General Information

1. Name / Number of Course / Sequence:
   GEOL 1100: Physical Geology

2. SLO(s) being assessed:
   Student will understand and appreciate methods and issues of science and technology.

3. Department:
   Geology and Geography

4. Department Representative:
   Mark Steltenpohl

5. AGSC Content Alignment:
   AREA III: Science and Math

Assessment Information

6. Assessment Method: [Explain how assessment for the measures associated with this SLO – not grading for the course as a whole was conducted.]
   See Progress Report at end of Assessment

7. Findings: [What assessment data did each assessment method produce?]
   See Progress Report at end of Assessment

8. How did you or will you use the findings for improvement: [What questions / issues/ concerns did your data raise for the faculty teaching the course? What discussion did the faculty have about the
findings? What future actions to improve student attainment of this outcome will the department / program take as a result of this analysis?

See Progress Report at end of Assessment

9. Additional comments: [What else would you like the Committee to know about your assessment of this course or plans for the future?]

See Progress Report at end of Assessment

10. Core Curriculum General Education Committee Comments:

The test questions used for assessment address "knowledge in one area of science." It is claimed that the five questions asked correspond to the five measures of SLO 10, but the correspondence was unclear to the committee. The Department might want to consider a larger groups of questions from which to draw conclusions about student learning.

GEOL 1100 Physical Geology Progress Report Form

This form is to be completed annually for the GEOL 1100 Physical Geology course near the beginning of each Fall term.

1. General Information

Course Title: Physical Geology

Course/Sequence Prefix/es and Number/s (to include Honors): GEOL 1100

Department: Geology and Geography

Department Representative/Contact: Mark G. Steltenpohl (Prof. of Geology)

College/School: COSAM

AGSC Alignment: Area III – Natural Sciences and Mathematics

SLO Alignment(s):
1. SLO 10 – Students will understand and appreciate the methods and issues of science and technology.

Estimated Annual Student Enrollment: 900

II. Summary of assessment plan

A set of five uniform questions were incorporated on final exams given in each lecture section. These questions were carefully selected to assess the five measures outlined for SLO10. The set of questions were agreed upon by each physical geology instructor at the beginning of the term. The uniform multiple-choice questions, attached to this assessment, were inserted within the body of each instructor’s final exam. These multiple choice questions provided a robust means of assessment that was readily collected and evaluated by our lecture coordinator. Given that the labs are coordinated with the lectures, and that the labs are rigidly uniform, we also developed two written problem exercises that were imbedded in the lab final exam. These short, written response problems, which are also attached below, included charts, concepts, and applications that bridge topics between the lecture and the laboratory. Inclusion on the standardized lab finals simplified the logistics of assessment-data collection and analysis. Questions and problems were developed to assess student knowledge for each of the five measures outlined in our CCGEC proposal.

At the end of the Fall 2010 and Spring 2011 terms, all lecture instructors and GTAs supplied question-set results in boiler-plate Excel spreadsheets to the lecture coordinator via mail, who compiled and analyzed the scores seamlessly across all sections; as this report was being prepared, our coordinator, Dr. Mark Steltenpohl, was in the process of handing over the coordinator designation to our new lecturer Dr. Jeff Chaumba who shared in its preparation. Following the lecture coordinator’s evaluation of the results, all instructors and the lab coordinator met to discuss the results and to define areas where instructional adjustments could be made to enhance instruction and student learning. The lecture coordinator will continuously monitor the question sets and the resulting assessment data in order to evaluate and maximize their effectiveness.
III. Data collection progress

Data were obtained from all five lecture sections of GEOL 1100. Auburn University computer scoring facilities provided output containing the number of students who marked each of the four to five possible response choices for each question. For our Lab assessment problems, during the Fall 2010 term we had 6 different GTAs each teaching an average of 3 labs; one GTA did not report her results. GTAs used a rigid, standardized rubric that was approved by the lecture coordinator for scoring the written problem responses. Data were entered into a spreadsheet showing the number of correct and incorrect responses for each question/problem. These were then organized by the five numbered measures in our proposal in order to chart the data and track future trends. We employed the same methods to collect and analyze assessment data during the Spring 2011 term.

IV. Timeline

The coordinator continued to monitor and ensure that the assessment process was maintained in each future term as described in II, II, and III, above. Analysis was ongoing as each term’s data was collected, analyzed, and then integrated with the previous data sets. The coordinator met with instructors at the start of each term to 1) discuss results of the previous term’s assessment and explore ways to improve the course, and 2) ensure consensus among the set of standardized assessment questions for the new term’s final exams. Dr. Chaumba, the new GEOL 1100 coordinator, will assume the role as the departmental assessment officer who will archive assessment data. Dr. Chaumba will also report, on an annual basis, question-set scores, associated statistics, and a summary of identified problems and planned recourses to those problems to the Department Chair and to the Core Curriculum and General Education Committee.

V. Instrument Sample(s)

See question sets that are attached.
1. "The present is the key to the past” is essentially a statement of:
   a. the Principle of Uniformitarianism
   b. the Principle of Cross-cutting Relationships
   c. the Principle of Original Horizontality
   d. the Principle of Faunal Succession

2. The youngest sea floor occurs ______________
   a. near ocean trenches
   b. along the mid-ocean ridges
   c. along the edge of a continent
   d. randomly over the entire ocean basin

3. How far do continents move in a single year?
   a. a few inches
   b. a few hundred feet
   c. a few miles
   d. we have no way of knowing
   e. continents do not move

4. Where is most groundwater, oil, and natural gas found?
a. in large underground rivers
b. in caverns or lakes underground
c. in small spaces between rock or mineral fragments
d. in small spaces between atoms making up rocks

5. The two most common elements in the Earth’s crust are _____.

a. calcium and carbon
b. iron and sulfur
c. silicon and oxygen
d. chlorine and sodium
e. iron and magnesium
Question 7 Use the above figure to answer the following questions.

A. (3 points; 1 point each) At what temperature, pressure, and depth is point X in the above graph?

Temperature: ________________________________

Pressure: ________________________________

Depth: ________________________________

B. (3 points) What will happen if point X is moved to a temperature of 2000 C° and a pressure of 20,000 atm?
**Question 10 (3 points)** A seismic station recorded a time interval between the P-wave and S-wave first arrivals from an earthquake event of 4.5 minutes. How far is the seismic station from the earthquake’s epicenter? (use graph above)

Distance from epicenter: _____________________________

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**VI. Academic Year 2010/2011 Assessment Report for Geol 1100**

The Student Learning Outcomes (SLOs) were assessed by including 5 standardized questions in final exams of all instructors teaching Geol 1100. The multiple choice questions that were used are indicated in V above. Each instructor who taught the course during the Fall 2010 and Spring 2011 terms summarized and submitted their scores to the coordinator and then tabulated comparison. Tables 1 and 2 below show the Fall 2011 and Spring 2011 evaluations, respectively, of the percent-correct student responses to these questions as well as the instructors who taught those sections.

**Table 1. Fall 2010 Geol 1100 assessment results.**

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Question</th>
<th>Instr. 1a</th>
<th>Instr. 1b</th>
<th>Instr. 2</th>
<th>Instr. 3</th>
<th>Instr. 4</th>
<th>average</th>
<th>St. Dev</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall 2010</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>40.6</td>
<td>43.8</td>
<td>65</td>
<td>87.5</td>
<td>85</td>
<td>64</td>
<td>62</td>
<td>22.1</td>
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<tr>
<td>2</td>
<td>61</td>
<td>65</td>
<td>59</td>
<td>69.4</td>
<td>63</td>
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<td>63</td>
<td>4.0</td>
</tr>
<tr>
<td>3</td>
<td>84</td>
<td>89</td>
<td>86</td>
<td>83.3</td>
<td>91</td>
<td>87</td>
<td>87</td>
<td>3.3</td>
</tr>
</tbody>
</table>
The performances varied greatly by instructor. Based on per-question averages, the students appear to have performed rather poorly (mostly Ds) on all the questions. However, the data indicate that this low per-question average was due mainly to students doing really poorly in some classes by some instructors and well in other classes taught by others. This is also indicated by the ranges in standard deviations shown in Tables 1 and 2. It can be noted from Figure 1 and 3 that there was an improvement in the narrowing of the variations by instructor, as the standard deviations were reduced from 22% to 16%, and from 32% to 24% for questions 1 and 5, respectively.

In the lab component of the same course, the 2 questions used in our assessment are noted above in V.

Tables 3 and 4 below shows the Fall 2010 and Spring 2011 results from our assessments by lab, respectively. Lab instructor names are on file in the GL/GY department.

### Table 2. Spring 2011 Geol 1100 assessment results.

<table>
<thead>
<tr>
<th>Question</th>
<th>Instr. 1</th>
<th>Instr. 2</th>
<th>Instr. 3</th>
<th>Instr. 4</th>
<th>average</th>
<th>St. Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>60</td>
<td>49</td>
<td>85</td>
<td>77</td>
<td>68</td>
<td>16.3</td>
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<tr>
<td>2</td>
<td>65</td>
<td>57</td>
<td>68</td>
<td>82</td>
<td>68</td>
<td>10.4</td>
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<tr>
<td>3</td>
<td>85</td>
<td>83</td>
<td>72</td>
<td>77</td>
<td>79</td>
<td>5.9</td>
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<td>4</td>
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<td>38</td>
<td>88</td>
<td>63</td>
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<tr>
<td>5</td>
<td>44</td>
<td>28</td>
<td>80</td>
<td>70</td>
<td>55</td>
<td>23.9</td>
</tr>
</tbody>
</table>

The performances varied greatly by instructor. Based on per-question averages, the students appear to have performed rather poorly (mostly Ds) on all the questions. However, the data indicate that this low per-question average was due mainly to students doing really poorly in some classes by some instructors and well in other classes taught by others. This is also indicated by the ranges in standard deviations shown in Tables 1 and 2. It can be noted from Figure 1 and 3 that there was an improvement in the narrowing of the variations by instructor, as the standard deviations were reduced from 22% to 16%, and from 32% to 24% for questions 1 and 5, respectively.
<table>
<thead>
<tr>
<th>Question</th>
<th>Lab 1</th>
<th>Lab 2</th>
<th>Lab 3</th>
<th>Lab 4</th>
<th>Lab 5</th>
<th>average</th>
<th>% avg</th>
<th>St. Dev</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>5.4</td>
<td>5.3</td>
<td>4.90</td>
<td>5.5</td>
<td>5.5</td>
<td>5.32</td>
<td>0.89</td>
<td>0.25</td>
</tr>
<tr>
<td>10</td>
<td>2.2</td>
<td>2.2</td>
<td>1.70</td>
<td>2.1</td>
<td>2.5</td>
<td>2.14</td>
<td>0.71</td>
<td>0.29</td>
</tr>
</tbody>
</table>

Table 4. Spring 2011 Geol 1100 Lab assessment results.

<table>
<thead>
<tr>
<th>Question</th>
<th>Lab 1</th>
<th>Lab 2</th>
<th>Lab 3</th>
<th>Lab 4</th>
<th>Lab 5</th>
<th>average</th>
<th>% avg</th>
<th>St. Dev</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>5.83</td>
<td>5.65</td>
<td>5.77</td>
<td>5.58</td>
<td>4.5</td>
<td>5.466</td>
<td>0.91</td>
<td>0.55</td>
</tr>
<tr>
<td>10</td>
<td>2</td>
<td>2.53</td>
<td>1.92</td>
<td>2.26</td>
<td>2.5</td>
<td>2.242</td>
<td>0.75</td>
<td>0.28</td>
</tr>
</tbody>
</table>

For the two lab-exam questions, it can be seen from Tables 3 and 4 that the students generally performed very well, particularly for Question 7, in both semesters. An improvement in student performance is noticeable from the Fall 2010 semester to the Spring 2011 semester. Only one instructor had a rather low score for question 7 in the Spring 2011 semester, and this resulted in the high standard deviation for this question. Students did not do so well on question 10, although there was a slight improvement from the previous semester. The variations among instructors also slightly improved for the Spring 2011 semester. This latter improvement likely resulted due to the coordinator requiring that all GTAs meet with him individually after mid-term grades were available each term to monitor and discuss their scores and to brainstorm on how they compare across the spectrum of all GTAs. These meetings focused on distinguishing whether or not some GTAs scored their students more or less stringently than others, in hopes of identifying ways of bringing consistency and parity across the diverse gamut of GTAs.

Some general insights were gained from the entire assessment and lessons from them will be applied during next year’s assessment. For example, based on recommendations by Michelle Sidler and Pamela Ulrich (memo to Mark Steltenpohl, May 25, 2011), Core Curriculum General Education Committee, one of the questions (question 4 above), will be either replaced by a question that is presently under discussion by our physical geology instructors; we are also considering the possibility of keeping question 4 but adding an additional question to this effect. We will most likely end up with a question addressing the environmental and economic impacts of geology. Further, we are ironing out the cause of
the wide variations in the student performances. We believe these reflect differences between instructors teaching those sections. Our discussions center on the need to better coordinate between instructors and to lessen these differences, perhaps installing a mid-term cross check between faculty similar to that employed with our GTAs last year. With our hiring of Lecturer Dr. Jeff Chaumba, who is teaching multiple physical geology sections, there will naturally be more continuity between the various sections taught. There will also be some additional emphasis during lectures on some of the material related to the questions which students had difficulties with.