The Dept of Geoscience has updated how we assess the MS degree Program in Geoscience. We have completed the following:

1) We updated the learning outcomes for the Ph.D. degree program in Geoscience. The new learning outcomes are listed on the next page.

2) We updated the curriculum map (Tables 1, 2).

3) We created several new assessments in order to have a balance between (A) Direct and Indirect assessments, (B) Quantitative versus Qualitative assessments, and (3) to address assessment at the beginning, middle and end of our program.
Ph.D. Geoscience Program
NEW Learning Outcomes

1. Demonstrate an understanding of scientific ethics and appreciation for scientific inquiry/scientific method
2. Demonstrate the ability to successfully present the results of a scientific inquiry in oral format (either poster or oral presentation).
3. Demonstrate the ability to
   (1) Search existing scientific literature for work relevant to a specific problem in at least one field of specialization;
   (2) Create a research problem by identifying questions and defining and testing hypotheses;
   (3) Design and complete substantial independent research project.
4. Demonstrate the ability to prepare publications and submit them to peer-reviewed journals.

Table 1. Key descriptors for Assessments found in Table 2.

<table>
<thead>
<tr>
<th>Timeline</th>
<th>Direct or Indirect</th>
<th>Qualitative or Quantitative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessment occurs at Beginning, Middle or End of Program</td>
<td>Assessment is Direct or Indirect. Direct methods ask students to demonstrate their learning while indirect methods ask them to reflect on their learning. Direct methods include some objective tests, essays, presentations and classroom assignments. Indirect methods include surveys and interviews.</td>
<td>Assessment is Qualitative or Quantitative. Qualitative measures &quot;rely on descriptions rather than numbers&quot; (Palomba and Banta, 1999). Quantitative measures assess teaching and learning by collecting and analyzing numeric data using statistical techniques.</td>
</tr>
</tbody>
</table>
Table 2. New Curriculum Map showing which assessments address which learning outcome. A key for the assessment descriptors (Direct/Indirect; Qualitative/Quantitative, Beginning/Middle/End can be found in Table 1.

<table>
<thead>
<tr>
<th>Geoscience PhD Program Learning Outcomes</th>
<th>Learning Outcome</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GEOL 701 Project</strong></td>
<td>1. Assessment in GEOL 701 Assignment (Direct, Quant; Beginning); 2. Faculty Assessment at end of 701 class (Indirect, Qual; Beginning).</td>
<td>1. Grade on written Proposal (Direct, Quant; Beginning)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Dissertation Proposal &amp; Presentation</strong></td>
<td>Faculty Reports (Indirect, Qual; Beginning)</td>
<td>Faculty Reports (Indirect, Qual; Beginning)</td>
<td>Faculty Reports (Indirect, Qual; Beginning)</td>
<td>1. Ph.D. Proposal Defense (Direct, Qual; Beginning)</td>
<td></td>
</tr>
<tr>
<td><strong>Comprehensive Exam</strong></td>
<td>Faculty Reports (Indirect, Qual; Middle)</td>
<td>Faculty Reports (Indirect, Qual; Middle)</td>
<td>Faculty Reports (Indirect, Qual; Middle)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Dissertation Defense &amp; Presentation</strong></td>
<td>Faculty Reports (Indirect, Qual; End)</td>
<td>1. Faculty report on Ph.D. Dissertation Defense of Oral Dissertation (Direct, Qual; End)</td>
<td>1. Ph.D. Dissertation Defense of written Dissertation (Direct, Qual; End)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Quality of Manuscripts for Publication</strong></td>
<td></td>
<td></td>
<td></td>
<td>Faculty Reports (Indirect, Qual; End)</td>
<td></td>
</tr>
<tr>
<td><strong>Presentations at local, regional or national meetings</strong></td>
<td></td>
<td></td>
<td>1. Geosymposium or other meetings: Faculty Advisors’ Semester Evaluations (Direct, Qual; Middle or End)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Semester Progress Reports</strong></td>
<td>Faculty Reports (Indirect, Qual; Beginning to End)</td>
<td>Faculty Reports (Indirect, Qual; Beginning to End)</td>
<td>Faculty Reports (Indirect, Qual; Beginning to End)</td>
<td>Faculty Reports (Indirect, Qual; Beginning to End)</td>
<td></td>
</tr>
</tbody>
</table>
Our previous assessment was too focused on quantitative and direct assessments and they were primarily based on overall course grades instead of specific learning outcomes. To address these issues, in our new plan, we have made sure that every learning objective is assessed through both quantitative and qualitative assessment as well as both direct and indirect methods. We also made sure that assessments are carried out at the beginning, middle and end of the program.

Attached at the end of this document are the assessments for each of the 4 learning objectives. Each semester the appropriate faculty member(s) for each assessment will fill out these forms and submit them to the Assessment coordinator. Each year the Assessment Coordinator presents the results to the faculty, and we discuss the overall results of our assessment and develop and implement changes as needed.
ASSESSMENT

Ph.D. Geoscience Program
Learning Outcomes #1

1. Demonstrate an understanding of scientific ethics and appreciation for scientific inquiry/scientific method

GEOL 701:
  1. GEOL 701: Ethics/Scientific Method Assignment (Direct, Quant, Beginning)
  2. GEOL 701: Faculty Assessment (Indirect, Qual, Beginning)

*****Remember Assessment is based on Ph.D. Students ONLY*****

1. GEOL 701: Ethics/Scientific Method Assignment

Ph.D. Students: Enrollment ____. Average grade _____.

____% performed satisfactorily (____ out of a total of____). These students averaged _____.

____% performed unsatisfactorily (____ out of a total of____), with average exam grades B- or lower.

Please state how many students had specific grades of F, D, C, or withdrew from the class.

If you have any other useful observations based solely on these results, please provide them:

Are there any suggested changes to this class (or the larger curriculum) that you would recommend in order to address any deficiencies or negative results of this assessment? Anything you would like to do differently next time?

2. GEOL 701: Faculty Assessment

Please provide a short summary of what you learned from this assessment for Ph.D. students as far as it applies to this learning objective and what if anything you recommend doing differently in the future.
ASSESSMENT

Ph.D. Geoscience Program
Learning Outcomes #2

2. Demonstrate the ability to successfully present the results of a scientific inquiry in oral format (either poster or oral presentation).

Assessment:
2. Presentations at Geosymposium/National Meetings: Faculty Advisors' Semester Evaluations (Direct, Qual; Middle or End)

*****Remember Assessment is based on Ph.D. Students ONLY*****

1. Dissertation Defense: Faculty Assessment

Please provide a short summary of your assessment of the Ph.D. student(s) whose Dissertation defense you attended. How well did they meet this learning outcome? If you have suggestions for improvement please provide them.

2. Presentations at Geosymposium/National Meetings: Faculty Assessment.

Please provide a short summary of your assessment of the Ph.D. student(s) whose Presentation(s) you attended. How well did they meet this learning outcome? If you have suggestions for improvement please provide them.
ASSESSMENT

Ph.D. Geoscience Program
Learning Outcomes #3

3. Demonstrate the ability to
   (1) Search existing scientific literature for work relevant to a specific problem in at least one field of specialization;
   (2) Create a research problem by identifying questions and defining and testing hypotheses;
   (3) Design and complete substantial independent research project.

GEOL 701
1. Grade on written Proposal (Direct, Quant, Beginning)
2. Ph.D. Proposal Defense (Direct, Qual; Beginning)
3. Ph.D. Dissertation Defense of written Dissertation (Direct, Qual, End)

*****Remember Assessment is based on Ph.D. Students ONLY*****

1. GEOL 701: Written Proposal

Ph.D. Students: Enrollment ____. Average grade _____.

____% performed satisfactorily (____ out of a total of____). These students averaged _____.

____% performed unsatisfactorily (____ out of a total of____), with average exam grades B- or lower.

Please state how many students had specific grades of F, D, C, or withdrew from the class.

If you have any other useful observations based solely on these results, please provide them:

Are there any suggested changes to this class (or the larger curriculum) that you would recommend in order to address any deficiencies or negative results of this assessment? Anything you would like to do differently next time?

2. Proposal Defense: Faculty Assessment

Please provide a short summary of your assessment of the Ph.D. student(s) whose Proposal defense you attended. How well did they meet this learning outcome? If you have suggestions for improvement please provide them.
3. Dissertation Defense: Faculty Assessment

Please provide a short summary of your assessment of the Ph.D. student(s) whose Dissertation defense you attended. How well did they meet this learning outcome? If you have suggestions for improvement please provide them.
4. Demonstrate the ability to prepare publications and submit them to peer-reviewed journals.

1. Manuscript Preparation/Submission: Faculty Assessment

*****Remember Assessment is based on Ph.D. Students ONLY*****

1. Manuscript Preparation/Submission: Faculty Assessment

Please provide a short summary of your assessment of the Ph.D. student(s) that prepared one or more manuscripts for publication this semester. How well did they meet this learning outcome? If you have suggestions for improvement please provide them.