### Student Learning Outcomes Assessment

**Department:** Geosciences  
**Program:** BA Geography  
**Academic Year:** 2015-2016

<table>
<thead>
<tr>
<th>Year</th>
<th>Objective</th>
<th>Direct Measure (DM)</th>
<th>DM Results</th>
<th>Indirect Measure (IM)</th>
<th>IM Results</th>
</tr>
</thead>
</table>
| 2015-16   | Obj. 3 Geography majors will acquire and hone intellectual and practical skills necessary to succeed in geography and related fields. This reporting cycle emphasizes "information literacy." | Evaluate culminating assignment using ACC&U’s Information Literacy VALUE Rubric in two upper-level courses:  
(A) GEOG 425 Geography of Water Resources (N=15) [prioritize (with reasoned justification) water resource issues]  
(B) GEOG 513 GIS Modeling (N=12) [identify and acquire geographic data for self-selected modeling project] | (A) 73% achieved at least upper milestone for the criterion “use information effectively to accomplish a specific purpose.”  
(B) 75% achieved at least upper milestones for three criteria: ‘determine extent of geographic information needed;' 'access the needed information;' and 'evaluate information and its sources critically.' 67% achieved at least upper milestone for ‘use geographic information effectively to accomplish a specific purpose.' |                       |            |

**Impression**  
Similar results obtained from two geography projects with distinctly different emphases. In addition to data reported above, 33% in (A) met “capstone” criteria, and in 17-25% in (B). From both, 0-13% only met benchmark criteria, and none fell below benchmark.

**Limitations**  
A rubric developed by outside organization (Assoc. of American Colleges & Universities, Information Literacy VALUE Rubric) was applied to student work; according to its developers, it is “intended for institutional-level use in evaluating and discussing student learning, not for grading” of specific projects.

**Proposed Action Item: Assessment Tool**  
Modify ACC&U rubric to better reflect Geography-specific information literacy criteria. Develop a rubric specifically for “geographic information” (geographically-referenced data sets to be used in a GIS database).

**Proposed Action Item: Program Content and Course Assessment Practices**  
Using a revised Information Literacy rubric, explicitly integrate “capstone” information literacy objectives into all relevant geography course assignments, including courses that will not be specifically assessing this objective for SLOA.

**Action Items Implemented**  
Trial of LEAP Information Literacy VALUE Rubric in two upper-level geography courses, with one specifically assessing “geographic” information. New assignment developed for direct measure of quantitative literacy and data management, assessed in Fall 2015.  
Non-software techniques geography seminar course taught Spring 2016: Transportation Planning

**Objective to be Assessed Next Year**  
Obj 4. Develop capacity for integration and synthesis with respect to geographical opportunities and problems. We will especially be examining/developing teamwork and problem solving capacities.
1. Upper milestone: communicates, organizes and synthesizes information from sources. Intended purpose is achieved.
2. Upper milestone: defines scope of research question. Can determine key concepts. Types of information selected answer research question.
3. Upper milestone: accesses information using variety of search strategies and some relevant information sources. Demonstrates ability to refine search.

Upper milestone: chooses a variety of information sources appropriate to the scope and discipline of the research question. Selects sources using multiple
Student Learning Outcomes Assessment
Department: Geosciences

Academic Year: 2015/2016
Program: BS Geology
<table>
<thead>
<tr>
<th>Year</th>
<th>Objective</th>
<th>Direct Measure (DM)</th>
<th>DM Results</th>
<th>Indirect Measure (IM)</th>
<th>IM Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring &amp; Fall 2015</td>
<td>#2: To acquire a core knowledge in geology and allied natural sciences</td>
<td>Embedded questions on exams in required GEOS courses (<em>); Class exercises (</em>); Geology field camp rankings (**); No direct measures currently exist to quantify student success in the allied natural sciences – course grades are used to reflect student performance.</td>
<td>The total percentage of geology students successfully accomplishing measures of this objective is 80.5%. Please see summary of courses assessed at the end of this document. Seven GEOS students attended geology summer field camp in 2015. Inquiries for student rankings were sent to each host institution, with 3 (all from the same host) of 7 students being ranked. Our students ranked 15, 19, and 21 out of 27.</td>
<td>Student exit survey (*) and Alumni survey (^^) results and comments; Performance in allied natural science courses (Math, Chemistry, Geology) reflected by course grades (from survey of 70 students in last 3 academic years), with grade of C or higher deemed sufficient.</td>
<td>Student exit survey results for spring 2014 and spring 2015 show consistent satisfaction ratings for Knowledge of Subject of 4.4/5 and 4.5/5, respectively. Alumni survey results for fall 2014 and spring 2015 also show consistent satisfaction ratings for Knowledge of Subject of 4.3/5 and 4.3/5, respectively. When asked what subject matter should be added to the geology curriculum, 3 of 6 (fall '14) and 5 of 17 (spring '15) suggested content related to petroleum geology, and 2 of 6 and 5 of 17 suggested content focused on field techniques and geophysics. Math requirements: Calc I &amp; Calc II – 76.9% (20/26) and 90.9% (10/11) sufficient, with Statistics substitute 90.9% (10/11) and 100.0% (5/5) sufficient ($), and 8 students transferring in credits. 75.7% (53/70) took at least 1 math course prior to Calc I (Alg, Trig, Precalc, etc.)($$) and 30.0% (21/70) performed insufficiently to earn credit (U, W, F). Chemistry requirements: Chem I &amp; Chem II – 91.3% (42/46) and 85.7% (30/35) sufficient, with 7 students transferring in credits. 31.4% (22/70) took at least 1 chem course prior to Chem I (Chem Orient, etc.) and 2.9% (2/70) performed insufficiently to earn credit. Physics requirements: Phys I &amp; Phys II – 97.6% (40/41) and 77.8% (21/27) sufficient, with 6 students transferring in credits. 7.1% (5/70) took at least 1 physics course prior to Phys I and 7.1% (5/70) performed insufficiently to earn credit.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Students show a high level of success in acquiring a core knowledge in GEOS geology courses. Student rankings at field camp indicate an acceptable level of performance, equivalent to mid “B” level work (#). Feedback from host institutions remains frustratingly low.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Impression**

We have clear and definitive ways to measure student success with respect to core knowledge in geology. To gauge success in the allied natural sciences is more difficult.

Graduating seniors and alumni indicate a high level of overall satisfaction with the core knowledge in geology they’ve obtained and used.

Courses focused on energy resources and applied (field-based) geophysics should be added to the curriculum. Most students need to take prerequisite math courses in preparation for Calc, with some students still struggling to fulfill the Math requirement. Some flexibility in math requirements should be practiced, especially when aligning student needs and career goals with specific math content and level of expertise. Some students need to take prerequisite chemistry and physics courses, however, eventual success in fulfilling these requirements is quite high.

**Limitations**

Small number of Geology faculty (4 full-time, tenured faculty, with 1 currently serving as Dept. Chair, and 1 regular part-time faculty) to cover wide breadth of core knowledge in the discipline.

Faculty expertise is only peripheral to this suggested additional content.
**Proposed Action Item: Assessment Tool**

1. To re-evaluate GEOS course activities and embedded questions to align better and more completely with Objective #2.
2. To highlight and include quantitative skills as part of Objective #1: To develop skills of analysis, synthesis, critical thinking and problem solving.
3. To continue to build and formalize assessment tools (mechanisms and rubrics) for measuring Objective #6: To provide students with an understanding of current social and ethical issues related to the environment (!!).
4. To send an assessment form with each student attending geology summer field camp for instructors to complete and return directly to EU Geosciences.

**Proposed Action Item: Program Content and Course Assessment Practices**

1. To offer 2 new courses (GEOS410 Applied Geophysics and GEOS430 Geology of Energy Resources) to fill gaps in core knowledge as part of a new BSGS Energy Resources track.
2. To integrate more fully Earth Systems concepts into the geoscience curriculum (@).

**Action Items Implemented**

- Successful implementation of two new courses (GEOS410 and GEOS430) and a new BSGS Energy Resources track;
- Continue to explore options for a capstone course and/or experience;
- Student exit and Alumni surveys are now available electronically, with little effect however on low response rates. Also, electronic survey results currently do not distinguish between different majors within Geosciences.

**Objective to be Assessed Next Year**

- Objective #6: To provide students with an understanding of current social and ethical issues related to the environment.

**Notes:**

(* These measures are assessed in selected upper level geology courses. Data are gathered every time the course is offered, with every Geology major being assessed. The criterion used to measure performance is a scoring scale (proficiency ≥70%).

(**) This measure is assessed by examining GEOS 581 – Geology Field Camp course grade and/or, when available, performance ranking with respect to other field camp attendees. Data are gathered on all Geology majors who attend field camp and collected every summer.

(#) For perspective, consider: a) a majority of students attending camp are typically from the host institution, which favors those students and not those from EUP; and b) EUP students merely need to pass for the credits to transfer, which provides little incentive to excel. These students have since a) received a graduate assistantship, b) gained employment in the field upon graduation, and c) graduated from EUP (in S15). Host institutions for summer 2015 camps were South Dakota SM&T (3 students), Southern Utah (2), Indiana (1), and Penn State (1).

(*) Instructions to access Exit surveys online are distributed in selected upper level Geology courses to all Geology majors who file intent to graduate. Surveys are submitted electronically near the conclusion of fall and spring semesters and a scoring scale is used to assess performance. Note that this is a new procedure where students file electronic surveys rather than hand in paper copies of surveys.

(**) Data are collected every year and gathered via traditional and electronic mailing, where instructions to access Alumni surveys online are (e)mailed to all Geology majors on 5-year and 10-year graduation anniversaries. This year, instructions were mailed twice in an attempt to increase response rates. A scoring scale is used to assess performance. Note that this is a new procedure where alumni submit electronic surveys rather than send in paper copies of surveys.

($) In the last 2 academic years, students have started to substitute Math 260 (Statistics) for either Math 211 (Calc I) or Math 212 (Calc II).

($$) In the last 4 academic years, students have commonly substituted Math 105 & 106 (Alg & Trig) for Match 107 (Precalc).

(®) National-level efforts (such as The Future of Undergraduate Geoscience Education) to establish what skills and concepts are important for undergraduate geology majors indicate that understanding of Earth systems is deemed one of the most important, especially so by prospective employers.

(!) Although the surveys are available electronically and submitted online, response rates are still frustratingly low. Additional efforts are needed to bolster those response rates.

(!!) We need to develop more direct and indirect measure instruments for this objective and conduct an initial assessment. Because we have struggled to arrive at meaningful measures that can be readily implemented, we considered dropping this objective altogether. Yet, because of its importance and relevance as a learning objective, we continue to explore how best to assess it. A workshop
entitled “Teaching GeoEthics Across the Geoscience Curriculum” took place in summer 2014. We hoped that results from this workshop would provide the framework to integrate this objective into our curriculum and give strategies to develop the tools to assess it, but we were over-optimistic. But, more webinars, conference technical sessions and such concerning this topic are on the horizon. The Geosciences community at the (inter)national level recognizes its importance and is actively raising awareness.