



Program Assessment Report (PAR)

Earth & Environmental Sciences (EES) Associate Degree

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ACADEMIC YEAR COVERED BY THIS REPORT: 2020-2021

I. PROGRAM LEARNING OUTCOMES

Graduates will demonstrate applied knowledge of fundamental concepts of earth and environmental sciences and solve problems applying that knowledge.

Graduates will demonstrate the ability to write in scientific format and demonstrate knowledge of the scientific method.

Graduates will demonstrate knowledge of fundamental methods to assess applications in EES field and laboratory techniques.

II. PROCEDURES USED FOR ASSESSMENT

A. Direct Assessment

Learning Outcome 2: Graduates will demonstrate the ability to write in scientific format and demonstrate knowledge of the scientific method.

* The students' abilities to understand and utilize scientific format and the scientific method were assessed by the collection of questions from exams in EES 2550. These questions are long-answer questions meant to analyze both the comprehensive knowledge of EES concepts and the ability of writing in a scientific format. A sample of questions selected for analysis is included below:

* The modern theory of plate tectonics is actually a combination of several theories, such as continental drift, polar wandering, paleomagnetism, and

sea floor spreading. Choose two of the theories that led to the creation of modern plate tectonics, describe each theory, and then explain how each theory contributed to the modern understanding of plate tectonics.

- * What processes or events are vital for fossilization to occur? Give an example of one type of fossilization, describing how that fossilization process works.
- * What is natural selection? What are the mechanisms of natural selection?
- * The global climate of Earth has drastically changed many times due to many diverse events. Explain how one of these global warming or cooling trends occur, using either hypothetical or real-life examples.
- * What major global event happened at the end of the Permian, what are two of the ideas as to what caused this event, and what were two of the groups that survived after the event?

* In future assessments of this learning outcome, long-answer essay questions from EES 2550 will be replaced with a semester-long research project in EES 2550. Each student will present a written research paper and an oral presentation. Both the research paper and oral presentation will be assessed via rubrics to ensure that the scientific method has been learned and followed by each student. The long-answer questions used in the current assessment will be used to help analyze Learning Outcome 1.

Note that all artifacts are available upon request. Scores and interpretations are in sections below. Scores were collected and analyzed by faculty that teach in the program.

B. Scoring of Student Work

The scoring of student work for Learning Outcome 2 uses a grading rubric to establish an overall score of 0-1 for each question. An overall percentage of passing per question was then calculated to assess students' comprehension of scientific format and scientific method.

This current assessment includes all students registered for the Earth and Environmental Sciences AS degree during the school years of Fall 2019-Spring 2020, Fall 2020-Spring 2021, and Fall 2021-Spring 2022. Data from this time period includes a total of 5 students.

Questions

Student ID

- 1.) The modern theory of plate tectonics is actually a combination of several theories, such as continental drift, polar wandering, paleomagnetism, and sea floor spreading. Choose two of the theories that led to the creation of modern plate tectonics, describe each theory, and then explain how each theory contributed to the modern understanding of plate tectonics.
- 2.) What processes or events are vital for fossilization to occur? Give an example of one type of fossilization, describing how that fossilization process works.
- 3.) What is natural selection? What are the mechanisms of natural selection?
- 4.) The global climate of Earth has drastically changed many times due to many diverse events. Explain how one of these global warming or cooling trends occur, using either hypothetical or real life examples. Be as descriptive as possible.
- 5.) What major global event happened at the end of the Permian, what are two of the ideas as to what caused this event, and what were two of the groups that survived/thrived after the event?

Average (%)

S1

-

1

1

1

1

100.00

S2

-

1

1

0.5

0.8

82.50

S3

1

1

0.8

0.8

1

92.00

S4

1

1

1

-

1

80.00

S5

1

1

1

0.8

1

96.00

Student Passing Rate (%)

60

100

96

62

C. Indirect Assessment

Currently, there is no collected indirect assessment data. In the future, strong efforts will be made to compile both direct and indirect assessment data. Direct assessment will be collected and compiled via Pilot. An indirect assessment will be emailed to students via Qualtrics.

III. ASSESSMENT RESULTS/INFORMATION:

Three of the five selected questions had a passing rate of 96% or higher, which suggests that students within the EES AS program have an in-depth understanding of the fundamental concepts taught. Due to these questions being long-answer in nature, the ability to assess critical thinking and the understanding of the scientific method can also be analyzed. Some data is missing (two students' data from Question 1 and one student's data from Question 4), which does skew the statistics. However, in general, there appears to be a good foundational grasp of how the scientific method works, and how to utilize it. The future changes to the assessment for Learning Outcome 2, in which students will undergo a written and oral research study and presentation, will enable the ability of students to use and write in a scientific format to be assessed.

For the school year of Fall 2020-Spring 2021, there was a graduation rate of 33% within the EES AS program. This data may be skewed due to matriculation of students into four-year programs, such as the Integrated Science Studies (ISS) program.

The graduation data is calculated based on enrolled students in each specified academic year. The percentage is a direct calculation of students enrolled to students graduated in that specific academic year. For instance, Fall 2020-Spring 2021 saw 3 students enrolled in the EES AS program, with 1 student graduating in the Spring 2021. The calculations were based on 1 out of the 3 students graduating, which comes out to 33%.

Student Name

Graduation Term

James Flannery

Winter 2009

Emily Overman

Spring 2012

Laura Roediger

Spring 2013

Austin Smith

Spring 2015

Zachariah Whetstone

Spring 2015

Chad Mason

Spring 2016

Adam Bornhorst

Spring 2019

Hollie Kovacs

Fall 2019

Mason Kriegel

Spring 2020

Samuel Conklin

Spring 2021

Ryleigh Dye

Spring 2022

Margaret Patterson

Spring 2022

[Summary]

[Analysis]

IV. ACTIONS TO IMPROVE STUDENT LEARNING

Constant efforts have been, and will continue to be, made to maintain and improve student learning within the EES AS program. These efforts include

- * Providing instructional materials such as textbooks, hands-on laboratory and field resources, lectures, and other resources to ensure students are learning both conceptual and technical skills within the field of earth and environmental sciences.
- * Continuing to teach students from a well-define curriculum that enables students to complete the learning outcomes of the program.
- * Using, and increasing, the network of contacts with other universities, research facilities, and scientists to give students the opportunity to learn more in-depth skills, and find research and learning opportunities through graduate programs, internships, volunteering, and jobs.
- * Establishing standardized rubrics for direct and indirect assessment purposes, and making better efforts to collect direct and indirect data that shows current student learning outcomes are being met and that graduates from the program are finding futures that are benefitted by the program.
- * Encouraging students to develop abilities to problem solve using the scientific method, and to create their own opportunities for researching issues within the realm of earth and environmental sciences.

V. SUPPORTING DOCUMENTS

Additional documentation, when provided, is stored in the internal Academic Program Assessment of Student Learning SharePoint site.