

Weber State University
Annual Assessment of Evidence of Learning

DEPARTMENT OF GEOSCIENCES
College of Science
2016-2017 Academic Year

Department/Program: GEOSCIENCES
Academic Year of Report: 2016-2017 (Summer 2016, Fall 2016, Spring 2017)
Date Submitted: November 30, 2017
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I. Verification of Information at the Assessment Site

A. Brief Introductory Statement:

Please review the Introductory Statement and contact information for your department or academic program displayed on the assessment site:

<http://www.weber.edu/portfolio/departments.html> - if this information is current, please place an 'X' below. No further information is needed. We will indicate "Last Reviewed: [current date]" on the page.

Information is current; no changes required.

Information is not current; updates below.

B. Mission Statement

Please review the Mission Statement for your department or academic program displayed on the assessment site: <http://www.weber.edu/portfolio/departments.html> - if it is current, please indicate as much; we will mark the web page as "Last Reviewed [current date]". No further information is needed.

If the information is not current, please provide an update:

Information is current; no changes required.

Information is not current; updates below.

C. Student Learning Outcomes

Please review the Student Learning Outcomes for your academic program displayed on the assessment site: <http://www.weber.edu/portfolio/departments.html> - if they are current, please indicate as much; we will mark the web page as "Last Reviewed [current date]". No further information is needed.

If they are not current, please provide an update:

Information is current; no changes required.

Information is not current; updates below.

D. Curriculum

Please review the Curriculum Grid for your department or academic program displayed on the assessment site: <http://www.weber.edu/portfolio/departments.html> - if it is current, please indicate as much; we will mark the web page as "Last Reviewed: [current data]". No further information is needed.

If the curriculum grid is not current, please provide an update:

Information is current; no changes required.

Information is not current; updates below

E. Assessment Plan

Please review the Assessment Plan for your department displayed on the assessment site: <http://www.weber.edu/portfolio/departments.html> - if the plan is current, please indicate as much; we will mark the web page as “Last Reviewed [current date]”. No further information is needed.

If the plan is not current, please provide an update: **Please see updated plan below.**

The site should contain an up-to-date assessment plan with planning going out a minimum of three years beyond the current year. Please review the plan displayed for your department at the above site. The plan should include a list of courses from which data will be gathered and the schedule, as well as an overview of the assessment strategy the department is using (for example, portfolios, or a combination of Chi assessment data and student survey information, or industry certification exams, etc.).

Please be sure to include your planned assessment of any general education courses taught within your department. This information will be used to update the General Education Improvement and Assessment Committee’s planning documentation.

Department of Geosciences Assessment Plan

4-Year Cycle presented below was approved in January 2015 and updated for this report.

Persons Responsible for Collecting and Analyzing the Data: The tenure-track faculty of the Department of Geosciences will serve as the Assessment Committee to oversee and implement the department’s assessment plan, with the Chair of Geosciences serving as the committee chair.

Assessment Measures to be Used: The Geosciences assessment plan examines the Physical Science (PS) outcomes in each of the general education courses offered by the department. The plan also examines the program-level learning outcomes for geoscience majors, including a separate assessment of the high-impact learning practices utilized in the department’s various curricula. Each general-education and department-level intended learning outcome (ILO) will be assessed by at least one direct measure (DM), typically a course-specific assessment instrument or assignment. In some cases, indirect measures, such as exit surveys of program graduates, will be used to supplement the direct measures.

Four-Year Assessment Cycle:

1. 2016-2017 (data collected); **subject report submitted November 2016**
General Education: Physical Science Intended Learning Outcomes (ILOs) 1-4
Courses: GEO 1030; 1060; 1110, 1130; 1350
2. 2017-2018 (data collected); report to be submitted Fall 2018
General Education: Physical Science Intended Learning Outcomes (ILOs) 5-8
Courses: GEO 1030; 1060; 1110, 1130; 1350

3. 2018-2019 (data collected); report to be submitted Fall 2019
Program-Level Learning Outcomes 1-9
Courses: GEO 1110, 1220, 2050, 3150, 3550, 4210, 4060
Summary of exit interviews
4. 2019-2020 (data collected); report to be submitted Fall 2020
High-Impact Educational Practices: Undergraduate Research; Internships; Study Abroad;
Capstone courses (GEO 4060, 4510)

Repeat beginning 2020-2021.

This proposed assessment cycle is meant to be flexible and can change as needed. For example, if data from one year indicate a need to improve student learning with respect to a particular set of ILOs, the plan would be adjusted in such a way to allow the department to collect and analyze data shortly after making changes to course materials or assessment instruments related to the ILOs in question. We will continue to explore ways to improve learning and teaching in the Department of Geoscience.

II. Report of Assessment Results for the 2016-201 Academic Year:

There are a variety of ways in which departments can choose to show evidence of learning. This is one example. The critical pieces to include are 1) what learning outcome is being assessed, 2) what method of measurement was used, 3) what the threshold for 'acceptable performance' is for that measurement, 4) what the actual results of the assessment were, 5) how those findings are interpreted, and 6) what is the course of action to be taken based upon the interpretation.

Evidence of Learning: General Education Courses

During the 2016-2017 academic year the Department of Geosciences collected assessment data related to learning outcomes one through four (1-4) listed below. Assessment data related to outcomes five through eight (5-8) will be collected and analyzed during the 2017-2018 academic year.

Measureable Physical-Science (PS) General-Education Learning Outcomes

All of the Physical Science breadth-area courses are designed to meet the following university-level, general-education learning outcomes (1-8).

- Students will demonstrate their understanding of the *general principles of science*:

1. Nature of science -- Scientific knowledge is based on evidence that is repeatedly examined, and can change with new information. Scientific explanations differ fundamentally from those that are not scientific.

2. Integration of science -- All natural phenomena are interrelated and share basic organizational principles. Scientific explanations obtained from different disciplines should be cohesive and integrated.

3. Science and society -- The study of science provides explanations that have significant impact on society, including technological advancements, improvement of human life, and better understanding of human and other influences on the Earth's environment.

4. Problem solving and data analysis -- Science relies on empirical data, and such data must be analyzed, interpreted, and generalized in a rigorous manner.

• Students will demonstrate their understanding of the following features of the *physical world*:

5. Organization of systems -- The universe is scientifically understandable in terms of interconnected systems. The systems evolve over time according to basic physical laws.

6. Matter -- Matter comprises an important component of the universe, and has physical properties that can be described over a range of scales.

7. Energy -- Interactions within the universe can be described in terms of energy exchange and conservation.

8. Forces -- Equilibrium and change are determined by forces acting at all organizational levels.

General Education Courses: The following Geoscience courses are offered for fulfillment of the physical science (PS) breadth area requirement within WSU's General Education Program:

• **GEO 1030 PS -- Earthquakes & Volcanoes:** The causes, distribution, and effects of earthquakes and volcanoes within the framework of global plate tectonics. Development of problem solving and analytical thinking skills are emphasized through homework assignments related to geologic processes.

• **GEO 1060 PS -- Environmental Geosciences:** The scientific study of the interaction of humans and earth systems including topics of natural hazards; soil, water, energy and mineral resources; and issues of global change.

• **GEO 1110 PS -- Dynamic Earth: Physical Geology:** Fundamental principles of geology emphasizing physical aspects of the Earth including earth materials, plate tectonics, and the effects of water, wind and ice on the Earth's surface. Useful for all students, and recommended as the first geology course for students with majors/minors in geosciences, science teaching, archaeology, and pre-engineering.

• **GEO 1130 PS -- Introduction to Meteorology:** Survey of atmospheric processes that create weather. Topics include solar radiation, temperature, moisture, pressure, wind, storm systems, weather forecasting, and air pollution. Problem solving skills and use of satellite imagery included.

• **GEO 1350 PS -- Principles of Earth Science:** Overview of Earth's systems, including weather, climate, seasons, rocks and minerals, processes that change Earth's surface, earthquakes, volcanoes, and plate tectonics. Data collection and analysis are included. Designed for Elementary Education majors.

Evidence of Learning: Data from 2016-2017

Course (1): **Earthquakes & Volcanoes (GEO 1030 PS)** / Fall 2016 & Spring 2017 (2 sections) / **Face-to Face** / 116 students

Gen Ed Learning Goal Students will demonstrate understanding of:	Measurable Learning Outcome Students will demonstrate their understanding of:	Method of Measurement Direct and Indirect Measures*	Threshold	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results
1. Nature of Science. Scientific knowledge is based on evidence that is repeatedly examined, and can change with new information. Scientific explanations differ fundamentally from those that are not scientific.	Learning Outcome 1.	Measure 1: Fall 2016: A set of 5 multiple-choice questions... Spring 2017: A set of 8 multiple-choice questions.... from the midterms and final exam about the scientific method, hypotheses, and process of science.	Measure 1: 80% of students will score 70% or better on 5 questions. Average score on the 5 / 8 questions should be $\geq 70\%$.	Measure 1: The average score for the 5 / 8 questions was 83% / 87% correct. Weighted average score (two sections) is 84%	Measure 1: Students successfully demonstrated a working knowledge of the nature of science.	Measure 1: No curricular or pedagogical changes needed at this time.

GE Learning Goal	Measurable Learning Outcome	Method of Measure	Threshold	Findings	Interpretation	Action Plan
2. Integration of Science All natural phenomena are interrelated and share basic organizational principles. Scientific explanations obtained from different disciplines should be cohesive and integrated	Learning Outcome 2.	Measure 1: For both Fall 2016 & Spring 2017 courses, a set of 9 multiple-choice questions from the midterms and final exam focused on integrating and organizing information from different	Measure 1: 80% of students will score 70% or better on 9 questions. Average score on the 9 questions should be $\geq 70\%$.	Measure 1: The average score for the 9 questions was 79% / 75% correct. Weighted average score (two sections) is 78%	Measure 1: Students successfully demonstrated a working knowledge of the integrated nature of science.	Measure 1: No curricular or pedagogical changes needed at this time.

		scientific approaches and disciplines.				
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GE Learning Goal	Measurable Learning Outcome	Method of Measure	Threshold	Findings	Interpretation	Action Plan
3. Science and Society The study of science provides explanations that have significant impact on society, including technological advancements, improvement of human life, and better understanding of human and other influences on the Earth's environment.	Learning Outcome 3.	Measure 1: For both Fall 2016 & Spring 2017 courses , a set of 14 multiple-choice questions from the midterms and final exam focused on influences of geology on society and everyday life.	Measure 1: 80% of students will score 70% or better on 14 questions. Average score on the 14 questions should be $\geq 70\%$.	Measure 1: The average score for the 14 questions was 85% / 86% correct. Weighted average score (two sections) is 85%	Measure 1: Students successfully demonstrated a working knowledge of the importance of science to society.	Measure 1: No curricular or pedagogical changes needed at this time.

GE Learning Goal	Measurable Learning Outcome	Method of Measure	Threshold	Findings	Interpretation	Action Plan
4. Problem Solving & Data Analysis Science relies on empirical data, and such data must be analyzed, interpreted, and generalized in a rigorous manner.	Learning Outcome 4.	Measure 1: For both Fall 2016 & Spring 2017 courses , a set of 7 multiple-choice questions from the midterms and final exam that require students to analyze data and solve problems.	Measure 1: 80% of students will score 70% or better on 7 questions. Average score on the 7 questions should be $\geq 70\%$.	Measure 1: The average score for the 7 questions was 82% / 80% correct. Weighted average score (two sections) is 81%	Measure 1: Students successfully demonstrated a basic competence in data analysis and problem solving.	Measure 1: No curricular or pedagogical changes needed at this time.

Evidence of Learning: Data from 2016-2017

Course (1): **Earthquakes & Volcanoes (GEO 1030 PS)** / Su 2016, Fall 2016, & Spr 2017
(4 sections) / **Online** / 336 students

Gen Ed Learning Goal Students will demonstrate understanding of:	Measurable Learning Outcome Students will demonstrate their understanding of:	Method of Measurement Direct and Indirect Measures*	Threshold	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results
1. Nature of Science. Scientific knowledge is based on evidence that is repeatedly examined, and can change with new information. Scientific explanations differ fundamentally from those that are not scientific.	Learning Outcome 1.	Measure 1: A set of 7 multiple-choice questions from three exams about the scientific method, hypotheses, and process of science.	Measure 1: 80% of students will score 70% or better on 7 questions. Average score on the 7 questions should be $\geq 70\%$.	Measure 1: The average score for the 7 questions was 81% correct.	Measure 1: Students successfully demonstrated a working knowledge of the nature of science.	Measure 1: No curricular or pedagogical changes needed at this time.

GE Learning Goal	Measurable Learning Outcome	Method of Measure	Threshold	Findings	Interpretation	Action Plan
2. Integration of Science All natural phenomena are interrelated and share basic organizational principles. Scientific explanations obtained from different disciplines should be cohesive and integrated.	Learning Outcome 2.	Measure 1: A set of 9 multiple-choice questions three exams focused on integrating and organizing information from different scientific approaches and disciplines.	Measure 1: 80% of students will score 70% or better on 9 questions. Average score on the 9 questions should be $\geq 70\%$.	Measure 1: The average score for the 9 questions was 75% correct.	Measure 1: Students successfully demonstrated a working knowledge of the integrated nature of science.	Measure 1: No curricular or pedagogical changes needed at this time.

GE Learning Goal	Measurable Learning Outcome	Method of Measure	Threshold	Findings	Interpretation	Action Plan
3. Science and Society The study of science provides explanations that have significant impact on society, including technological advancements, improvement of human life, and better understanding of human and other influences on the Earth's environment.	Learning Outcome 3.	Measure 1: A set of 11 multiple-choice questions from three exams focused on influences of geology on society and everyday life.	Measure 1: 80% of students will score 70% or better on 11 questions. Average score on the 11 questions should be $\geq 70\%$.	Measure 1: The average score for the 11 questions was 73% correct.	Measure 1: Students successfully demonstrated a working knowledge of the importance of science to society.	Measure 1: No curricular or pedagogical changes needed at this time.

GE Learning Goal	Measurable Learning Outcome	Method of Measure	Threshold	Findings	Interpretation	Action Plan
4. Problem Solving & Data Analysis Science relies on empirical data, and such data must be analyzed, interpreted, and generalized in a rigorous manner.	Learning Outcome 4.	Measure 1: A set of 8 multiple-choice questions from three exams that require students to analyze data and solve problems that they had not previously solved. Measure 2: A set of 16 questions / problems covering the metric system, scientific notation, and graphs from	Measure 1: 80% of students will score 70% or better on 8 questions. Average score on the 8 questions should be $\geq 70\%$. Measure 2: Measure 1: 80% of students will score 70% or better on 16 questions. Average score on the 16 questions should be $\geq 70\%$.	Measure 1: The average score for the 8 questions was 37% correct. Measure 2: The average score for the 16 questions was 96% correct.	Measure 1: Students had difficulties translating what they learned in the readings, support material, and the online assignment to successfully answer most of the exam questions (i.e., solving math problems, logically interpreting math-based logic, and understanding very large or small numbers. Measure 2: Students successfully	Measure 1: Evaluate and modify (if necessary) online material, assignments, and exam questions covering different forms of problem solving, including math calculations, and data analysis. Measure 2: No curricular or pedagogical changes needed at this time. **Will consider

		online assignment that require students to understand math in science that they had not previously solved.			demonstrated a basic competence in data analysis and problem solving.	adding data analysis and additional problem-solving questions to address student retention issues and difficulties on exams.
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Evidence of Learning: Data from 2016-2017

Course (2): Environmental Geosciences (GEO 1060 PS)

Gen Ed Learning Goal Students will demonstrate understanding of:	Method of Measurement Direct and Indirect Measures*	Threshold	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results
Nature of Science. Scientific knowledge is based on evidence that is repeatedly examined, and can change with new information. Scientific explanations differ fundamentally from those that are not scientific.	Measure 1: Responses to set of multiple choice questions from exams	Measure 1: 80% of students have 80% correct responses selected questions	Measure 1 87.3% of students scored 80% correct responses	Measure 1 Threshold met.	Measure 1: Continue to stress importance of scientific method through examples in classes.
	Measure 2: Essay that requires use of outside scientific resources related to plate tectonic theory.	Measure 2: 80% of students demonstrate understanding of scientific models/hypotheses	Measure 2 84.3% of students demonstrated understanding of scientific approach.	Measure 2: Threshold met.	Measure 2: Provide additional examples and explanations of model.

Gen Ed Learning Goal Students will demonstrate understanding of:	Method of Measurement Direct and Indirect Measures*	Threshold	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results
Integration of Science All natural phenomena are interrelated and share basic organizational principles. Scientific explanations obtained from different disciplines should be cohesive and integrated.	Measure 1: Responses to set of multiple choice questions from exams	80% of students have 80% correct responses selected questions	Measure 1 91.6 % of students scored 80% correct responses	Measure 1 Threshold met.	Measure 1: Continue to emphasize connections of geosciences to physics, chemistry, and biology
	Measure 2: Essay that requires use of outside scientific resources related water pollution and treatment.	Measure 2: 80% of students demonstrate understanding of relations between water chemistry and flow	Measure 2 88.5 % of students utilized web resources from multiple disciplines as applied to groundwater flow	Measure 2: Threshold met.	Measure 2: Provide additional examples and explanations of proper and improper use of information/disinformation.

Gen Ed Learning Goal Students will demonstrate understanding of:	Method of Measurement Direct and Indirect Measures*	Threshold	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results
Science and Society The study of science provides explanations that have significant impact on society, including technological advancements, improvement of human life, and better understanding of human and other influences on the Earth's environment	Measure 1: Responses to set of multiple choice questions from exams	Measure 1: 80% of students have 80% correct responses selected questions	Measure 1 82% of students scored 70% correct responses	Measure 1 Threshold met.	Measure 1: Continue to emphasize relations between human society and Earth environment
	Measure 2: Essay that requires use of outside scientific resources related to water: processes, supply and use.	Measure 2: 80% of students demonstrate understanding of geologic hazards	Measure 2 93% of students adequately discussed volcanic geologic hazards	Measure 2: Threshold met.	Measure 2: Provide additional examples/explanations of proper and improper use of information/ disinformation.

Gen Ed Learning Goal Students will demonstrate understanding of:	Measurable Learning Outcome Students will demonstrate their understanding by:	Method of Measurement Direct and Indirect Measures*	Threshold	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results
Problem Solving & Data Analysis Science relies on empirical data, and such data must be analyzed, interpreted, and generalized in a rigorous manner.	Learning Outcome S4	Measure 1: Responses to set of multiple choice questions from exams	Measure 1: 80% of students have 80% correct responses selected questions	Measure 1 79.5 % of students scored 80% correct responses	Measure 1 Threshold is almost met.	Measure 1: Continue to provide better examples of data analysis
		Measure 2: Essay that requires use of outside scientific resources related to earthquakes	Measure 2: 80% of students demonstrate ability to plot data and	Measure 2 90% of students correctly answered >80% questions correctly	Measure 2: Although threshold was met, some students still misuse web resources	Measure 2: Provide additional examples& explanations of proper and

Gen Ed Learning Goal Students will demonstrate understanding of:	Measurable Learning Outcome Students will demonstrate their understanding by:	Method of Measurement Direct and Indirect Measures*	Threshold	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results
			interpret relations			improper use of data.

Evidence of Learning: Data from 2016-2017

Course (3): **Dynamic Earth: Physical Geology (GEO 1110 PS)**. Four face-to-face sections, 78 students, Fall 2016 & Spring 2017

Gen Ed Learning Goal Students will demonstrate understanding of:	Method of Measurement Direct and Indirect Measures*	Threshold	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results
Nature of Science. Scientific knowledge is based on evidence that is repeatedly examined, and can change with new information. Scientific explanations differ fundamentally from those that are not scientific.	Measure 1: Class activity to observe/measure properties of mineral and rock specimens and classify based on comparison with expected properties. Measure 2: Set of 10 multiple choice questions on two exams that deal with scientific methodology	(1) 70% correct identification of mineral and rock specimens (2) 70% correct responses to questions on exams	(1) 100% students had >70% correct identification of provided minerals and rocks (2) 80% students had >70% correct responses	(1) Most students were able to observe /measure properties and relate these with expected properties that reflect underlying chemical structure. (2) Most students understood nature of scientific observations and explanations.	Continue to emphasize science as a way of observing, developing models, and testing models. Continue class activities that integrate observations and interpretations.
Integration of Science All natural phenomena are interrelated and share basic organizational principles. Scientific explanations obtained from different disciplines should be cohesive and integrated.	Measure 1: Homework on methods to evaluate geologic time. Measure 2: Set of 12 multiple choice questions on three exams that deal with integration of scientific concepts across disciplines	(1) 70% correct answers on determining relative order of geologic events (including fossil succession), calculation of radiometric ages, and residence times of chemical cycles (2) 70% correct responses to 12 questions on exams.	(1) 85% students had >70% correct responses (2) 92% students had >70% correct responses	(1) Most students were able evaluate geologic time using life science, physics, and chemistry applications. (2) Most students understood integrated nature of science concepts.	Continue to emphasize applications of life sciences, physics, and chemistry to understanding the Earth. Continue class activities that integrate applications from different disciplines.

<p>Science and Society The study of science provides explanations that have significant impact on society, including technological advancements, improvement of human life, and better understanding of human and other influences on the earth's environment.</p>	<p>Measure 1: In-class activity on hydrocarbon exploration and utilization Measure 2: Homework on volcanic hazards</p>	<p>(1) 70% correct construction and interpretation of cross section (2) 70% correct values on tables and 70% of hazard types that impact society addressed in written exercise</p>	<p>(1) 100% students had >70% correct responses (2) 95% students had >70% correct responses</p>	<p>(1) Students were able to understand basic concepts involved in exploration and development of a key natural resource. (2) Most students were able to evaluate and describe multiple volcanic hazards, and how those hazards affect human society.</p>	<p>Continue to emphasize relevance of geosciences to society, including natural resources, natural hazards, and climate change. Continue class activities and homework that illustrate connections to society.</p>
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<p>Problem Solving & Data Analysis Science relies on empirical data, and such data must be analyzed, interpreted, and generalized in a rigorous manner.</p>	<p>Measure 1: Homework on analysis of earthquake data Measure 2: Homework on analysis of plate tectonic motions and types of associated geologic activity</p>	<p>(1) 70% correct answers on data tables and calculations (2) 70% correct values on tables and calculated rates of motion</p>	<p>(1) 94% of students had >70% correct responses (2) 88% of students had >70% correct responses</p>	<p>(1) Most students were able to compile and plot earthquake data and calculate recurrence intervals and probabilities. (2) Most students were able to analyze types of earthquake and volcanic activity along different types of plate boundaries and calculate rates and directions of absolute and relative plate motion.</p>	<p>Continue to incorporate homework and in class activities that involve quantitative and graphical analysis and interpretation of data sets.</p>
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Evidence of Learning: Data from 2016-2017

Course (4): **Introduction to Meteorology (GEO 1130 PS)** / Fall Semester 2016 / Face-to Face / 12 students

Gen Ed Learning Goal Students will demonstrate understanding of:	Measurable Learning Outcome Students will demonstrate their understanding of:	Method of Measurement Direct and Indirect Measures*	Threshold	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results
1. Nature of Science. Scientific knowledge is based on evidence that is repeatedly examined, and can change with new information. Scientific explanations differ fundamentally from those that are not scientific.	Learning Outcome 1.	Measure 1: A set of 33 multiple-choice questions from the midterms and final exam.	Measure 1: 70% of students will score 70% or better on 33 questions.	Measure 1: 100% of students scored 70% or better on 33 questions.	Measure 1: Students successfully demonstrated a working knowledge of the nature of science.	Measure 1: No curricular or pedagogical changes needed at this time.
		Measure 2: One problem on a home-work assignment.	Measure 2: 70% of students will score 70% or better on the homework problem.	Measure 2: 100% of the students scored 70% or better on the homework problem.	Measure 2: Students successfully demonstrated a working knowledge of the nature of science.	Measure 2: No curricular or pedagogical changes needed at this time.

GE Learning Goal	Measurable Learning Outcome	Method of Measure	Threshold	Findings	Interpretation	Action Plan
2. Integration of Science All natural phenomena are interrelated and share basic organizational principles. Scientific explanations obtained from different disciplines should be cohesive and integrated.	Learning Outcome 2.	Measure 1: A set of 28 multiple-choice questions from the midterms and final exam.	Measure 1: 70% of students will score 70% or better on 28 questions.	Measure 1: 92% of students scored 70% or better on 28 questions.	Measure 1: Students successfully demonstrated a working knowledge of the integrated nature of science.	Measure 1: No curricular or pedagogical changes needed at this time.

GE Learning Goal	Measurable Learning Outcome	Method of Measure	Threshold	Findings	Interpretation	Action Plan
3. Science and Society The study of science provides explanations that have significant impact on society, including technological advancements, improvement of human life, and better understanding of human and other influences on the Earth's environment.	Learning Outcome 3.	Measure 1: A set of 24 multiple-choice questions from the midterms and final exam. Measure 2: Two problems on a home-work assignment.	Measure 1: 70% of students will score 70% or better on 24 questions. Measure 2: 70% of students will score 70% or better on the 2 homework problems.	Measure 1: 92% of students scored 70% or better on 24 questions. Measure 2: The average score for the two homework problems was 83%.	Measure 1: Students successfully demonstrated a working knowledge of the importance of science to society. Measure 2: Students successfully demonstrated a working knowledge of the importance of science to society.	Measure 1: No curricular or pedagogical changes needed at this time. Measure 2: No curricular or pedagogical changes needed at this time.

GE Learning Goal	Measurable Learning Outcome	Method of Measure*	Threshold	Findings	Interpretation	Action Plan
4. Problem Solving & Data Analysis Science relies on empirical data, and such data must be analyzed, interpreted, and generalized in a rigorous manner.	Learning Outcome 4.	Measure 1: A set of 27 multiple-choice questions from the midterms and final exam. Measure 2: Two problems on a home-work assignment.	Measure 1: 70% of students will score 70% or better on 27 questions. Measure 2: 70% of students will score 70% or better on the 2 homework problems.	Measure 1: 85% of students scored 70% or better on 27 questions. Measure 2: The average score for the two homework problems was 92%.	Measure 1: Students successfully demonstrated a basic competence in data analysis and problem solving. Measure 2: Students successfully demonstrated a basic competence in data analysis and problem solving.	Measure 1: No curricular or pedagogical changes needed at this time. Measure 2: No curricular or pedagogical changes needed at this time.

Evidence of Learning: data from 2016-2017

Course (4): **Introduction to Meteorology (GEO 1130 PS)** / Spring Semester 2017 / Face-to-Face / 24 students

Gen Ed Learning Goal Students will demonstrate understanding of:	Measurable Learning Outcome Students will demonstrate their understanding of:	Method of Measurement Direct and Indirect Measures*	Threshold	Findings Linked to Learning Outcomes	Interpretation of Findings	Action Plan/Use of Results
1. Nature of Science. Scientific knowledge is based on evidence that is repeatedly examined, and can change with new information. Scientific explanations differ fundamentally from those that are not scientific.	Learning Outcome 1.	Measure 1: A set of 33 multiple-choice questions from the midterms and final exam.	Measure 1: 70% of students will score 70% or better on 33 questions.	Measure 1: 100% of students scored 70% or better on 33 questions.	Measure 1: Students successfully demonstrated a working knowledge of the nature of science.	Measure 1: No curricular or pedagogical changes needed at this time.
		Measure 2: One problem on a home-work assignment.	Measure 2: 70% of students will score 70% or better on the homework problem.	Measure 2: 100% of the students scored 70% or better on the homework problem.	Measure 2: Students successfully demonstrated a working knowledge of the nature of science.	Measure 2: No curricular or pedagogical changes needed at this time.

GE Learning Goal	Measurable Learning Outcome	Method of Measure	Threshold	Findings	Interpretation	Action Plan
2. Integration of Science All natural phenomena are interrelated and share basic organizational principles. Scientific explanations obtained from different disciplines should be cohesive and integrated.	Learning Outcome 2.	Measure 1: A set of 28 multiple-choice questions from the midterms and final exam.	Measure 1: 70% of students will score 70% or better on 28 questions.	Measure 1: 100% of students scored 70% or better on 28 questions.	Measure 1: Students successfully demonstrated a working knowledge of the integrated nature of science.	Measure 1: No curricular or pedagogical changes needed at this time.

GE Learning Goal	Measurable Learning Outcome	Method of Measure	Threshold	Findings	Interpretation	Action Plan
3. Science and Society The study of science provides explanations that have significant impact on society, including technological advancements, improvement of human life, and better understanding of human and other influences on the Earth's environment.	Learning Outcome 3.	Measure 1: A set of 24 multiple-choice questions from the midterms and final exam. Measure 2: Two problems on a home-work assignment.	Measure 1: 70% of students will score 70% or better on 24 questions. Measure 2: 70% of students will score 70% or better on the 2 homework problems.	Measure 1: 92% of students scored 70% or better on 24 questions. Measure 2: The average score for the two homework problems was 92%.	Measure 1: Students successfully demonstrated a working knowledge of the importance of science to society. Measure 2: Students successfully demonstrated a working knowledge of the importance of science to society.	Measure 1: No curricular or pedagogical changes needed at this time. Measure 2: No curricular or pedagogical changes needed at this time.

GE Learning Goal	Measurable Learning Outcome	Method of Measure*	Threshold	Findings	Interpretation	Action Plan
4. Problem Solving & Data Analysis Science relies on empirical data, and such data must be analyzed, interpreted, and generalized in a rigorous manner.	Learning Outcome 4.	Measure 1: A set of 27 multiple-choice questions from the midterms and final exam. Measure 2: Two problems on a home-work assignment.	Measure 1: 70% of students will score 70% or better on 27 questions. Measure 2: 70% of students will score 70% or better on the 2 homework problems.	Measure 1: 92% of students scored 70% or better on 27 questions. Measure 2: The average score for the two homework problems was 100%.	Measure 1: Students successfully demonstrated a basic competence in data analysis and problem solving. Measure 2: Students successfully demonstrated a basic competence in data analysis and problem solving.	Measure 1: No curricular or pedagogical changes needed at this time. Measure 2: No curricular or pedagogical changes needed at this time.

Evidence of Learning: Data from 2016-2017

Course (5): **Principles of Earth Science (GEO 1350 PS)**: Only one section was taught during the report period (Spring 2017). This section only had seven (7) students, too few for meaningful analysis. Data will be collected during the Spring 2018 offering (approximately 20 students) and reported in November 2018 as part of the 2017-2018 Assessment Report.

• **Summary of Findings:** Data from the four (4) courses assessed this year indicate that, in general, students in each are meeting the intended learning outcomes in general science at an appropriate level. Minor adjustments in teaching strategies and methods will be made as indicated. No major curricular or pedagogic changes are needed at this time.

III. Summary (Responses to the following questions):

1) *Based on your program's assessment findings, what subsequent action will your program take?*

The faculty will discuss this report at a departmental meeting early in Spring Semester 2018. Though no major changes are needed with respect to the physical-science general-education courses offered by the department, the data in this report will be considered as part of our ongoing curriculum review and revision efforts. Nationally, the geoscience community has been engaged in a comprehensive evaluation, sponsored by the National Science Foundation, of the future of undergraduate geoscience education (<http://www.jsg.utexas.edu/events/future-of-geoscience-undergraduate-education/>). The Department of Geosciences has been represented at each of the meetings during this process and is committed to using the results of this national effort to evaluate and revise its courses and curricula to better prepare our students. One of the most important aspects of this work is that geoscience employers, in all sectors, have been engaged in the process and we now have a broad consensus on the content knowledge and skills needed to be well trained and effective a 21st-century geoscientist.

Earlier this semester (October 19-20, 2017), the Department of Geosciences hosted a 2-day workshop sponsored by the National Association of Geoscience Teachers (NAGT) that brought 2 outside facilitators to help us in designing new curricula for our Geology and Applied Environmental B.Sc. degrees. A focus of the workshop was on ways to integrate sustainability science concepts across our curricula. We plan to submit our revised and updated curricula to the Curriculum Committee early in 2018.

2) *We are interested in better understanding how departments/programs assess their graduating seniors or graduate students. Please provide a short narrative describing the practices/curriculum in place for your department/program. Please include both direct and indirect measures employed. Finally, what were your findings from this past year's graduates?*

The Department of Geosciences routinely conducts exit interviews with all of its graduating seniors. During the interviews the graduates are asked about their satisfaction with college- and department-level advising and their perceptions of the strengths and weaknesses of our programs. In addition, they are asked to self-report, using a Likert-type scale, on their level of mastery of the nine (9) program-level learning outcomes. These data are scheduled to be reported in the 2018-2019 departmental assessment report.

Appendix A

Please provide the following information about the full-time and adjunct faculty contracted by your department during the last academic year (summer through spring). Gathering this information each year will help with the headcount reporting that must be done for the final Five-Year Program Review document that is shared with the State Board of Regents.

Faculty: Department of Geosciences College of Science	2016-2017
Headcount	
With Doctoral Degrees (Including MFA and other terminal degrees, as specified by the institution)	7
Full-time Tenured	4
Full-time Non-Tenured (includes tenure-track)	2
Part-time and adjunct	1
With Master's Degrees	4
Full-time Tenured	0
Full-time Non-Tenured	0
Part-time and adjunct	4
With Bachelor's Degrees	0
Full-time Tenured	0
Full-time Non-tenured	0
Part-time and adjunct	0
Other	0
Full-time Tenured	0
Full-time Non-tenured	0
Part-time	0
Total Headcount Faculty	11
Full-time Tenured	4
Full-time Non-tenured	2