

**DEPARTMENT OF EARTH & ENVIRONMENTAL SCIENCES**  
**California State University, Fresno**  
Master of Science in Geology  
Student Outcomes Assessment Plan

**MISSION STATEMENT**

The Department of Earth and Environmental Sciences provides graduate training in the Earth Sciences with opportunities to specialize in several areas of advanced study and research. This background allows students to pursue a variety of careers in industry, government, teaching, or to enter Ph.D. programs. The Department of Earth and Environmental Sciences graduate program provides training for students who wish to enter Master's level careers in the Earth Sciences, prepares graduate students for teaching Earth Sciences in the primary and secondary schools, and provides a foundation of skills for students who seek advanced degrees at universities offering doctorate degrees.

Earth Science is an interdisciplinary science, integrating aspects of physics, chemistry, mathematics, biology, and computer science, as well as incorporating philosophical and critical thinking skills to address geological, environmental, and social problems. As a result, the Department trains graduate students to become well-versed in a broad spectrum of scientific disciplines.

**GOALS**

**Goal 1:** Develop skills for acquiring new knowledge, both for matriculation and for success in post Master's degree activities.

**Objective 1.1:** To provide the graduate student with the ability to learn and conduct research in the Earth Sciences, both independently and collaboratively. Students will demonstrate the application of inductive and deductive methods of reasoning, the use of geological and geophysical data for interpretation, and how to arrive at valid, defensible conclusions. Students will demonstrate their ability to conduct background studies using published scientific research. They will learn how to formulate questions of previous published scientific studies, and identify critical new research paths that build on previous work.

**Goal 2:** Enhance the student's depth of understanding of a broad range of topics in the Earth Sciences.

**Objective 2.1:** To increase graduate student knowledge in both specific areas of thesis research, such as stratigraphy, structural geology, geophysics, hydrology, etc., and any related specialties of the Earth Sciences required to conduct research.

**Objective 2.2:** To broaden graduate student knowledge in disciplines that are related to or supportive of their thesis research.

**Goal 3:** Increase the student's understanding of field observation and data acquisition techniques, experimental methods, data analysis, and their application to timely issues in the Earth Sciences.

**Objective 3.1:** To apply the scientific method and hypothesis formulation and testing for the design and implementation of a formal thesis research project, including planning the data acquisition phase of the thesis project so that the research objectives can be achieved.

**Objective 3.2:** To analyze observational and experimental results through application of quantitative statistical and other analysis techniques, where appropriate.

**Goal 4:** Enhance communication skills, both written and oral, for purposes of conveying Earth Science information to both professional scientists and non-scientists.

**Objective 4.1:** To improve oral presentation skills through participation in graduate seminar presentations, teaching assistant experience, and presentations at professional meetings.

**Objective 4.2:** To improve written communication skills through participation in writing seminars, thesis preparation, and publication of research results.

**Objective 4.3:** To present the results of the Master's research project at a special Departmental seminar.

**Objective 4.4:** To present the results of the Master's research project at regional or national professional meetings, where appropriate.

**Goal 5:** Promote high ethical standards and integrity in the conduct of scientific research and the presentation and use of research results.

**Objective 5.1:** To develop an understanding of the difference between the objective process of observation/data acquisition and the evaluative process of data analysis and interpretation, with emphasis on multiple working hypothesis techniques.

**Five Year Program Assessment Plan**

Assessment of graduate student learning outcomes, in the Department of Earth & Environmental Sciences will include both quantitative methods and qualitative methods. Because Master's students are all required to accomplish a specific set of goals, such as a thesis proposal presentation, completion of a Master's thesis, etc., year to year evaluation of these common products will allow the Department of Earth & Environmental Sciences to assess whether or not the program is meeting its goals over time (Table 1).

<b>Assessment Activity</b>	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>	<b>Year 4</b>	<b>Year 5</b>
Thesis Proposal Presentation	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>
Thesis Proposal	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>
Thesis Presentation / Defense	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>
Thesis	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>
Graduate Exit Survey	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>
Alumni Survey		<b>X</b>			
Employer Survey				<b>X</b>	

Table 1. Assessment timeline and methods per five-year cycle.

Quantitative evaluation methods include:

- Performance on standardized examinations, such as the GRE exam.
- Rate of admission to Ph.D. programs.

Qualitative evaluation methods include:

- Faculty evaluations of graduate student performance in such specific areas as the thesis, the oral thesis seminar, and the Graduate Seminar (thesis proposals).
- Interviews and surveys with program graduates, colleagues, and employers.

Evaluation methods will be implemented on the following schedule:

1) Faculty Evaluation of Thesis Proposal Presentations (EES 201)

Each spring semester students give thesis proposal presentations in EES 201 (Graduate Seminar). All faculty are invited to attend the presentations and fill out evaluation forms, which are collected and summarized by the course instructor and then provided to the assessment coordinator (Appendix A).

2) Thesis Proposal (EES 201)

The faculty member instructing EES 201 (Graduate Seminar) will evaluate the written thesis proposals of students enrolled in the class each spring semester.

3) Faculty Evaluation of Thesis Presentations / Defense

These occur as students complete their thesis work. All department faculty are invited to fill out presentation evaluation forms at each thesis defense.

4) Thesis Committee Evaluation of Graduate Student Performance on Thesis Work

Evaluation conditions are determined by each thesis committee.

5) Graduate Student Exit Survey

Filled out when a student completes the degree (Appendix B).

6) Alumni Survey

The Department of Earth & Environmental Sciences will contact alumni to solicit their comments on the Geology graduate program's strengths and weaknesses and what the Department can do to improve the educational experience for future students.

### 7) Employer Survey

The Department of Earth & Environmental Sciences will solicit comments from student employers regarding the qualifications of our students and the strengths and weaknesses of their training.

The matrix below correlates Geology graduate program assessment activities and objectives (Table 2).

Objective	EES 201 Thesis Proposal Presentation	EES 201 Thesis Proposal	Thesis Presentation / Defense	Thesis	Graduate Exit Survey	Alumni Survey	Employer Survey
Objective 1.1	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>			
Objective 2.1	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>			
Objective 2.2	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>			
Objective 3.1	<b>X</b>	<b>X</b>		<b>X</b>			
Objective 3.2				<b>X</b>			
Objective 4.1	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>			
Objective 4.2	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>			
Objective 4.3			<b>X</b>				
Objective 4.4				<b>X</b>			
Objective 5.1				<b>X</b>			

Table 2. Correlation between assessment activities and Geology graduate program assessment plan objectives they will measure.

**Appendix A**

**EES 201 (Graduate Seminar)**

**THESIS PROPOSAL PRESENTATION SCORING RUBRIC**

Presenter: \_\_\_\_\_

EES 201  
Graduate Seminar

Title: \_\_\_\_\_

Total Score: \_\_\_\_\_ / 100

### Thesis Proposal Presentation

Rating: 1 = poor, 2 = fair, 3 = moderate, 4 = good, 5 = excellent.

	1	2	3	4	5
CONTENT ( _____ x 2 = _____ )					
1) How well was each of the following presented?					
a) Statement of the research problem	___	___	___	___	___
b) Justification / Significance of the project	___	___	___	___	___
c) Scientific background of the thesis topic	___	___	___	___	___
d) Methodology	___	___	___	___	___
e) Potential obstacles	___	___	___	___	___
f) Timeline	___	___	___	___	___
g) Budget	___	___	___	___	___
2) How well were audience questions answered?	___	___	___	___	___

PRESENTATION ( \_\_\_\_\_ )

1) <u>Style</u> (overall rating)					
a) Pace / amount of material covered	___	___	___	___	___
b) Organization, sequence	___	___	___	___	___
2) <u>Clarity and Delivery</u>	___	___	___	___	___
Includes: Speech mannerisms "uh", "you know", etc.;					
Tone and enunciation; Word usage and jargon					
3) <u>Visuals: Diagrams and figures</u>	___	___	___	___	___
Effectiveness, appropriateness, number, clarity					

COMMENTS:

**APPENDIX B**

**Master of Science in Geology**

**GRADUATE EXIT SURVEY**

Exit Interview Questionnaire  
Geology Graduate Program  
Department of Earth & Environmental Sciences

Name of Graduating Student:

Degree: Master of Science in Geology

Semester/Year received:

Applied Geology Program: Yes/No (Please Circle)

International Student: Yes/No

Do you belong to a minority or economically disadvantaged group? (Optional): Yes/No

Ethnicity (Optional): \_\_\_\_\_

Your Age (Optional): \_\_\_\_\_ Sex (Optional): M/F

Did you have an off-campus full-time or part-time job when you were a student in this program? (You may exclude the time when you were just finishing your thesis project).  
Yes/No

Did you already have an undergraduate degree in Geology or Geological Sciences before you started? Yes/No

Why did you choose this program? (If more than one apply, please rank by numbers).

- A. Location of the University
- B. Academic reputation of the department
- C. Program content
- D. Faculty expertise and/or reputation
- E. Financial consideration
- F. Personal reasons
- G. Other reasons. Please describe: \_\_\_\_\_

How did you find out about our program?

- A. Mailings (Department's poster or postcards)
- B. Guides to graduate education/departments (e.g. Peterson's guide, AGI, etc.)
- C. Internet website
- D. Word of mouth (recommended by friends and/or faculty).
- E. Undergraduate degree from this department.
- F. Undergraduate degree from another department of this University.
- G. Other: \_\_\_\_\_

Your immediate career goal is:

- A. A professional position
- B. A sub-professional position
- C. Advanced (PhD) degree program in geological sciences at other universities.
- D. Teacher training programs
- E. Other degree (e.g. MBA, LLD) programs
- F. None or not sure
- G. Others. Please specify: \_\_\_\_\_

Your long-term career goal is:

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In your opinion, what was the most formidable difficulty that you had to overcome?

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Please respond to the following statements by indicating your agreement or disagreement on a scale of 1 (strongly disagree) to 10 (strongly agree).

### **GENERAL ENVIRONMENT**

#### University

The university campus provides a friendly and supportive environment for graduate students.

1    2    3    4    5    6    7    8    9    10

The library collection and service are adequate for my graduate work.

1    2    3    4    5    6    7    8    9    10

The University provides adequate supporting facilities (health, counseling, food, dormitory, etc.) for graduate life.

1    2    3    4    5    6    7    8    9    10

Off campus

The Fresno area provides a reasonable social environment for my stay.

1      2      3      4      5      6      7      8      9      10

Social life on and off campus has been wonderful.

1      2      3      4      5      6      7      8      9      10

Housing in the area is reasonable and adequate.

1      2      3      4      5      6      7      8      9      10

**FINANCIAL SUPPORT**

Part-time or full-time employments are readily available to supplement my financial needs.

1      2      3      4      5      6      7      8      9      10

The University provides reasonable financial support through scholarships and assistantships.

1      2      3      4      5      6      7      8      9      10

Teaching assistantships from the department have been a great help to me financially.

1      2      3      4      5      6      7      8      9      10

Research assistantships from the department have been a great help to me financially.

1      2      3      4      5      6      7      8      9      10

**PROGRAM**

I was able to obtain instruction (courses) in subjects that I am interested in.

1      2      3      4      5      6      7      8      9      10

I was able to obtain instruction (courses) that I need to advance my future career.

1      2      3      4      5      6      7      8      9      10

The level of instruction that I received was generally appropriate for the level of the degree program.

1      2      3      4      5      6      7      8      9      10

The amount of work required for the degree is appropriate for the level of the degree program.

1      2      3      4      5      6      7      8      9      10

The amount of work required for the degree is appropriate for the degree that I sought.

1      2      3      4      5      6      7      8      9      10

The program in general met my expectation.

1      2      3      4      5      6      7      8      9      10

I was able to obtain the knowledge and training from the courses that will help me advance my career objective.

1      2      3      4      5      6      7      8      9      10

I was able to obtain additional courses in related areas from other departments.

1      2      3      4      5      6      7      8      9      10

After graduation, I was able to pursue my immediate career goal.

1      2      3      4      5      6      7      8      9      10

## **FACULTY**

The size of the faculty is just right.

1      2      3      4      5      6      7      8      9      10

I was intellectually challenged by the teaching of the faculty.

1      2      3      4      5      6      7      8      9      10

The length of time required for my degree is reasonable.

1      2      3      4      5      6      7      8      9      10

The graduate faculty of the department is active and up-to-date in their fields of expertise.

1      2      3      4      5      6      7      8      9      10

The graduate faculty is generally reasonably competent graduate level instructors.

1      2      3      4      5      6      7      8      9      10

My thesis advisor is a good mentor.

1      2      3      4      5      6      7      8      9      10

My thesis committee members were able and willing to assist me in my research.

1      2      3      4      5      6      7      8      9      10

**DEPARTMENT**

The staff of the Department is friendly and helpful.

1      2      3      4      5      6      7      8      9      10

The students in the Department are generally friendly and helpful.

1      2      3      4      5      6      7      8      9      10

The instructional facilities of the Department are adequate and well maintained.

1      2      3      4      5      6      7      8      9      10

The research facilities of the Department are adequate and well maintained.

1      2      3      4      5      6      7      8      9      10

On a scale of 1 to 10 (1 for the worst; 10 for the best), your over-all ranking of your graduate education experience is:

1      2      3      4      5      6      7      8      9      10