and conceptual content in these courses (e.g. responses to multiple choice questions, short explanation or description questions, longer essays, etc.).
- ***SLO 2: Skills.*** The final laboratory exam, quiz or practicum score if cumulative, or the average of unit laboratory exam, quiz or practicum scores if the course is taught as distinct sub-sections, or an aggregate score based on laboratory and/or homework assignments. These data reflect student performance in the skills taught in courses that include a laboratory component (e.g. identification of minerals or rocks or fossils, numerical or graphical problem solving, interpretation of data, etc.).
- ***SLO 3: Writing.*** Scores for final drafts of research papers. These data reflect how well students communicate their findings from research assignments (e.g. literature review, original data collection, etc.) in a written format.
- ***SLO 4: Speaking.*** Scores for final research presentations. These data reflect how well students communicate their findings from research assignments (e.g. literature review, original data collection, etc.) in a spoken format.
- ***SLO 5: Application.*** Scores from the week-long South Bethlehem mapping project, which is the last week of GLY 476 and the third week of GLY 481 taught in summers at Brauer Field Station. This project requires students to apply knowledge and skills from multiple courses in their program to the real-world task of mapping geological units in the field.

Data collection and analysis

Instructors are responsible for providing one to four course SLO scores for each student in their course. For example, GLY 367: Geomorphology currently includes three unit exams, has a laboratory component, and students present a literature review as both a written paper and an oral presentation; accordingly, the instructor calculates course SLO scores for SLOs 1, 2, 3, and 4 for each student at the end of the course. In contrast, GLY 397: Physical Oceanography has exams and a presentation but no laboratory or paper, and so the instructor only provides scores for SLOs 1 and 4. Each course SLO score is calculated based on materials submitted by the student that have been instructor-graded and is expressed on a scale of 0 to 10.

The Department Chair is responsible for collating course SLO scores from instructors. Data are entered into a master spreadsheet and are organized by student (i.e. each student in the program has a row in the spreadsheet wherein their course SLO scores over multiple semesters are recorded). When a student graduates, their accumulated SLO scores are used to calculate an average score for each of the learning outcomes (SLOs 1 through 5). The average SLO scores for the individual students are then aggregated by graduation year (August through May) to provide an annual snapshot of student performance in the program (example below). The summary statistics of the annual snapshot can then be used for reporting purposes, and the spreadsheet with the calculations and data details can be used by department faculty to look at underlying issues and to consider changes for programmatic improvement.

Geology (GLY) program SLO assessment data for 2014-15 graduation cohort

	SLO 1: Knowledge	**SLO 2: Skills**	**SLO 3: Writing**	**SLO 4: Speaking**	**SLO 5: Application**
Average score	8.14	8.31	8.30	8.75	8.34
Standard deviation	0.76	0.57	0.66	0.43	0.35
Number of students	11	11	11	11	10
Median score	8.09	8.28	8.50	8.60	8.45
Maximum score	9.48	9.18	9.08	9.35	8.70
Minimum score	6.99	7.37	7.28	8.02	7.70
No. scores less than 7.0	1	0	0	0	0

Scores are on a scale of 0 to 10.

Part 4: Assessment Cycle

We will collect and analyze our SLO assessment data in an annual cycle:

- May - faculty submit course SLO scores to the Chair for their respective courses for the past academic year (Fall and Spring semesters). The request for these data will come from the Chair and will accompany the request for faculty annual reports.
- June - Chair updates the master spreadsheet and calculates average SLO scores for the graduating cohort. Summary statistics are included in the departmental annual report.
- Fall semester - Chair provides faculty with both the summary statistics and the updated master spreadsheet that has additional data details. Results are discussed at one or more faculty meetings, most likely in October or November after any curricular actions have been completed (we prefer to launch curricular proposals early in the Fall semester if possible in order to meet deadlines for the catalog of the following year).
- Spring semester - Proposals for curricular updates are discussed at one or more faculty meetings, most likely in March or April after the time-sensitive deliberations on student awards and scholarships. Any curricular actions favored by faculty will be tabled for final consideration and implementation at the start of the following Fall semester.

Faculty will also be able to reflect on assessment results and implement changes within their own courses on a more continual basis. Because the upper-level courses of all faculty are involved in the SLO assessment and the annual results will be provided to everyone, there is no reason why faculty cannot make changes within their own teaching any time they so wish. Such actions will not harm the assessment process because we have moved away from specific unchanging course-embedded instruments and instead now rely on a more holistic approach based on SLO scores calculated across multiple courses.

Respectfully submitted,
David Barclay