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

1. We updated the learning outcomes for the Geology BS degree program. The new learning outcomes are listed below (1-9).
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.

Our previous assessment was too focused on quantitative and direct assessments. 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 9 learning objectives. Each semester the appropriate
faculty member(s) for each assessment will fill out these forms and submit them to the Assessment coordinator, who will present the results to the faculty, and we discuss the overall results of our assessment and develop and implement changes as needed.

Geology BS Degree Program
NEW Learning Outcomes

1. Identify common rock-forming minerals in hand specimen and thin section, name major rock types, and describe the conditions under which each of them formed. This will include being able to describe the chemical characteristics of various types of rocks and the use of stable and radiogenic isotopes as environmental tracers and geochronologic tools.

2. Identify the common types of invertebrate and vertebrate fossils, their approximate age, and the environments in which they lived, and have a grounding in the historical development of the field of geology.

3. Recognize, in the field, various types of geologic structures, and be able to use these to reconstruct the structural history of a region.

4. Describe the major processes that determine the characteristics of the earth’s surface, and be able to examine a landscape and interpret its geomorphic history.

5. Describe the plate-tectonic history of the earth (when various supercontinents assembled and fragmented), the relationship between plate tectonic processes and mountain building, and the types of data that are used to reconstruct the position of a particular plate in the geologic past.

6. Understand the principles of sedimentation and stratigraphy. Learn to measure stratigraphic sections and describe sedimentary structures and textures required for facies analyses and interpretation. Demonstrate the ability to establish a stratigraphic framework for sedimentary successions.

7. Be facile in computer applications in geology including spatial and imagery analysis applications, quantitative skills, express themselves well in oral and written reports, and be able to demonstrate the ability to function independently, collaboratively, and ethically with others in the profession as colleagues and supervisors.

8. Apply the techniques of at least two specializations within the field of geology (e.g., geophysics, hydrogeology, GIS, geochronology, petroleum geology) to the solution of appropriate research or applied problems.

9. Demonstrate the ability to enter a new field area, construct a geologic map on a topographic base, interpret the geologic history of the area, and write a professional quality report on the geology of the area. This learning objective comprises the Capstone experience for this degree program and is fulfilled through the summer field geology course. It also includes the ability to recognize, formulate, employ, and interpret the scientific methodology, and employ critical thinking skills. Many other learning outcomes for this degree program are also reinforced through this capstone experience (For instance, outcomes 1-5, and 9).
Table 1. New Curriculum Map showing which classes/assessments address which learning outcome. See previous list above for Learning Outcomes labeled 1-9. A key for the assessment descriptors (Direct/Indirect; Qualitative/Quantitative, Beginning/Middle/End can be found in Table 2.

<table>
<thead>
<tr>
<th>Learning Outcome</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEOL 102 (Earth and Life Through Time)</td>
<td>1. Faculty questionnaire (Indirect, Qual; Beginning); 2. Fossil/Earth History Quiz (Direct, Quant; Beginning)</td>
<td></td>
<td></td>
<td></td>
<td>GEOL 102 - specific questions on the survey (Indirect, quant; Beginning)</td>
</tr>
<tr>
<td>GEOL 102 (Earth and Life Through Time) Laboratory Excercises</td>
<td>1. Two Mineral exams (Direct, Quant; Beginning); 2. Instructor Assessment of Student Presentation/Report (Indirect, Qual; Beginning).</td>
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<tr>
<td>GEOL 220 (Mineralogy)</td>
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<td></td>
<td></td>
<td></td>
<td>1. Photo questions on each exam and final exam (Direct, Quant; Middle); 2. Faculty Assessment (Indirect, Qual; Middle)</td>
</tr>
<tr>
<td>GEOL 333 (Geomorphology)</td>
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<td></td>
<td></td>
<td></td>
<td>1. Final exam (Direct, Quant; Middle), 2. Final Lab project (Direct, Quant; Middle), 3. Faculty Questionnaire (Indirect, Qual; Middle)</td>
</tr>
<tr>
<td>GEOL 341 (Structure)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1. Student questionnaire (Direct, Qual; End), 2. Faculty questionnaire (Indirect, Qual; End)</td>
</tr>
<tr>
<td>GEOL 427 (Ig/Met/Pet)</td>
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<td></td>
<td></td>
<td></td>
<td>Lab quizzes 3, 8, 12 (Direct, Quant; End)</td>
</tr>
<tr>
<td>GEOL 427 (Ig/Met/Pet) Laboratory Excercises</td>
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</tbody>
</table>
Table 1 (continued). New Curriculum Map showing which classes/assessments address which learning outcome. See previous list above for Learning Outcomes labeled 1-9. A key for the assessment descriptors (Direct/Indirect; Qualitative/Quantitative, Beginning/Middle/End can be found in Table 2.

<table>
<thead>
<tr>
<th>GEOLOGY BS Learning Outcomes</th>
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</thead>
<tbody>
<tr>
<td>Learning Outcome</td>
</tr>
<tr>
<td>GEO 462 Sed/Strat</td>
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<tr>
<td>GEOL 348 (Field 1)</td>
</tr>
<tr>
<td>GEOL 372 (Advanced Field)</td>
</tr>
</tbody>
</table>

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

<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>
1. Identify common rock-forming minerals in hand specimen and thin section, name major rock types, and describe the conditions under which each of them formed. This will include being able to describe the chemical characteristics of various types of rocks and the use of stable and radiogenic isotopes as environmental tracers and geochronologic tools.

**GEOL 220:**
1. Two Mineral exams (Direct, Quant, Beginning);
2. Instructor Assessment of Student Presentation/Report (Indirect, Qual, Beginning).

**GEOL 427/427L**
1. Student questionnaire (Direct, Qual, End),
2. Faculty questionnaire (Indirect, Qual, End)
3. Lab quizzes 3, 8, 12 (Direct, Quant, End)

*****Remember Assessment is based on GEOL MAJORS ONLY*****

1. **GEOL 220: Mineral Exam 1**

GEOL Majors: Enrollment ____. Average grade _____.
_____% performed satisfactorily (____ out of a total of____). These students averaged _____.
_____% performed unsatisfactorily (____ out of a total of____), with average Exam grades C- 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:

2. **GEOL 220: Mineral Exam 2**

GEOL Majors: Enrollment ____. Average grade _____.
_____% performed satisfactorily (____ out of a total of____). These students averaged _____.
_____% performed unsatisfactorily (____ out of a total of____), with average Exam grades C- 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:

3. **GEOL 220: Instructor Assessment of Student Presentation/Report (Indirect, Qual).**
Please provide a short summary of what you learned from this assessment for GEOL majors as far as it applies to this learning objective:
ASSESSMENT

Geology BS Degree Program
Learning Outcomes #1

1. Identify common rock-forming minerals in hand specimen and thin section, name major rock types, and describe the conditions under which each of them formed. This will include being able to describe the chemical characteristics of various types of rocks and the use of stable and radiogenic isotopes as environmental tracers and geochronologic tools.

GEOL 220:
1. Two Mineral exams (Direct, Quant, Beginning);
2. Instructor Assessment of Student Presentation/Report (Indirect, Qual, Beginning).

GEOL 427/427L
1. Lab quizzes 3, 8, 12 (Direct, Quant, End)
2. Student questionnaire (Direct, Qual, End),
3. Faculty questionnaire (Indirect, Qual, End)

*****Remember Assessment is based on GEOL MAJORS ONLY*****

1. GEOL 427: Lab Quiz 3

GEOL Majors: Enrollment ____. Average grade _____.
______% performed satisfactorily (______ out of a total of______). These students averaged ______.
______% performed unsatisfactorily (______ out of a total of_____), with average quiz grades C- 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:

2. GEOL 427: Lab Quiz 8

GEOL Majors: Enrollment ____. Average grade _____.
______% performed satisfactorily (______ out of a total of______). These students averaged ______.
______% performed unsatisfactorily (______ out of a total of_____), with average quiz grades C- 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:
3. GEOL 427: Lab Quiz 12

GEOL Majors: Enrollment ____. Average grade ____.
____% performed satisfactorily (____ out of a total of____). These students averaged _____.
____% performed unsatisfactorily (____ out of a total of____), with average quiz grades C- 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:

4. GEOL 427: Student questionnaire

Please provide a short summary of what you learned from this assessment for GEOL majors as far as it applies to this learning objective.

5. GEOL 427: Faculty Questionnaire

Please provide a short summary of what you learned from this assessment for GEOL majors as far as it applies to this learning objective:
2. Identify the common types of invertebrate and vertebrate fossils, their approximate age, and the environments in which they lived, and have a grounding in the historical development of the field of geology.

GEOL 102:
1. Fossil/Earth History Quiz (Direct, Quant, Beginning)
2. Faculty Assessment (Indirect, Qual, Beginning);

*****Remember Assessment is based on GEOL MAJORS ONLY*****

1. GEOL 102: Fossil/Earth History Quiz

GEOL Majors: Enrollment ____. Average grade _____.

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

_____% performed unsatisfactorily (____ out of a total of____), with average quiz grades C- 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 quiz results, please provide them:

2. GEOL 102: Faculty Assessment (Indirect, Qual)

Please provide a short summary of what you learned from this assessment for GEOL majors as far as it applies to this learning objective:
3. Recognize, in the field, various types of geologic structures, and be able to use these to reconstruct the structural history of a region.

GEOL 341/341L:
1. Final exam (Direct, Quant, Middle)
2. Final Lab project (Direct, Quant, Middle)
3. Faculty Questionnaire (Indirect, Qual, Middle)

*****Remember Assessment is based on GEOL MAJORS ONLY*****

1. GEOL 341: Final Exam

GEOL Majors: Enrollment _____. Average grade _____.
______% performed satisfactorily (____ out of a total of____). These students averaged _____.
______% performed unsatisfactorily (____ out of a total of____), with average exam grades C- 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 quiz results, please provide them:

2. GEOL 341: Final Lab Project

GEOL Majors: Enrollment _____. Average grade _____.
______% performed satisfactorily (____ out of a total of____). These students averaged _____.
______% performed unsatisfactorily (____ out of a total of____), with average project grades C- 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 quiz results, please provide them:

3. GEOL 341: Faculty Questionnaire

Please provide a short summary of what you learned from this assessment for GEOL majors as far as it applies to this learning objective:
4. Describe the major processes that determine the characteristics of the earth's surface, and be able to examine a landscape and interpret its geomorphic history.

GEOL 333/333L:
1. Photo questions on each exam and final exam (Direct, Quant, Middle);
2. Faculty Assessment (Indirect, Qual, Middle)

*****Remember Assessment is based on GEOL MAJORS ONLY*****

1. GEOL 333: Photo questions on each exam and final exam (you can combine this information or fill out the information below for each photo question. The latter would provide more information if there is a weakness in a specific area of knowledge).

GEOL Majors: Enrollment ____. Average grade _____.

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

____% performed unsatisfactorily (____ out of a total of__), with average grades C- 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 quiz results, please provide them:

2. GEOL 333: Faculty Questionnaire

Please provide a short summary of what you learned from this assessment for GEOL majors as far as it applies to this learning objective:
ASSESSMENT

Geology BS Degree Program
Learning Outcomes #5

5. Describe the plate-tectonic history of the earth (when various supercontinents assembled and fragmented), the relationship between plate tectonic processes and mountain building, and the types of data that are used to reconstruct the position of a particular plate in the geologic past.

GEOL 102
- specific questions on the survey to address this learning outcome.

*****Remember Assessment is based on GEOL MAJORS ONLY*****

Please fill in the blanks below:

2. GEOL 102: Faculty Assessment (Indirect, Qual, Beginning)

Please provide a short summary of what you learned from this assessment as far as it applies to this learning objective:
ASSESSMENT

Geology BS Degree Program
Learning Outcomes #6

6. Understand the principles of sedimentation and stratigraphy. Learn to measure stratigraphic sections and describe sedimentary structures and textures required for facies analyses and interpretation. Demonstrate the ability to establish a stratigraphic framework for sedimentary successions.

GEOL 462/462L:
1. Laboratory exercises 2, 3, 4, 5, 6 (Direct, Quant, End)
2. Final project report (Direct, Quant, End)
3. Final Exam (Direct, Quant, End)
4. Faculty Assessment (Indirect, Qual, End).

*****Remember Assessment is based on GEOL MAJORS ONLY*****

1. GEOL 462: Laboratory Exercise 2

GEOL Majors: Enrollment ____. Average grade _____.
______% performed satisfactorily (____ out of a total of____). These students averaged _____.
______% performed unsatisfactorily (____ out of a total of____), with average grades C- 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:

2. GEOL 462: Laboratory Exercise 3

GEOL Majors: Enrollment ____. Average grade _____.
______% performed satisfactorily (____ out of a total of____). These students averaged _____.
______% performed unsatisfactorily (____ out of a total of____), with average grades C- 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:
3. GEOL 462: Laboratory Exercise 4
GEOL Majors: Enrollment ____. Average grade ____.
____% performed satisfactorily (____ out of a total of____). These students averaged ____ .
____% performed unsatisfactorily (____ out of a total of____), with average grades C- 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:

4. GEOL 462: Laboratory Exercise 5
GEOL Majors: Enrollment ____. Average grade ____.
____% performed satisfactorily (____ out of a total of____). These students averaged ____ .
____% performed unsatisfactorily (____ out of a total of____), with average grades C- 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:

5. GEOL 462: Laboratory Exercise 6
GEOL Majors: Enrollment ____. Average grade ____.
____% performed satisfactorily (____ out of a total of____). These students averaged ____ .
____% performed unsatisfactorily (____ out of a total of____), with average grades C- 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:

6. GEOL 462: Final Project Report
GEOL Majors: Enrollment ____. Average grade ____.
____% performed satisfactorily (____ out of a total of____). These students averaged ____ .
____% performed unsatisfactorily (____ out of a total of____), with average grades C- 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:

7. GEOL 462: Final Exam

GEOL Majors: Enrollment ____. Average grade _____.

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

____% performed unsatisfactorily (____ out of a total of__), with average exam grades C- 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:

8. GEOL 462: Faculty Assessment (Indirect, Qual).
Please provide a short summary of what you learned from this assessment for GEOL majors as far as it applies to this learning objective:
7. Be facile in computer applications in geology including spatial and imagery analysis applications, quantitative skills, express themselves well in oral and written reports, and be able to demonstrate the ability to function independently, collaboratively, and ethically with others in the profession as colleagues and supervisors.

GEOL 348:
1. Final Project (Direct, Quant, Middle)
2. Faculty Assessment (Indirect, Qual, Middle)
3. Student Survey Before/After (Indirect, Qual, Middle)

*****Remember Assessment is based on GEOL MAJORS ONLY*****

1. GEOL 348: Final Project

GEOL Majors: Enrollment ____. Average grade _____.

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

____% performed unsatisfactorily (____ out of a total of____), with average final project grades C- 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:

2. GEOL 348: Faculty Assessment

Please provide a short summary of what you learned from this assessment for GEOL majors as far as it applies to this learning objective:

3. GEOL 348: Student Survey Before/After

Please provide a short summary of what you learned from this assessment for GEOL majors as far as it applies to this learning objective:
ASSESSMENT
Geology BS Degree Program
Learning Outcomes #8

8. Apply the techniques of at least two specializations within the field of geology (e.g., geophysics, hydrogeology, GIS, geochronology, petroleum geology) to the solution of appropriate research or applied problems.

GEOL 348:
1. Final Project (Direct, Quant, MIddle)
2. Faculty Assessment (Indirect, Qual, Middle)
3. Student Survey Before/After (Indirect, Qual, MIddle)

GEOL 372:
1. Final Project (Direct, Quant, End)
2. Faculty Assessment (Indirect, Qual, End)
3. Student Survey Before/After (Indirect, Qual, End)

*****Remember Assessment is based on GEOL MAJORS ONLY*****

1. GEOL 348: Final Project

GEOL Majors: Enrollment ____. Average grade _____.
______% performed satisfactorily (_____ out of a total of____). These students averaged _____ .
______% performed unsatisfactorily (_____ out of a total of____), with average final project grades C- 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:

2. GEOL 348: Faculty Assessment

Please provide a short summary of what you learned from this assessment for GEOL majors as far as it applies to this learning objective:

3. GEOL 348: Student Survey Before/After

Please provide a short summary of what you learned from this assessment for GEOL majors as far as it applies to this learning objective:
9. Apply the techniques of at least two specializations within the field of geology (e.g., geophysics, hydrogeology, GIS, geochronology, petroleum geology) to the solution of appropriate research or applied problems.

GEOL 348:
1. Final Project (Direct, Quant, Middle)
2. Faculty Assessment (Indirect, Qual, Middle)
3. Student Survey Before/After (Indirect, Qual, Middle)

GEOL 372:
1. Final Project (Direct, Quant, End)
2. Faculty Assessment (Indirect, Qual, End)
3. Student Survey Before/After (Indirect, Qual, End)

*****Remember Assessment is based on GEOL MAJORS ONLY*****

1. GEOL 372: Final Project

GEOL Majors: Enrollment _____. Average grade _____.
_____% performed satisfactorily (____ out of a total of____). These students averaged _____.
_____% performed unsatisfactorily (____ out of a total of____), with average final project grades C- 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:

2. GEOL 372: Faculty Assessment

Please provide a short summary of what you learned from this assessment for GEOL majors as far as it applies to this learning objective:

3. GEOL 372: Student Survey Before/After

Please provide a short summary of what you learned from this assessment for GEOL majors as far as it applies to this learning objective:
ASSESSMENT

Geology BS Degree Program
Learning Outcomes #9

4. Demonstrate the ability to enter a new field area, construct a geologic map on a topographic base, interpret the geologic history of the area, and write a professional quality report on the geology of the area. This learning objective comprises the Capstone experience for this degree program and is fulfilled through the summer field geology course. It also includes the ability to recognize, formulate, employ, and interpret the scientific methodology, and employ critical thinking skills. Many other learning outcomes for this degree program are also reinforced through this capstone experience (For instance, outcomes 1-5, and 9).

GEOL 372:
1. Final Project (Direct, Quant, End)
2. Faculty Assessment (Indirect, Qual, End)
3. Student Survey Before/After (Indirect, Qual, End)

*****Remember Assessment is based on GEOL MAJORS ONLY*****

1. GEOL 372: Final Project

GEOL Majors: Enrollment ____. Average grade _____.

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

_____% performed unsatisfactorily (____ out of a total of___), with average final project grades C- 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:

2. GEOL 372: Faculty Assessment

Please provide a short summary of what you learned from this assessment for GEOL majors as far as it applies to this learning objective:

3. GEOL 372: Student Survey Before/After

Please provide a short summary of what you learned from this assessment for GEOL majors as far as it applies to this learning objective: