2016-2017
Annual Assessment Report Template

For instructions and guidelines visit our **website**
or **contact us** for more help.

Please begin by selecting your program name in the drop down. If the program name is not listed, please enter it below:

BA Geology Earth Science

OR

Question 1: Program Learning Outcomes

Q1.1.
Which of the following Program Learning Outcomes (PLOs), Sac State Baccalaureate Learning Goals (BLGs), and emboldened Graduate Learning Goals (GLGs) **did you assess?** [**Check all that apply**]

- [x] 1. **Critical Thinking**
- [ ] 2. **Information Literacy**
- [ ] 3. **Written Communication**
- [ ] 4. **Oral Communication**
- [ ] 5. Quantitative Literacy
- [ ] 6. **Inquiry and Analysis**
- [ ] 7. Creative Thinking
- [ ] 8. Reading
- [ ] 9. Team Work
- [x] 10. Problem Solving
- [ ] 11. Civic Knowledge and Engagement
- [ ] 12. **Intercultural Knowledge, Competency, and Perspectives**
- [ ] 13. Ethical Reasoning
- [ ] 14. Foundations and Skills for Lifelong Learning
- [ ] 15. **Global Learning and Perspectives**
- [ ] 16. Integrative and Applied Learning
- [ ] 17. Overall Competencies for GE Knowledge
- [x] 18. **Overall Disciplinary Knowledge**
- [ ] 19. **Professionalism**
- [ ] 20. Other, specify any assessed PLOs not included above:

a.
b.
c.

Q1.2.
Please provide more detailed background information about **EACH PLO** you checked above and other information including how your specific PLOs are **explicitly** linked to the Sac State **BLGs**/**GLGs**:

The Geology Department assessed three Program Learning Outcomes (PLO's) in the 2016/17 academic year. These PLO's are consistent across all three of our undergraduate degree programs: the B.S. in Geology, B.A. in Geology, and B.A. in Earth Science.

1. Students will master a set of fundamental geologic concepts essential to understanding and solving geologic problems.

2. Students will be proficient in solving geologic problems.

3. Students will be proficient in understanding and producing geologic maps.

These Learning Objectives align with Sacramento State's Baccalaureate Learning Goals (BLGS) as shown:

Geology Department Program Learning Objectives (PLO's)	University Baccalaureate Learning Goals (BALG's)
1. Students will master a set of fundamental earth science concepts essential to understanding and solving geologic problems	Competence in the Disciplines Knowledge of Human Cultures and the Physical and Natural World
2. Students will be proficient in solving geologic problems	Competence in the Disciplines Knowledge of Human Cultures and the Physical and Natural World Integrative learning, including synthesis and advanced accomplishment
3. Students will be proficient in introductory skills of evaluating and producing geologic maps	Competence in the Disciplines Knowledge of Human Cultures and the Physical and Natural World Intellectual and Practical Skills Personal and Social Responsibility Integrative Learning

Q1.2.1.
Do you have rubrics for your PLOs?

◉ 1. Yes, for all PLOs

- ○ 2. Yes, but for some PLOs
- ○ 3. No rubrics for PLOs
- ○ 4. N/A
- ○ 5. Other, specify:

Q1.3.
Are your PLOs closely aligned with the mission of the university?

- ◉ 1. Yes
- ○ 2. No
- ○ 3. Don't know

Q1.4.
Is your program externally accredited (other than through WASC Senior College and University Commission (WSCUC))?

- ○ 1. Yes
- ◉ 2. No (skip to **Q1.5**)
- ○ 3. Don't know (skip to **Q1.5**)

Q1.4.1.
If the answer to Q1.4 is **yes**, are your PLOs closely aligned with the mission/goals/outcomes of the accreditation agency?

- ○ 1. Yes
- ○ 2. No
- ○ 3. Don't know

Q1.5.
Did your program use the *Degree Qualification Profile* ("DQP", see http://degreeprofile.org) to develop your PLO(s)?

- ◉ 1. Yes
- ○ 2. No, but I know what the DQP is
- ○ 3. No, I don't know what the DQP is
- ○ 4. Don't know

Q1.6.
Did you use action verbs to make each PLO measurable?

- ◉ 1. Yes
- ○ 2. No
- ○ 3. Don't know

(Remember: Save your progress)

Question 2: Standard of Performance for the Selected PLO

Q2.1.
Select **OR** type in **ONE(1)** PLO here as an example to illustrate how you conducted assessment (be sure you *checked the correct box* for this PLO in Q1.1):

Problem Solving

If your PLO is **not listed, please enter it here**:

Q2.1.1.
Please provide more background information about the **specific PLO** you've chosen in Q2.1.

The PLO that we evaluated in detail is related to geologic problem solving:

2. Students will be proficient in solving geologic problems.

Q2.2.
Has the program developed or adopted **explicit** standards of performance for this PLO?

- (●) 1. Yes
- ( ) 2. No
- ( ) 3. Don't know
- ( ) 4. N/A

Q2.3.
Please **provide the rubric(s)** and **standards of performance** that you have developed for this PLO here or in the appendix.

The Geology Department uses the Problem Solving Value Rubric from The Association of American Colleges and Universities. This is a widely accepted rubric that shows student progress toward different aspects of problem solving.

Our performance standards expect that 70% of our students will perform at the Milestone 2 level on the Problem Solving Value Rubric attached to this question. This indicates that students are able to construct and evaluate simple solutions to a complex problem.

Problem_Solving_VALUE_Rubric.doc
75 KB

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Q2.4. PLO	Q2.5. Stdrd	Q2.6. Rubric	Please indicate where you have published the **PLO**, the **standard** of performance, and the **rubric** that was used to measure the PLO:
☑	☐	☐	1. In **SOME** course syllabi/assignments in the program that address the PLO
☐	☐	☐	2. In **ALL** course syllabi/assignments in the program that address the PLO
☐	☐	☐	3. In the student handbook/advising handbook
☐	☐	☐	4. In the university catalogue
☐	☐	☐	5. On the academic unit website or in newsletters
☑	☑	☑	6. In the assessment or program review reports, plans, resources, or activities
☐	☐	☐	7. In new course proposal forms in the department/college/university
☐	☐	☐	8. In the department/college/university's strategic plans and other planning documents
☐	☐	☐	9. In the department/college/university's budget plans and other resource allocation documents
☐	☐	☐	10. Other, specify:

Question 3: Data Collection Methods and Evaluation of Data Quality for the Selected PLO

Q3.1.
Was assessment data/evidence **collected** for the selected PLO?

- (●) 1. Yes
- ( ) 2. No (skip to **Q6**)
- ( ) 3. Don't know (skip to **Q6**)
- ( ) 4. N/A (skip to **Q6**)

Q3.1.1.
How many assessment tools/methods/measures **in total** did you use to assess this PLO?

1

Q3.2.
Was the data **scored/evaluated** for this PLO?

- (●) 1. Yes
- ( ) 2. No (skip to **Q6**)
- ( ) 3. Don't know (skip to **Q6**)
- ( ) 4. N/A (skip to **Q6**)

Q3.2.1.
Please describe how you collected the assessment data for the selected PLO. For example, in what course(s) or by what means were data collected:

Problem solving was assessed in a Junior-level course that is required for all geology majors, and B.A. students were not evaluated separately from B.S. students during the assessment. All scores and comments about performance with problem solving refer to the entire Junior class. This year 7 out of 32 students in the Junior class were on track to receive a B.A. degree. 4 of these students will receive a B.A. in Geology, and 3 students will receive a B.A. in Earth Science. We chose to evaluate problem solving for the entire Junior class instead of limiting this report to results from 3 students.

Problem solving was evaluated using a question on the final exam for Geol 103 (Sedimentology and Stratigraphy). This class covers a wide range of topics, and information is presented in a variety of formats that include readings, exams, projects, field trips and oral reports. The final exam question required students to construct a cross section across northern California. A cross section is a slice through the Earth that shows the relationship and orientation of different layers. Information necessary to solve the problem was presented at different times during the semester, and students constructed the cross section by connecting the information they learned in the different modules. Students who performed at a high level on this question related different geologic concepts from different parts of the course, and compiled their answer into a single diagram that summarized the geology of northern California.

(Remember: Save your progress)

Question 3A: Direct Measures (key assignments, projects, portfolios, etc.)

Q3.3.
Were direct measures (key assignments, projects, portfolios, course work, student tests, etc.) used to assess this PLO?

- (●) 1. Yes
- ( ) 2. No (skip to **Q3.7**)
- ( ) 3. Don't know (skip to **Q3.7**)

Q3.3.1.
Which of the following direct measures (key assignments, projects, portfolios, course work, student tests, etc.) were used? [**Check all that apply**]

- [ ] 1. Capstone project (e.g. theses, senior theses), courses, or experiences
- [x] 2. Key assignments from required classes in the program
- [ ] 3. Key assignments from elective classes
- [ ] 4. Classroom based performance assessment such as simulations, comprehensive exams, or critiques

☐ 5. External performance assessments such as internships or other community-based projects

☐ 6. E-Portfolios

☐ 7. Other Portfolios

☐ 8. Other, specify:

Q3.3.2.
Please **provide** the direct measure (key assignments, projects, portfolios, course work, student tests, etc.) you used to collect data, THEN **explain** how it assesses the PLO:

The final exam for Geol 103 (Sedimentology and Stratigraphy) was used to evaluate problem solving. The last question (#15) asks:

15) Draw a cross section of California. Show the major geologic units, and discuss the ages, general rock types and environments of deposition for each. Your cross section should extend from the Reno/Tahoe area in the east to the North Bay/Mendocino area in the west (20 points).

California is divided into geologic provinces, and students were introduced to the geologic provinces through different exercises during the Spring 2017 semester:

- Mesozoic intrusions in the Sierra Nevada and a related metamorphic belt were discussed during lab exercises as possible sources for local river sediment. Students looked on a geologic map of California to identify the location of different metamorphic and intrusive igneous rocks.

- Cenozoic volcanic deposits were discussed as sources for local sedimentary units. These units were visited during two field trips.

- California's Central Valley was identified as a site for Mesozoic shallow marine sedimentation and Cenozoic alluvial/fluvial deposition. These concepts were covered during lectures and field trips.

- California's Coast Range was visited during a 3 day field trip, and a field guide identified the ages, relationships and environments for the Great Valley and Franciscan sequences.

- The San Andreas Fault was visited and discussed on two separate field days.

The sum total of these exercises and field trips gave the students the background they needed to draw a cross section across northern California. Problem solving occurred during the final exam as students defined the problem, identified strategies, proposed solutions, evaluated the solutions, implemented the solutions and evaluated the outcomes. Their success with these activities was rated using the Problem Solving Value Rubric and their test score on the final exam.

Geol 103 final exam Spring 2017.docx
24.16 KB

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Q3.4.
What tool was used to evaluate the data?

○ 1. **No** rubric is used to interpret the evidence (skip to **Q3.4.4.**)

○ 2. Used rubric developed/modified by the faculty who teaches the class (skip to **Q3.4.2.**)

◉ 3. Used rubric developed/modified by a group of faculty (skip to **Q3.4.2.**)

○ 4. Used rubric pilot-tested and refined by a group of faculty (skip to **Q3.4.2.**)

○ 5. The VALUE rubric(s) (skip to **Q3.4.2.**)

○ 6. Modified VALUE rubric(s) (skip to **Q3.4.2.**)

○ 7. Used other means (Answer **Q3.4.1.**)

Q3.4.1.
If you used other means, which of the following measures was used? [**Check all that apply**]

☐ 1. National disciplinary exams or state/professional licensure exams (skip to **Q3.4.4.**)

☐ 2. General knowledge and skills measures (e.g. CLA, ETS PP, etc.) (skip to **Q3.4.4.**)

☐ 3. Other standardized knowledge and skill exams (e.g. ETC, GRE, etc.) (skip to **Q3.4.4.**)

☐ 4. Other, specify: (skip to **Q3.4.4.**)

Q3.4.2.
Was the **rubric** aligned directly and explicitly **with the PLO**?

◉ 1. Yes
○ 2. No
○ 3. Don't know
○ 4. N/A

Q3.4.3.
Was the **direct measure** (e.g. assignment, thesis, etc.) aligned directly and explicitly **with the rubric**?

◉ 1. Yes
○ 2. No
○ 3. Don't know
○ 4. N/A

Q3.4.4.
Was the **direct measure** (e.g. assignment, thesis, etc.) aligned directly and explicitly **with the PLO**?

◉ 1. Yes
○ 2. No
○ 3. Don't know
○ 4. N/A

Q3.5.
How many faculty members participated in planning the assessment data **collection** of the selected PLO?

3

Q3.5.1.
How many faculty members participated in the **evaluation** of the assessment data for the selected PLO?

2

Q3.5.2.
If the data was evaluated by multiple scorers, was there a norming process (a procedure to make sure everyone was scoring similarly)?

○ 1. Yes
○ 2. No
○ 3. Don't know
◉ 4. N/A

Q3.6.
How did you **select** the sample of student work (papers, projects, portfolios, etc.)?

Work was evaluated from all students in the class. This included B.S. in Geology, B.A. in Geology and B.A. in Earth Science students. We did not do an explicit analysis of the B.A. in Earth Science students.

Q3.6.1.
How did you **decide** how many samples of student work to review?

Work was evaluated from all students in the class. This included B.S. in Geology, B.A. in Geology and B.A. in Earth Science students. We did not do an explicit analysis of the B.A. in Earth Science students.

Q3.6.2.
How many students were in the class or program?

32

Q3.6.3.
How many samples of student work did you evaluated?

32

Q3.6.4.
Was the sample size of student work for the direct measure adequate?

- (●) 1. Yes
- ( ) 2. No
- ( ) 3. Don't know

(Remember: Save your progress)

Question 3B: Indirect Measures (surveys, focus groups, interviews, etc.)

Q3.7.
Were indirect measures used to assess the PLO?

- ( ) 1. Yes
- (●) 2. No (skip to **Q3.8**)
- ( ) 3. Don't Know (skip to **Q3.8**)

Q3.7.1.
Which of the following indirect measures were used? [**Check all that apply**]

- [ ] 1. National student surveys (e.g. NSSE)
- [ ] 2. University conducted student surveys (e.g. OIR)

- [ ] 3. College/department/program student surveys or focus groups
- [ ] 4. Alumni surveys, focus groups, or interviews
- [ ] 5. Employer surveys, focus groups, or interviews
- [ ] 6. Advisory board surveys, focus groups, or interviews
- [ ] 7. Other, specify:

Q3.7.1.1.
Please explain and attach the indirect measure you used to collect data:

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Q3.7.2.
If surveys were used, how was the sample size **decided**?

Q3.7.3.
If surveys were used, how did you **select** your sample:

Q3.7.4.
If surveys were used, what was the response rate?

Question 3C: Other Measures (external benchmarking, licensing exams, standardized tests, etc.)

Q3.8.
Were external benchmarking data, such as licensing exams or standardized tests, used to assess the PLO?

- ○ 1. Yes
- ◉ 2. No (skip to **Q3.8.2**)
- ○ 3. Don't Know (skip to **Q3.8.2**)

Q3.8.1.
Which of the following measures was used? [**Check all that apply**]

- ☐ 1. National disciplinary exams or state/professional licensure exams
- ☐ 2. General knowledge and skills measures (e.g. CLA, ETS PP, etc.)
- ☐ 3. Other standardized knowledge and skill exams (e.g. ETC, GRE, etc.)
- ☐ 4. Other, specify:

Q3.8.2.
Were other measures used to assess the PLO?

- ○ 1. Yes
- ◉ 2. No (skip to **Q4.1**)
- ○ 3. Don't know (skip to **Q4.1**)

Q3.8.3.
If other measures were used, please specify:

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Question 4: Data, Findings, and Conclusions

Q4.1.
Please provide simple tables and/or graphs to summarize the assessment data, findings, and conclusions for the selected PLO in **Q2.1**:

Student reports were graded using the Problem Solving Value Rubric attached in question 2.3. Results were plotted to show student performance in these areas: Define the problem, Identify strategies, Propose solutions, Evaluate solutions, Implement solutions and Evaluate outcomes. Results show student performance by decile as cumulative frequency plots (see attached file).

The problem solving value rubric does not report scores by deciles. It has 4 levels of performance for each component in the rubric:

- *Benchmark* 1 performance describes a limited ability to identity and solve problems.

- *Milestone 2* performance describes single or simple approaches to problems.

- *Milestone 3* performance descibes ability to implement multiple approaches or solutions.

- *Capstone 4* performance describes deep and comprehensive approaches to problems.

Results attached to this question show student performance in each component of problem solving. Results are plotted in 4 steps to match the 4 levels of performance:

- Students who reached Benchmark performance levels recieved a score of 1

- Students who reached Milestone 1 performance levels recieved a score of 2

- Students who reached Milestone 2 performance levels recieved a score of 3

- Students who reached Capstone 4 performance levels recieved a score of 4

These scores helped to determine the percentage of students who are performing at Milestone 2 level or higher.

Geol_103_problem_solving_2017_results.pdf
18 KB

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Q4.2.
Are students doing well and meeting the program standard? If not, how will the program work to improve student performance of the selected PLO?

Our target is to have 70% of the students score at or above Milestone 2 in each of the rubric categories. The summary shows these results:

Define the Problem: 79% of students met or exceeded the Milestone 2 performance level on the Problem Solving Value Rubric.

Identify Strategies: 82% of students met or exceeded the Milestone 2 performance level on the Problem Solving Value Rubric.

Propose Solutions: 79% of students met or exceeded the Milestone 2 performance level on the Problem Solving Value Rubric.

Evaluate Potential Solutions: 72% of students met or exceeded the Milestone 2 performance level on the Problem Solving Value Rubric.

Implement Solutions: 91% of students met or exceeded Milestone 2 perfomance on the Problem Solving Value Rubric.

Evaluate Outcomes: 91% of students met or exceeded Milestone 2 performance on the Problem Solving Value Rubric.

Results indicate that more than 70% of our students are meeting our Milestone 2 performance standards for all aspects of problem solving. Student's weakest performance was scored as they evaluated potential solutions. This step required them to think about all of the geologic provinces that they were exposed to during the semester, and select appropriate examples for each part of the cross section. This higher level of thinking was only attained by 72% of the students. Students scored highest with their ability to implement solutions and evaluate outcomes for the cross sections. These skills are reinforced by exposure to cross sections in several classes, so the results are confirmation of our student's ability to solve a geologic problem that involved constructing and evaluating a cross section.

We started this assessment by evaluating the entire Junior class, regardless of the degree program. The fact that this class meets performance expectations as a large group is a strong indicator that our B.A. students also meet our performance standards.

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Q4.3.
For the selected PLO, the student performance:

- ○ 1. **Exceeded** expectation/standard
- ◉ 2. **Met** expectation/standard
- ○ 3. **Partially** met expectation/standard
- ○ 4. Did not meet expectation/standard
- ○ 5. No expectation/standard has been specified
- ○ 6. Don't know

Question 4A: Alignment and Quality

Q4.4.
Did the data, including the direct measures, from all the different assessment tools/measures/methods directly align with the PLO?

- ◉ 1. Yes
- ○ 2. No
- ○ 3. Don't know

Q4.5.
Were **all** the assessment tools/measures/methods that were used good measures of the PLO?

- ◉ 1. Yes
- ○ 2. No
- ○ 3. Don't know

Question 5: Use of Assessment Data (Closing the Loop)

Q5.1.
As a result of the assessment effort and based on prior feedback from OAPA, do you anticipate *making any changes* for your program (e.g. course structure, course content, or modification of PLOs)?

- (●) 1. Yes
- ( ) 2. No (skip to **Q5.2**)
- ( ) 3. Don't know (skip to **Q5.2**)

Q5.1.1.
Please describe *what changes* you plan to make in your program as a result of your assessment of this PLO. Include a description of how you plan to assess the impact of these changes.

Our students met our performance standard for Problem Solving, but our Department will continue to refine and improve our teaching and assessment methods.

The area where we scored the lowest on Problem Solving showed that students were not relating different parts of the course to a common theme. They didn't always understand the relationships or connections between different concepts. We will use this information when the class is taught again, and will have students practice drawing cross sections through different areas. This will give students practical experience with the complex process of Problem Solving, and we expect scores to improve in this area.

Q5.1.2.
Do you have a plan to assess the *impact of the changes* that you anticipate making?

- (●) 1. Yes
- ( ) 2. No
- ( ) 3. Don't know

Q5.2.

Since your last assessment report, **how have the assessment data from then been used** so far?	1. Very Much	2. Quite a Bit	3. Some	4. Not at All	5. N/A
1. Improving specific courses	( )	(●)	( )	( )	( )
2. Modifying curriculum	( )	( )	(●)	( )	( )
3. Improving advising and mentoring	( )	( )	(●)	( )	( )
4. Revising learning outcomes/goals	( )	( )	( )	(●)	( )
5. Revising rubrics and/or expectations	( )	( )	(●)	( )	( )
6. Developing/updating assessment plan	( )	( )	( )	(●)	( )
7. Annual assessment reports	(●)	( )	( )	( )	( )
8. Program review	(●)	( )	( )	( )	( )
9. Prospective student and family information	( )	( )	( )	(●)	( )
10. Alumni communication	( )	( )	( )	(●)	( )
11. WSCUC accreditation (regional accreditation)	( )	( )	( )	( )	(●)
12. Program accreditation	( )	( )	( )	( )	(●)
13. External accountability reporting requirement	( )	( )	( )	( )	(●)

14. Trustee/Governing Board deliberations	○	○	○	○	◉
15. Strategic planning	○	○	○	◉	○
16. Institutional benchmarking	○	○	○	○	◉
17. Academic policy development or modifications	○	○	○	◉	○
18. Institutional improvement	○	○	○	◉	○
19. Resource allocation and budgeting	○	○	○	◉	○
20. New faculty hiring	○	○	○	◉	○
21. Professional development for faculty and staff	○	○	○	◉	○
22. Recruitment of new students	○	○	○	◉	○

23. Other, specify:

Q5.2.1.
Please provide a detailed example of how you used the assessment data above:

Last year we assessed *Overall Competency in the Major or Discipline* for the B.A. in Earth Science. This University-level Baccalaureate Learning Goal (BALG) was mapped to Program Learning Outcomes (PLO's) in the Geology major. At the program level we examined whether our Students are proficient in introductory skills of understanding and producing geologic maps. This PLO was evaluated in Geol 111B (Field mapping) for all students including the B.A. in Earth Science students. We identified weakness in these areas as a result of the assessment process:

- Students were not able to write Geologic histories at an appropriate level.

- Students had problems constructing Stratigraphic columns.

- Students were not able to summarize the structural geology of an area at an appropriate level.

The Geology Department took immediate steps to use assessment data from the 2015/16 assessment report. Faculty members discussed the assessment results at our faculty retreat in August, and we put our 2015/16 assessment results to use immediately. Faculty members who teach Geol 103 (Sedimentology/stratigraphy), Geol 111A (Field techniques) and Geol 111B (Field methods) spent more time on concepts that we identified during the assessment process. An extra cross section was introduced in Geol 111A, we gave students more examples of geologic histories during Geol 111B and we showed extra stratigraphic columns in Geol 103 and Geol 111A. We also had students construct simple cross sections and stratigraphic columns several times during the field classes. These ranged from "no points" exercises where instructors gave free critiques to evening assignments that counted as part of the Geol 111B grade. We feel that this spiralling effect is the most effective way to reinforce difficult concepts that were identified during by assessment.

Q5.3.
To what extent did you apply **last year's feedback** from the Office of Academic Program Assessment in the following areas?

	1. Very Much	2. Quite a bit	3. Some	4. Not at All	5. N/A
1. Program Learning Outcomes	○	○	○	◉	○
2. Standards of Performance	○	○	○	◉	○
3. Measures	○	○	○	◉	○
4. Rubrics	○	○	○	◉	○
5. Alignment	○	○	○	◉	○
6. Data Collection	○	○	○	◉	○
7. Data Analysis and Presentation	○	○	◉	○	○
8. Use of Assessment Data	○	○	○	◉	○
9. Other, please specify:	○	○	○	○	◉

Q5.3.1.
Please share with us an example of how you applied **last year's feedback** from the Office of Academic Program Assessment in any of the areas above:

Comments from last year's assessment review by the Office of Program Assessment (OPA) were generally positive. We were commended for using high quality assessment data that is well-aligned to Program Learning Objectives (PLO's). Reviewers also appreciated the use of direct measures of student learning and standardized rubrics. We specified standards of performance, and used results to modify the curriculum and improve instruction.

Reviewers recommended that we consider more data analysis in future reports, and use the curriculum maps to help students develop a roadmap to the degree. We are already implementing Roadmaps to the Degree for the B.A. in Geology, B.S. in Geology and B.A. in Earth Science. We plan to do longitudinal assessment at the end of this 5 year assessment plan, so more data will be provided in a future report.

Specific steps used to improve geologic histories, stratigraphic columns and summaries of structural geology were discussed in question 5.2.1.

(Remember: Save your progress)

Additional Assessment Activities

Q6.
Many academic units have collected assessment data on aspect of their program *that are not related to the PLOs* (i.e. impacts of an advising center, etc.). **If** your program/academic unit has collected data on program *elements*, please briefly report your results here:

No file attached No file attached

Q7.
What PLO(s) do you plan to assess next year? [**Check all that apply**]

- [ ] 1. **Critical Thinking**
- [ ] 2. **Information Literacy**
- [x] 3. **Written Communication**
- [ ] 4. **Oral Communication**
- [ ] 5. Quantitative Literacy
- [ ] 6. **Inquiry and Analysis**
- [ ] 7. Creative Thinking
- [ ] 8. Reading
- [ ] 9. Team Work
- [x] 10. Problem Solving
- [ ] 11. Civic Knowledge and Engagement
- [ ] 12. **Intercultural Knowledge, Competency, and Perspectives**
- [ ] 13. Ethical Reasoning
- [ ] 14. Foundations and Skills for Lifelong Learning
- [ ] 15. **Global Learning and Perspectives**

- [ ] 16. Integrative and Applied Learning
- [ ] 17. Overall Competencies for GE Knowledge
- [x] 18. **Overall Disciplinary Knowledge**
- [ ] 19. **Professionalism**
- [ ] 20. Other, specify any PLOs not included above:

a.
b.
c.

Q8. Please attach any additional files here:

No file attached | No file attached | No file attached | No file attached

Q8.1.
Have you attached any files to this form? If yes, please list every attached file here:

The Geology Department's curriculum map and assessment plan are attached to questions 19.2 and 20.1.

Program Information (**Required**)

Program:

(If you typed your program name at the beginning, please skip to Q10)

Q9.
Program/Concentration Name: [skip if program name appears above]

BA Geology Earth Science

Q10.
Report Author(s):

Tim Horner

Q10.1.
Department Chair/Program Director:

Tim Horner

Q10.2.
Assessment Coordinator:

Amelia Vankeuren

Q11.
Department/Division/Program of Academic Unit

Geology

Q12.
College:

College of Natural Science & Mathematics

Q13.
Total enrollment for Academic Unit during assessment semester (see Departmental Fact Book):

90

Q14.
Program Type:

- (●) 1. Undergraduate baccalaureate major
- ( ) 2. Credential
- ( ) 3. Master's Degree
- ( ) 4. Doctorate (Ph.D./Ed.D./Ed.S./D.P.T./etc.)
- ( ) 5. Other, specify:

Q15. Number of **undergraduate degree programs** the academic unit has?
3

Q15.1. List all the names:
B.S. Geology

B.A. Geology

B.A. Earth Science

Q15.2. How many concentrations appear on the diploma for this undergraduate program?
0

Q16. Number of **master's degree programs** the academic unit has?
1

Q16.1. List all the names:
M.S. Geology

Q16.2. How many concentrations appear on the diploma for this master's program?
0

Q17. Number of **credential programs** the academic unit has?
0

Q17.1. List all the names:

Q18. Number of **doctorate degree programs** the academic unit has?
0

Q18.1. List all the names:

When was your **assessment plan**...	1. Before 2011-12	2. 2012-13	3. 2013-14	4. 2014-15	5. 2015-16	6. 2016-17	7. No Plan	8. Don't know
Q19. developed?	◉	○	○	○	○	○	○	○
Q19.1. last updated?	○	○	○	○	◉	○	○	○

Q19.2. (REQUIRED)
Please **obtain** and **attach** your latest **assessment plan**:

Geology assessment plan 2014_2019.pdf
99.65 KB

Q20.
Has your program developed a **curriculum map?**

◉ 1. Yes
○ 2. No
○ 3. Don't know

Q20.1.
Please **obtain** and **attach** your latest **curriculum map**:

Geology curriculum mapping.pdf
132.64 KB

Q21.
Has your program indicated in the curriculum map where assessment **of student learning** occurs?

◉ 1. Yes
○ 2. No
○ 3. Don't know

Q22.
Does your program have a capstone class?

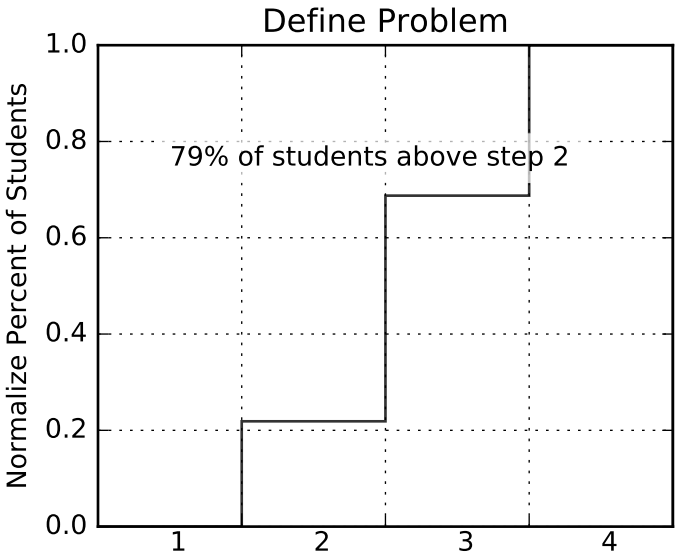
- ○ 1. Yes, indicate:
- ◉ 2. No
- ○ 3. Don't know

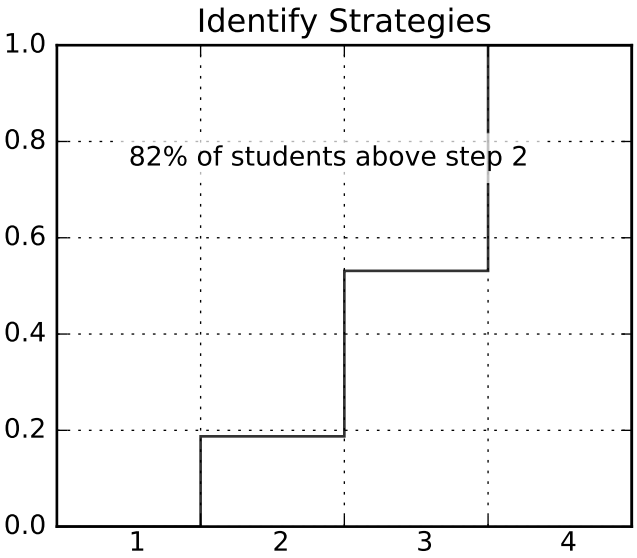
Q22.1.
Does your program have **any** capstone project?

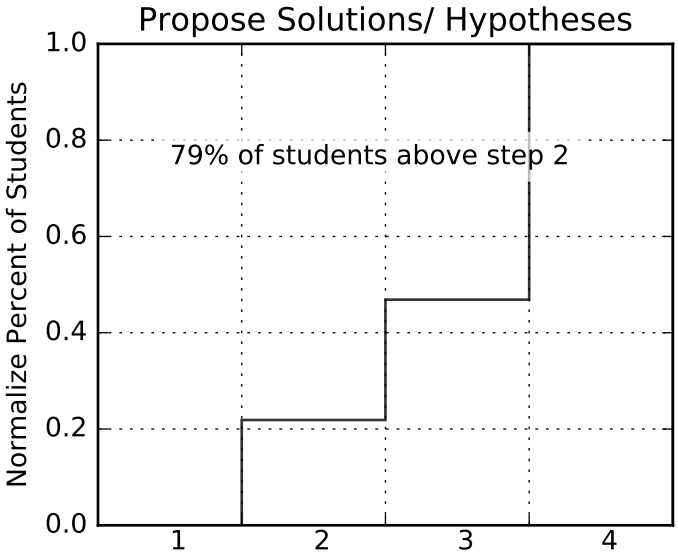
- ○ 1. Yes
- ◉ 2. No
- ○ 3. Don't know

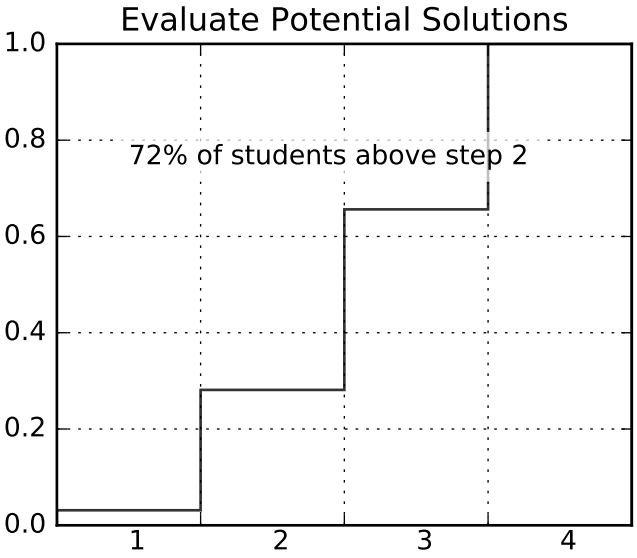
(**Remember**: **Save your progress**)

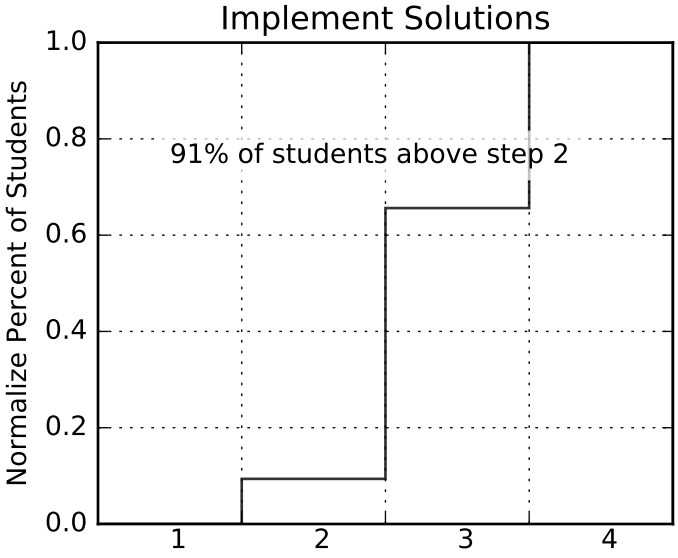
ver. 5.15/17

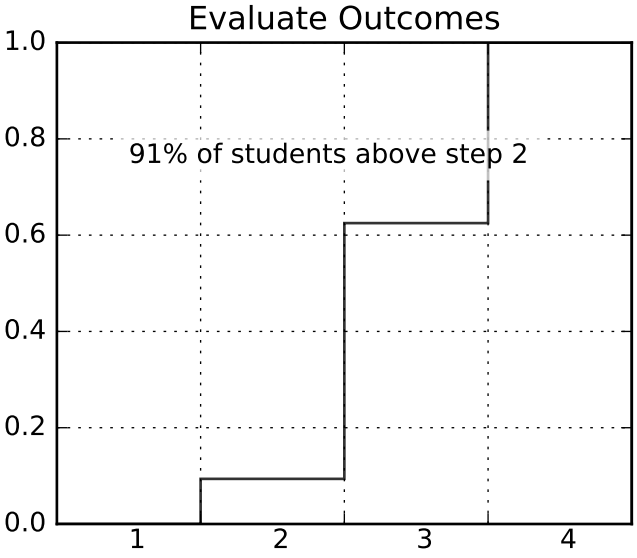

Define Problem
Normalize Percent of Students
79% of students above step 2
1.0
0.8
0.6
0.4
0.2
0.0
1
2
3
4


Identify Strategies
82% of students above step 2
1.0
0.8
0.6
0.4
0.2
0.0
1
2
3
4


Propose Solutions/ Hypotheses
Normalize Percent of Students
79% of students above step 2
1.0
0.8
0.6
0.4
0.2
0.0
1
2
3
4


Evaluate Potential Solutions
72% of students above step 2
1.0
0.8
0.6
0.4
0.2
0.0
1
2
3
4


Implement Solutions
Normalize Percent of Students
91% of students above step 2
1.0
0.8
0.6
0.4
0.2
0.0
1
2
3
4


Evaluate Outcomes
91% of students above step 2
1.0
0.8
0.6
0.4
0.2
0.0
1
2
3
4

Appendix 1

Overall Program Goals for All Programs of the Geology Dept.

I. Students are prepared for professional and /or graduate study involving the geosciences;
II. Students develop a deep understanding of Earth systems: how Earth systems work and how they interact;
III. Students develop their ability to solve geologic problems through the use of scientific method;
IV. Students develop a deep curiosity about how the Earth works, and a lifelong appreciation of the Earth's place in space and time; and
V. Students develop their technical communication skills: seeking and processing technical information; and communicating technical information and conclusions in both oral and written form.

Summary of Assessment Data:

- Student Knowledge Inventory
- Geology 188 field maps and assignments
- Geology 111B field maps and assignments
- Embedded assignments from majors courses
- Writing rubrics from required assignments
- CSET scores

Summary of Assessment Tasks for 2014-2019

Year	Periodic Tasks	Yearly Tasks
2014-15	Geology 188 review	1. Administer SKI in Fall semester; compile results & review. 2. Collect Geology 188 rubrics, cross-sections and select maps 3. Collect Geology 111B rubrics, cross-sections and maps. 4. Collect writing rubrics 5. Collect embedded assignments from one course. 6. Collect CSET data from Earth Science majors.
2015-16	Geology 111B review	
2016-17	Embedded assessment review Geology 188 review	
2017-18	Writing review Geology 111B review	
2018-19	SKI longitudinal review	

Appendix 1

BS in Geology

Program Learning Outcome	Assessment Method(s)	Performance Standard	Assessment Schedule
Students will master a set of fundamental geologic concepts essential to understanding and solving geologic problems	Student Knowledge Inventory	70% of seniors answer questions in each domain correctly	Every Fall, administered in Geology 100 and Geology 102. Collect data yearly, review annual data yearly, do longitudinal review once every five years.
	Embedded assignments, select exam problems/questions	70 % of students answer questions/work problems correctly	Sample one course every year. Analyze data once in 5-year cycle.
Students will be proficient in solving geologic problems	Field assignments from Geology 188	TBD	Collect every year, review every other year. 2014-15 2016-17 2018-19
Students will be proficient in understanding and producing geologic maps.	Field assignments from Geology 188.	TBD	Collect every year, review every other year 2014-15 2016-17 2017-18
Students will be proficient writers, skilled in the genres of scientific and technical writing	Review rubrics from required writing assignments: • Field report from Geology 111B • Literature review from an elective course	70% of students demonstrate Milestone 2 on revised Written Communication VALUE Rubric	Review once in 5-year cycle.

Appendix 1

BA in Geology

Program Learning Outcome	Assessment Method(s)	Performance Standard	Assessment Schedule
Students will master a set of fundamental geologic concepts essential to understanding and solving geologic problems	Student Knowledge Inventory	70% of students answer questions in each domain correctly	Every Fall, administered in Geology 100 and Geology 102
	Embedded assignments	70 % of students answer questions/work problems correctly	Sample one course every year. Analyze data once in 5-year cycle.
Students will be proficient in solving geologic problems	Field assignments from Geology 111B.	TBD	Collect every year, review every other year. 2015-16 2017-18 2018-19
Students will be proficient in introductory skills of understanding and producing geologic maps.	Field assignments from Geology 111B.	TBD	Collect every year, review every other year. 2015-16 2017-18 2018-19
Students will be proficient writers, skilled in the genres of scientific and technical writing	Review rubrics from required writing assignments: • Field report from Geology 111 • Literature review from an elective course	70% of students demonstrate Milestone 2 on revised Written Communication VALUE Rubric	Review once in 5-year cycle.

Appendix 1

BA in Earth Science

Program Learning Outcome	Assessment Method(s)	Performance Standard	Assessment Schedule
Students will master a set of fundamental earth science concepts essential to understanding and solving geologic problems	Student Knowledge Inventory	70% of students answer questions in each domain correctly	Every Fall, administered in Geology 100 and Geology 102
	CSET scores	70% of students will pass Science Subtest #1 on the first try	Collect data yearly, review once every five years
Students will be proficient in solving geologic problems	Field assignments from Geology 111B.	TBD	Collect every year, review every other year. 2015-16 2017-18 2018-19
Students will be proficient in introductory skills of understanding and producing geologic maps.	Field assignments from Geology 111B.	TBD	Collect every year, review every other year. 2015-16 2017-18 2018-19
Students will be proficient writers, skilled in the genres of scientific and technical writing	Review rubrics from required writing assignments: • Field report from Geology 111 • Literature review from an elective course	70% of students demonstrate Milestone 2 on revised Written Communication VALUE Rubric	Review once in 5-year cycle.

Curriculum Map: Geology BS and BA

Linking Program Learning Outcomes[1] (PLO) to Each Course in the Curriculum (number of Learning Outcomes varies per program)

Outcomes (PLOs) / **Courses**	**Outcome 1:** Students will master a set of fundamental geologic concepts essential to understanding and solving geologic problems	**Outcome 2:** Students will be proficient in solving geologic problems	**Outcome 3:** Students will be proficient in (BA: introductory) skills of understanding and producing geologic maps	**Outcome 4:** Students will be proficient writers, skilled in the genres of scientific and technical writing	**Outcome 5:**	**Outcome 6:**	**Outcome 7:**	**Outcome 8:**
Required Courses								
GEOL 10	I	I						
GEOL 10L	I	I	I					
GEOL 12	I	I		I				
GEOL 12L	I	I	I					
GEOL 100	D	D						
GEOL 102	D	D						
GEOL 103	D	D	D	D				
GEOL 110A	D	D	D					
GEOL 110B	D	D	D	D				
GEOL 111A	D	D	D					
GEOL 111B	M	M	M	M				
(GEOL 188 – only in BS)	M	M	M	M				
Elective Courses								
GEOL 105	M	M		D				
GEOL 112	M	M						
GEOL 114	M	M		D				
GEOL 120	M	M						
GEOL 123	M	M						
GEOL 125	M	M						
GEOL 127	M	M						
GEOL 150	M	M	M					

GEOL 171	M	M						
GEOL 190A	M	M						
GEOL 190C	M	M						
GEOL 198A	M	M		M				
GEOL 198B	M	M		M				

[1] use “I” for “Introduced”, “D” for “Developed”, and “M” for “Mastered”.

Table 2.5b: Curriculum Map: Earth Science BA

Linking Program Learning Outcomes[1] (PLO) to Each Course in the Curriculum (number of Learning Outcomes varies per program)

Outcomes (PLOs) / **Courses**	**Outcome 1:** Students will master a set of fundamental earth science concepts essential to understanding and solving geologic problems	**Outcome 2:** Students will be proficient in solving geologic problems	**Outcome 3:** Students will be proficient in introductory skills of understanding and producing geologic maps	**Outcome 4:** Students will be proficient writers, skilled in the genres of scientific and technical writing	**Outcome 5:**	**Outcome 6:**	**Outcome 7:**	**Outcome 8:**
Required Courses								
GEOL 5, GEOL 7, GEOL 8 or GEOL 10	I	I						
GEOL 8L or 10L	I	I	I					
ASTR 4B & ASTR 6								
BIO 1 & BIO 2; OR BIO 7								
CHEM 1A OR CHEM 6A								
GEOL 12	I	I		I				
GEOL 12L	I	I	I					
GEOL 17 (currently being changed to GEOL)	D	D						
MATH 26A	I							
PHYS 5A & PHYS 5B	I, D							
GEOG 111	D							
GEOL 103	D	D	D	D				
GEOL 111A	D	D	D					
GEOL 111B	M	M	M	M				
GEOL 130	D	D		M				
Elective Courses								
GEOL 105	M	M		D				
GEOL 110A	M	M	M					
GEOL 114	M	M		D				
GEOL 120	M	M						

GEOL 140	M	M		M				
GEOL 184	I	M	I					
ANTH 124	D							
ANTH 151	D		M					
ENGL 120P				M				
GEOG 113	D							
GEOG 116	D							
GEOG 117	D			M				
GEOG 161	D			M				
JOUR 131				M				
PHIL 125	D							
RPTA 153	D							

[1] use “I” for “Introduced”, “D” for “Developed”, and “M” for “Mastered”.

Table 2.5c: Curriculum Map: Geology MS

Linking Program Learning Outcomes[1] (PLO) to Each Course in the Curriculum (number of Learning Outcomes varies per program)

Outcomes (PLOs) / Courses	**Outcome 1:** Students will be able to read and digest complex scientific papers in the discipline, assess competing hypotheses and reach rational and logical conclusions.	**Outcome 2:** Students will be able to evaluate and interpret real-world data sets and use discipline-specific analytical tools to generate insight into discipline specific geologic problems.	**Outcome 3:** Students will develop presentation skills and the ability to relay technical data and scientific concepts to diverse audiences.	**Outcome 4:** Students will demonstrate the ability to obtain, assess, and analyze information from a variety of sources.	**Outcome 5:** Students will demonstrate an understanding of professional integrity.	**Outcome 6:** Students will demonstrate relevant knowledge and application of intercultural and/or global perspectives.	**Outcome 7:**	**Outcome 8:**
Required Courses								
GEOL 200	X	X	X		X	X		
GEOL 275	X	X	X	X				
GEOL 290	X	X	X	X	X			
Elective Courses								
GEOL 202	X	X	X	X	X			
GEOL 208	X	X	X	X	X			
GEOL 212	X		X	X	X	X		
GEOL 213	X	X	X	X	X	X		
GEOL 218	X	X	X	X				
GEOL 220	X	X	X	X	X	X		
GEOL 227	X	X	X	X	X			
GEOL 240C	X		X	X	X	X		
GEOL 500	X	X	X	X	X	X		
GEOL 596	X	X	X	X				

[1] Note: currently courses are marked with an "X" to indicate which ones contain PLOs. Eventually course map will include "I" for "Introduced", "D" for "Developed", and "M" for "Mastered", but those determinations are still in progress.

Name _____ Geol 103 Final exam
Spring 2017

Short answer questions: 5 points each. If the questions asks for a diagram be sure to include it!

1) What is the phi scale? What phi number would we assign to a grain that is 1/256 mm in diameter? Show your work.

2) A sand sample contains quartz, feldspar, mica and plutonic rock fragments. All particles are subangular to angular, and the sample is poorly to moderately sorted. What interpretations can you make about this sample? Discuss distance to the source, composition of the source rock and textural and compositional maturity of the sample.

Distance to the source:

Composition of the source material:

Textural and compositional maturity:

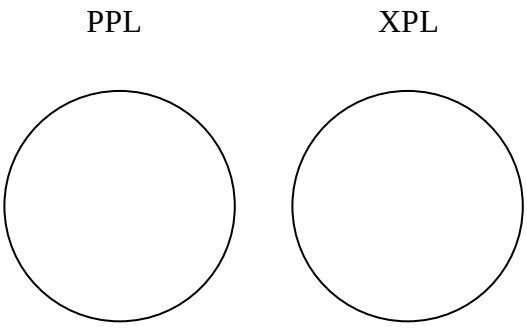
3) Describe the difference between an oscillation ripple and a current ripple. What current conditions are responsible for the formation of each type of ripple, and what depositional environments might produce these conditions? Draw a simple sketch of each.

4) Why do meandering stream deposits fine upward? Draw a diagram to illustrate your discussion. Label the parts of the stream system.

5) Draw a picture of a volcanic rock fragment under plane-polarized light and cross-polarized light. Describe the petrographic properties that would help you identify a volcanic rock fragment.

PPL_____
_____
_____
_____

XPL_____
_____
_____
_____



6) What features would you expect to find in a ***proximal*** deep sea fan? Discuss sedimentary structures, grain size or rock types and bedding:

Sedimentary structures:

Grain size or rock types:

Bedding:

7) Describe the parts of a Gilbert-type delta. Draw a simple sketch to illustrate your discussion.

8) Draw a picture of a barchan dune. Show the wind direction and the slip face.

9) What is the difference between normal graded bedding and reverse graded bedding? Draw a picture of each. Describe an environment where each might occur.

10) What environments do phosphatic rocks form in? Describe why each environment is rich in phosphate.

11) Describe the environment of deposition for each formation or unit:

Arroyo Seco Formation:

Valley Springs Formation:

Fair Oaks unit:

12) What would Dunham name a carbonate rock that consists mostly of aragonitic lime mud, with less than 10% allochems? Some of the allochems are made of high-magnesian calcite.

13) Reynolds numbers are calculated using the following formula: $R_e = UL/\mu$. Define the variables in this formula, discuss the difference between laminar and turbulent flow (as defined by the Reynolds number) and list three natural conditions where changes in U, L or μ result in laminar flow conditions (10 points).

14) How do the World's oceans maintain a relatively constant pH level? Describe the series of reactions that would occur if ocean water suddenly became too acidic because of a volcanic eruption (10 points).

15) Draw a cross section of California. Show the major geologic units, and discuss the ages, general rock types and environments of deposition for each. Your cross section should extend from the Reno/Tahoe area in the east to the North Bay/Mendocino area in the west (20 points).

North Bay/
Mendocino

Tahoe area

W

E

PROBLEM SOLVING VALUE RUBRIC

for more information, please contact value@aacu.org

Association of American Colleges and Universities

The VALUE rubrics were developed by teams of faculty experts representing colleges and universities across the United States through a process that examined many existing campus rubrics and related documents for each learning outcome and incorporated additional feedback from faculty. The rubrics articulate fundamental criteria for each learning outcome, with performance descriptors demonstrating progressively more sophisticated levels of attainment. The rubrics are intended for institutional-level use in evaluating and discussing student learning, not for grading. The core expectations articulated in all 15 of the VALUE rubrics can and should be translated into the language of individual campuses, disciplines, and even courses. The utility of the VALUE rubrics is to position learning at all undergraduate levels within a basic framework of expectations such that evidence of learning can by shared nationally through a common dialog and understanding of student success.

Definition

Problem solving is the process of designing, evaluating and implementing a strategy to answer an open-ended question or achieve a desired goal.

Framing Language

Problem-solving covers a wide range of activities that may vary significantly across disciplines. Activities that encompass problem-solving by students may involve problems that range from well-defined to ambiguous in a simulated or laboratory context, or in real-world settings. This rubric distills the common elements of most problem-solving contexts and is designed to function across all disciplines. It is broad-based enough to allow for individual differences among learners, yet is concise and descriptive in its scope to determine how well students have maximized their respective abilities to practice thinking through problems in order to reach solutions.

This rubric is designed to measure the quality of a **process**, rather than the quality of an **end-product**. As a result, work samples or collections of work will need to include some evidence of the individual's thinking about a problem-solving task (e.g., reflections on the process from problem to proposed solution; steps in a problem-based learning assignment; record of think-aloud protocol while solving a problem). The final product of an assignment that required problem resolution is insufficient without insight into the student's problem-solving process. Because the focus is on institutional level assessment, scoring team projects, such as those developed in capstone courses, may be appropriate as well.

Glossary

The definitions that follow were developed to clarify terms and concepts used in this rubric only.

- Contextual Factors: Constraints (such as limits on cost), resources, attitudes (such as biases) and desired additional knowledge which affect how the problem can be best solved in the real world or simulated setting.
- Critique: Involves analysis and synthesis of a full range of perspectives.
- Feasible: Workable, in consideration of time-frame, functionality, available resources, necessary buy-in, and limits of the assignment or task.
- "Off the shelf"solution: A simplistic option that is familiar from everyday experience but not tailored to the problem at hand (e.g. holding a bake sale to "save" an underfunded public library).
- Solution: An appropriate response to a challenge or a problem.
- Strategy: A plan of action or an approach designed to arrive at a solution. (If the problem is a river that needs to be crossed, there could be a construction-oriented, cooperative (build a bridge with your community) approach and a personally oriented, physical (swim across alone) approach. An approach that partially applies would be a personal, physical approach for someone who doesn't know how to swim.
- Support: Specific rationale, evidence, etc. for solution or selection of solution.

PROBLEM SOLVING VALUE RUBRIC

	Capstone 4	**Milestones** 3	 2	**Benchmark** 1
Define Problem	Demonstrates the ability to construct a clear and insightful problem statement with evidence of all relevant contextual factors.	Demonstrates the ability to construct a problem statement with evidence of most relevant contextual factors, and problem statement is adequately detailed.	Begins to demonstrate the ability to construct a problem statement with evidence of most relevant contextual factors, but problem statement is superficial.	Demonstrates a limited ability in identifying a problem statement or related contextual factors.
Identify Strategies	Identifies multiple approaches for solving the problem that apply within a specific context.	Identifies multiple approaches for solving the problem, only some of which apply within a specific context.	Identifies only a single approach for solving the problem that does apply within a specific context.	Identifies one or more approaches for solving the problem that do not apply within a specific context.
Propose Solutions/Hypotheses	Proposes one or more solutions/hypotheses that indicates a deep comprehension of the problem. Solution/hypotheses are sensitive to contextual factors as well as all of the following: ethical, logical, and cultural dimensions of the problem.	Proposes one or more solutions/hypotheses that indicates comprehension of the problem. Solutions/hypotheses are sensitive to contextual factors as well as the one of the following: ethical, logical, or cultural dimensions of the problem.	Proposes one solution/hypothesis that is "off the shelf" rather than individually designed to address the specific contextual factors of the problem.	Proposes a solution/hypothesis that is difficult to evaluate because it is vague or only indirectly addresses the problem statement.
Evaluate Potential Solutions	Evaluation of solutions is deep and elegant (for example, contains thorough and insightful explanation) and includes, deeply and thoroughly, all of the following: considers history of problem, reviews logic/reasoning, examines feasibility of solution, and weighs impacts of solution.	Evaluation of solutions is adequate (for example, contains thorough explanation) and includes the following: considers history of problem, reviews logic/reasoning, examines feasibility of solution, and weighs impacts of solution.	Evaluation of solutions is brief (for example, explanation lacks depth) and includes the following: considers history of problem, reviews logic/reasoning, examines feasibility of solution, and weighs impacts of solution.	Evaluation of solutions is superficial (for example, contains cursory, surface level explanation) and includes the following: considers history of problem, reviews logic/reasoning, examines feasibility of solution, and weighs impacts of solution.
Implement Solution	Implements the solution in a manner that addresses thoroughly and deeply multiple contextual factors of the problem.	Implements the solution in a manner that addresses multiple contextual factors of the problem in a surface manner.	Implements the solution in a manner that addresses the problem statement but ignores relevant contextual factors.	Implements the solution in a manner that does not directly address the problem statement.
Evaluate Outcomes	Reviews results relative to the problem defined with thorough, specific considerations of need for further work.	Reviews results relative to the problem defined with some consideration of need for further work.	Reviews results in terms of the problem defined with little, if any, consideration of need for further work.	Reviews results superficially in terms of the problem defined with no consideration of need for further work