MASTER OF SCIENCE IN GEOLOGY ASSESSMENT PLAN

Submitted by the Geology Department
via
Graduate Coordinator, Dr. Kevin Cornwell

May 19, 2016

Program Learning Goals

The Geology Department has six Program Learning Goals (PLG's) that closely parallel the Office of Graduate Studies PLG's. The Geology Department goals are outlined as follows:

1. Students will be able to read and digest complex scientific papers in the discipline, assess competing hypotheses and reach rational and logical conclusions.

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.

3. Students will develop presentation skills and the ability to relay technical data and scientific concepts to diverse audiences.

4. Students will demonstrate the ability to obtain, assess, and analyze information from a variety of sources

5. Students will demonstrate an understanding of professional integrity

6. Students will demonstrate relevant knowledge and application of intercultural and / or global perspectives.

Program Learning Objectives

These overall program learning goals are assessed throughout our graduate curriculum through a series of Program Learning Objectives (PLO's). The PLO's are outlined below for each of the PLG's.

PLG 1 - Students will be able to read and digest complex scientific papers in the discipline, assess competing hypotheses and reach rational and logical conclusions.

PLO 1 - 1a) Evaluates the scholarly significance and relevance within and beyond the discipline.

1b) Recognizes possible implications of the text for contexts, perspectives, or issues beyond the assigned task.

1c) Compares and evaluates multiple and diverse sources and viewpoints according to specific criteria appropriate for the discipline.

1d) Articulates an understanding of the multiple interpretive possibilities particular to a text.

PLG 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.

PLO 2 - 2a) Uses specific inductive or deductive reasoning to make inferences regarding premises.

2b) Thoroughly identifies and addresses key aspects of the problem.

2c) Insightfully uses facts and relevant evidence from analysis to support and defend potentially valid solutions.

PLG 3 - Students will develop presentation skills and the ability to relay technical data and scientific concepts to diverse audiences.

PLO 3 - 3a) Main points are clear and organized effectively and support a clear purpose.

3b) Language is familiar to the audience and appropriate for the setting.

3c) The delivery is natural, confident, and enhances the message - posture, eye contact, smooth gestures, facial expressions, volume, and pace.

PLG 4 - Students will demonstrate the ability to obtain, assess, and analyze information from a variety of sources.

PLO 4 - 4a) Students compare and evaluate multiple and diverse sources and viewpoints according to specific criteria appropriate to the discipline.

4b) Effectively synthesizes and integrates information from a variety of sources.

PLG 5 - Students will demonstrate an understanding of professional integrity

.

PLO 5 - 5a) Students consistently and accurately cite ideas and information of others correctly in written and oral exercises.

5b) Students are properly attired and present clear and cogent presentations to audience in oral exercises.

PLG 6 - Students will demonstrate relevant knowledge and application of intercultural and / or global perspectives.

PLO 6 - 6a) Insightfully relates concepts and ideas from multiple sources and across geographic regions relative to geologic processes and hazards.

6b) Evaluates the scholarly significance and relevance within and beyond the discipline and geographic region.

Curriculum Map of Graduate Geology Courses

The curriculum map below outlines where in the graduate program the 6 PLG's are evaluated. Courses GEOL200, GEOL275 and GEOL290 are core (in the shaded course boxes), required classes for all students advancing through the M.S. Geology program. All students who successfully navigate the Program will either complete a master's thesis (GEOL500) or take the comprehensive exam (GEOL596).

COURSE	COURSE TITLE	PLG 1	PLG 2	PLG 3	PLG 4	PLG 5	PLG 6
GEOL200	Research Methods	X	X	X		X	X
GEOL275	Quantitative Research Methods	X	X	X	X		
GEOL290	Regional Geology of the Western US	X	X	X	X	X	
GEOL202	Aqueous Geochemistry	X	X	X	X	X	
GEOL208	Groundwater Modeling	X	X	X	X	X	
GEOL212	Geologic Remote Imaging	X		X	X	X	X
GEOL213	Advanced Structural Geology	X	X	X	X	X	X

GEOL218	Applied Geophysics	X	X	X	X		
GEOL220	Surficial Processes	X	X	X	X	X	X
GEOL227	Advanced Hydrogeology	X	X	X	X	X	X
GEOL240C	Advanced Volcanology	X		X	X	X	X
GEOL500	Master's Thesis	X	X	X	X	X	X
GEOL596	Comprehensive Examination	X	X	X	X		

Assessment Plan

The M.S. Geology program is just getting underway (Fall, 2015) after being administratively closed for several years. With the construction of this assessment plan, Geology will begin collecting assessment data in the Fall, 2016 semester. Pending the continued development of assessment at the graduate level, it is anticipated that the M.S. Geology program collect assessment data every semester that classes are held and will review and assess selective parts of that data set every five years. With this schedule in mind, our first assessment of the M.S. in Geology program will be conducted in Fall, 2021.

Assessment Tools

The Geology Graduate Program has developed four different assessment rubrics to be used in the overall evaluation of the program. Those rubrics are reading, writing, oral presentation and analysis and ultimately address all six of the PLG's. Each rubric consists of three standard of performance levels (beginner (1 point), proficient (3 points) and advanced (5 points)) that will be assessed for each student on each rubric required activity. Numerical values are assigned to each standard of performance which allows the grader some range within each performance standard. Within the rubric are descriptions for each level of performance that assessors will look for. For example, when determining the problem solving skills in the analysis rubric of a student, the difference between the advanced, proficient and beginning standards are as follows:

Advanced - ***thoroughly*** identifies and addresses key aspects of the problem,
insightfully uses facts and relevant evidence from analysis to support and defend potentially valid solutions.

Proficient - identifies and addresses key aspects of the problem,

uses facts and relevant evidence from analysis to develop potentially valid conclusions or solutions.

Beginning - identifies and addresses ***some*** aspects of the problem;
develops possible conclusions or solutions ***using some inappropriate*** opinions and information from analysis.

The four assessment rubrics are located in Appendix A of this report.

Lines of Evidence

Direct lines of evidence will ultimately be used to reach assessment decisions regarding program effectiveness. The Geology Department is always open to indirect assessments that come our way regarding the effectiveness of the program but with the exception of occasional class queries will not be a primary source for assessment data.

Program Learning Outcomes	Direct	Indirect
1a) Evaluates the scholarly significance and relevance within and beyond the discipline 1b) Recognizes possible implications of the text for contexts, perspectives, or issues beyond the assigned task 1c) Compares and evaluates multiple and diverse sources and viewpoints according to specific criteria appropriate for the discipline. 1d) Articulates an understanding of the multiple interpretive possibilities particular to a text.	• Reading and presentation assignments in core and elective courses	Possible mid-course assessments Alumni surveys
2a) Uses specific inductive or deductive reasoning to make inferences regarding premises. 2b) Thoroughly identifies and addresses key aspects of the problem, 2c) Insightfully uses facts and relevant evidence from analysis to support and defend potentially valid solutions.	• Analytical assignments in elective courses. • G-500 thesis • G-596 comprehensive exam	Possible mid-course assessments Alumni surveys
3a) Main points are clear and organized effectively and support a clear purpose. 3b) Language is familiar to the audience and appropriate for the setting. 3c) The delivery is natural, confident, and enhances the message - posture, eye contact, smooth gestures, facial expressions, volume, and pace.	• Presentation assignments in core and elective courses • Thesis defense	Possible mid-course assessments Alumni surveys
4a) Students compare and evaluate multiple and diverse sources and viewpoints according to specific criteria appropriate to the discipline. 4b) Effectively synthesizes and integrates information from a variety of sources.	• Reading, writing and presentation assignments in core and elective courses	Possible mid-course assessments Alumni surveys
5a) Students consistently and accurately cite ideas and information of others	• Writing assignments	Possible mid-course

correctly in written and oral exercises. 5b) Students are properly attired and present clear and cogent presentations to audience in oral exercises.	• Thesis writing and culminating exam • Presentation assignments in core and elective courses • Thesis defense	assessments Alumni surveys
6a) Insightfully relates concepts and ideas from multiple sources and across geographic regions relative to geologic processes and hazards. 6b) Evaluates the scholarly significance and relevance within and beyond the discipline and geographic region.	• Presentation assignments in core and elective assignments • Writing assignments in core and elective classes	Possible mid-course assessments Alumni surveys

Action Plan

The Geology Department has begun a new MS in Geology program and students have just completed their first year of course work. Assessment data collection in the program will begin in Fall, 2016. Data will be collected in classes according to the included curriculum map and stored in a Geology Department database. Select assessment data will be reviewed every five years and analyzed for issues that impact our program learning goals. Recommendations will be considered for modifications that will address potential issues. Our first assessment of selected parts of this data will be in Fall, 2021.

General Outline of MS in Geology Assessment Plan

OGS Goals	Geology Program Learning Goals	Program Learning Objectives	Measure	Eval. Tools	Stan. of perform.	When	Who
Disciplinary knowledge	Students will be able to read and digest complex scientific papers in the discipline, assess competing hypotheses and reach rational and logical conclusions.	1a) Evaluates the scholarly significance and relevance within and beyond the discipline 1b) Recognizes possible implications of the text for contexts, perspectives, or issues beyond the assigned task 1c) Compares and evaluates multiple and diverse sources and viewpoints according to specific criteria appropriate for the discipline. 1d) Articulates an understanding of the multiple interpretive possibilities particular to a text.	1) Instructor assesses and evaluates in-class presentations and discussions using detailed rubric for standardized evaluations. 2) Instructor evaluates written responses from students. 3) GEOL596 (Cumulative exit exam)	Reading, writing and oral rubrics	Advanced, Proficient and Beginning	See Course Map	Instructor
Critical thinking / analysis	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.	2a) Uses specific inductive or deductive reasoning to make inferences regarding premises. 2b) Thoroughly identifies and addresses key aspects of the problem, 2c) Insightfully uses facts and relevant evidence from analysis to support and defend potentially valid solutions.	1) Instructor assesses and evaluates the strength and detail of the technical reports using a detailed rubric.	Analysis rubric	Advanced, Proficient and Beginning	See Course Map	Instructor
Communi-cation	Students will develop presentation skills and the ability to relay technical data and scientific concepts to diverse audiences.	3a) Main points are clear and organized effectively and support a clear purpose. 3b) Language is familiar to the audience and appropriate for the setting. 3c) The delivery is natural, confident, and enhances the message -	1) Instructor assesses the student's knowledge of topics, clarity of discussion and connection and engagement of the audience in classroom presentations and	Writing and oral rubrics	Advanced, Proficient and Beginning	See Course Map	Instructor

		posture, eye contact, smooth gestures, facial expressions, volume, and pace.	thesis edits.				
Information literacy	Students will demonstrate the ability to obtain, assess, and analyze information from a variety of sources	4a) Students compare and evaluate multiple and diverse sources and viewpoints according to specific criteria appropriate to the discipline. 4b) Effectively synthesizes and integrates information from a variety of sources.	1) Instructor assesses student's abilities to make information literacy decisions using a detailed rubric.	Writing Rubric	Advanced, Proficient and Beginning	See Course Map	Instructor
Professional -ism	Students will demonstrate an understanding of professional integrity	5a) Students consistently and accurately cite ideas and information of others correctly in written and oral exercises. 5b) Students are properly attired and present clear and cogent presentations to audience in oral exercises.	1) Instructor assesses these outcomes using detailed rubrics	Writing and oral rubrics	Advanced, Proficient and Beginning	See Course Map	Instructor
Intercultural / global perspectives	Students will demonstrate relevant knowledge and application of intercultural and / or global perspectives.	6a) Insightfully relates concepts and ideas from multiple sources and across geographic regions relative to geologic processes and hazards. 6b) Evaluates the scholarly significance and relevance within and beyond the discipline and geographic region.	1) Instructor assesses this outcome using detailed rubrics	Reading and analysis rubrics	Advanced, Proficient and Beginning	See Course Map	Instructor

Appendix A

- Reading Rubric
- Writing Rubric
- Analysis Rubric
- Oral Rubric

READING TECHNICAL PAPERS RUBRIC

Definition

Reading is "the process of simultaneously extracting and constructing meaning through interaction and involvement with written language" (Snow et al., 2002). (From www.rand.org/ pubs/ research_briefs/ RB8024/ index1.html)

	Advanced (5 points)	**Proficient** (3 points)	**Beginning** (1 points)	**Score 5 - 0**
Comprehension	• Recognizes possible implications of the text for contexts, perspectives, or issues beyond the assigned task and/or geographic region. (e.g., might recognize broader issues at play, or might pose challenges to the author's message and presentation).	• Uses the reading to draw more complex inferences about the author's message and attitude.	• Uses vocabulary appropriately to paraphrase or summarize the information the text communicates.	
Value of reading contribution *In the context of the assignment / course*	• Evaluates the scholarly significance and relevance within and beyond the discipline and geographic region. • Evaluates according to contributions and consequences.	• Uses text in the context of scholarship to develop a foundation of disciplinary knowledge. • Raises and explores important questions.	• Approaches text in the context of assignments with the intention and expectation of finding right answers and facts and concepts to display for credit.	
Analysis *Interacting with data and interpretations in parts and as a whole*	• Identifies relations among ideas in the text. • Evaluate how ideas support an advanced understanding of the text as a whole.	• Recognizes relations among ideas in different parts of a text. • Evaluates effective and ineffective arguments. • Can explain how these ideas contribute to a basic understanding of the text as a whole.	• Identifies aspects of a text as needed to respond to questions posed in assigned tasks. • Can outline the analysis used to reach texts conclusions	
Interpretation *Making sense with texts as blueprints for meaning*	• Articulates an understanding of the multiple interpretive possibilities particular to a text.	• Demonstrates that s/he can read purposefully. • Can frame the text's interpretation into the purpose of the reading.	• Can identify basic purpose(s) for reading. • Relies on an external authority for clarification on the applicability of the text.	

RESEARCH WRITING RUBRIC

2005. Adapted from California State University (http://www.calstate.edu/LS/1_rubric.doc)

	Advanced (5 points)	**Proficient** (3 points)	**Beginning** (1 point)	**Score** (5-0)
1. Determine the extent of the information	• Formulates a research question or topic that is focused, complete and identifies key concepts. • Identifies most or all relevant information tools in various potential formats.	• Formulates a question that is mostly focused and clear. • Identifies concepts related to the topic, and identifies some useful information tools to meet the information need.	• Formulates a question that is not focused or clear. • Identifies few concepts related to the topic. • Identifies some useful information tools to meet the information need.	
2. Access the needed information effectively	• Implements a clear and focused research strategy. • Uses information tools effectively. • Finds information that directly fulfills the information need.	• Uses an appropriate research strategy. • Solves / clarifies problems by finding a variety of relevant information resources.	• Uses an appropriate research strategy. • Student solves problems by finding an appropriate information resource. • Information sources may not always be appropriate	
3. Evaluate information and its sources critically	• Compares and evaluates multiple and diverse sources and viewpoints according to specific criteria appropriate for the discipline.	• Examines information using broad criteria such as authority, credibility, relevance, timeliness, and accuracy • Makes good judgments about what to keep and what to discard.	• Student examines information using limited criteria • Makes inconsistent decisions about what to keep and what to discard.	
4. Use information effectively to accomplish a specific purpose	• Effectively synthesizes and integrates information from a variety of sources, • Draws appropriate conclusions. • Clearly communicates ideas to others.	• Generally uses appropriate information and evidence from multiple sources to support their claims and conclusions.	• Student uses appropriate (but limited) information and evidence to support their claims and conclusions.	

5. Use information ethically	• Student consistently and accurately cites ideas and information of others.	• Student usually cites ideas and information of others correctly.3	• Student sometimes cites ideas and information of others correctly.	

INFORMATION TOOLS - Most people think of information literacy as a set of skills requiring technical ability, or more simply, as "doing". True information literacy, however, involves both thinking and doing. Given the ever-expanding sea of information at our disposal, analysis of an information need, knowledge of resource types, evaluation of access tools, and interpretation of results are critical to successful information retrieval. We need to "know-how" but more importantly, we must first "know-why".

ANALYSIS AND CRITICAL THINKING RUBRIC

Performance Element	Advanced (5)	Proficient (3)	Beginning (1)	Score (5-0)
Communication	• Identifies the main idea or problem with numerous supporting details / examples which are organized logically and coherently.	• Identifies the main idea or problem with some supporting details and examples in an organized manner.	• Identifies the main idea or problem with few details or examples in a somewhat organized manner.	
Analysis	• Uses specific inductive or deductive reasoning to make inferences regarding premises; • addresses implications and consequences; • identifies facts and information correctly.	• Uses logical reasoning to make inferences regarding solutions; • addresses implications and consequences; • Identifies facts and relevant information correctly.	• Uses superficial reasoning to make inferences regarding solutions; • Shows some confusion regarding facts, opinions, and relevant, evidence, data, or information.	
Problem Solving	• Thoroughly identifies and addresses key aspects of the problem, • insightfully uses facts and relevant evidence from analysis to support and defend potentially valid solutions.	• Identifies and addresses key aspects of the problem, • uses facts and relevant evidence from analysis to develop potentially valid conclusions or solutions.	• Identifies and addresses some aspects of the problem; • develops possible conclusions or solutions using some inappropriate opinions and information from analysis.	
Evaluation	• Insightfully interprets data or information; • identifies obvious as well as hidden assumptions, • establishes credibility of sources on points other than authority alone, • distinguishes appropriate arguments from extraneous elements; • provides sufficient logical support.	• Accurately interprets data or information; • identifies obvious assumptions, • establishes credibility of sources on points other than authority alone, • distinguishes appropriate arguments from extraneous elements; • provides sufficient logical support.	• Makes some errors in data or information interpretation; • makes arguments using weak evidence; • exhibits some fallacies in reasoning; • provides superficial support for conclusions or solutions.	
Synthesis	• Insightfully relates concepts and ideas from multiple sources and across geographic regions; • uses new information to enhance chosen solution; • recognizes missing information; • correctly identifies potential effects of new information.	• Accurately relates concepts and ideas from multiple sources; • uses new information to enhance chosen solution; • correctly identifies potential effects of new information.	• Inaccurately or incompletely relates concepts and ideas from multiple sources; • shallow determination of effect of new information on chosen solution.	

ORAL COMMUNICATION RUBRIC

	Advanced (5 points)	**Proficient** (3 points)	**Beginning** (1 points)	**Score** **5-0**
Organization	• Ideas are clearly organized, developed, and support a clear purpose. • The introduction gets the attention of the audience • Main points are clear and organized effectively. • The conclusion is satisfying and relates back to introduction.	• Ideas are organized relative to the purpose but clarity between is not strong and clear. • Introduction has the basic mechanics but not engaging. • Main points are present but lacking some in clarity or method of organization. • Conclusion is appropriate but may not connect to all issues raised.	• Main idea is evident, but the organizational structure is weak • Ideas may not be clearly developed or flow smoothly. • Purpose not clearly stated. • Introduction may not be well developed. • Transitions may be awkward. • Supporting material may lack in development. • The conclusion may need additional development.	
Topic Knowledge	• Student has a clear grasp of information. • Citations are introduced and attributed appropriately and accurately. • Student demonstrates full knowledge of topic. • Speaking outline or note cards are used for reference only.	• Student has a partial grasp of the information. • Citations are generally introduced and attributed appropriately. • Student is at ease with expected answers to all questions but fails to elaborate. • Over dependence on notes may be observed.	• Student has a limited grasp of information. • Citations not used properly or too few • Has some difficulty answering questions about the subject. • Presentation is read directly from note cards.	
Audience Adaptation	• The presenter is able to effectively keep the audience engaged. • Material is modified or clarified as needed given audience verbal and nonverbal feedback. • Delivery style is modified as needed.	• The presenter is able to keep the audience engaged most of the time. • Generally, the speaker demonstrates audience awareness through nonverbal and verbal behaviors. • Some effort to make the material relevant to audience needs and interests.	• The presenter is not able to keep the audience engaged. • Not aware of audience feedback • No noticeable change in delivery based on obvious verbal or nonverbal feedback from the audience.	
Language Use	• Language is familiar to the audience and appropriate for the setting. • The presenter may “code-switch” (use a different language form) when appropriate. • Language choices are vivid and	• Language is appropriate. W • Word choices are not particularly vivid or precise.	• Language choices may be limited, peppered with slang or jargon, too complex, or too dull. • Language is questionable or inappropriate for a particular audience, occasion, or setting.	

	precise.		•	
Delivery	• The delivery is natural, confident, and enhances the message - posture, eye contact, smooth gestures, facial expressions, volume, pace, etc. indicate confidence, • The vocal tone and delivery style and clothing are consistent with the message. Articulation and pronunciation are clear. • All audience members can hear the presentation.	• The delivery generally seems effective – however, effective use of volume, eye contact, vocal control, etc. may not be consistent. • Vocal tone, facial expressions, and clothing and other nonverbal expressions do not detract significantly from the message, generally, articulation and pronunciation are clear. • Most audience members can hear the presentation.	• The delivery detracts from the message (eye contact may be very limited, presenter may tend to look at the floor, mumble, speak inaudibly, fidget, or read most of the speech. • The delivery may appear inconsistent with the message, articulation and pronunciation tend to be sloppy. • Audience members have difficulty hearing the presentation. • Nonfluencies (“ums, like, etc…) are used excessively.	