

## **Earth Sciences BS: 2018-2019**

### **Definition of Unit**

#### **Providing Department:**

Earth Sciences

#### **Department/Unit Contact:**

Mike Harrison

#### **Mission/Vision Statement:**

1. To provide a robust undergraduate learning and research experience for geoscience students.
2. To demonstrate the importance of the geosciences to society.
3. To promote faculty research, scholarly activity and interdisciplinary collaboration.

### **Program goal 1: Recruitment**

#### **Define Goal:**

Recruit and retain sufficient majors for a successful educational program.

#### **Intended Outcomes / Objectives:**

The Department will maintain an average of 10 graduates/year.

DRILL DOWN-----

RELATED ITEM LEVEL 1

#### **Assessment: PG 1: Number of majors and graduates**

#### **Frequency of Assessment:**

annually

#### **Rationale:**

Programs graduating <10 students/year can be classified as low producing by the Tennessee Board of Regents. Low producing programs have been eliminated.

## RELATED ITEM LEVEL 2

### **Results: PG 1: Majors and graduates**

#### **Results:**

The number of majors in the fall 2018 semester was 40; it increased to 42 in spring 2019. For F2018-S2019, we graduated 12 students. As of summer 2019, our 5-year graduation average is 16.2 students/year—an increase from last year's 5-year average of 14.8.

#### **Attachments:**

Presentations, enrollment, graduates chart 2019.docx

## RELATED ITEM LEVEL 3

### **Modifications: Program Goal 1**

#### **Program Changes and Actions due to Results:**

(1) Development of new courses such as Paleoclimates and the hiring of a climate scientist has helped recruit new students; and (2) More online courses. As of spring 2018, the department has taught 8 different online courses (GEOG 1120, 1130, 4410, 4510, 4810/4820, 5410, ESS 6510, and GEOL 1045); 3 of these courses are general-education courses (GEOG 1120, 1130, and GEOL 1045). We continue our aggressive recruitment and retention of geoscience majors.

#### **Link to Assessment:**

Number of geoscience majors and graduates.

## **Program goal 2: Endowment**

### **Define Goal:**

The department's Alumni Endowment will be used to offer scholarships, domestic and international undergraduate field experiences, and to help fund student research.

### **Intended Outcomes / Objectives:**

Increase the department's Alumni Endowment to offer more scholarships, experiences, and student research.

DRILL DOWN-----

RELATED ITEM LEVEL 1

### **Assessment: PG 2: Donations and endowment growth**

#### **Frequency of Assessment:**

biannually

#### **Rationale:**

The Department tracks the size of the endowment as well as the number of scholarships, experiences and student research funded.

RELATED ITEM LEVEL 2

### **Results: PG 2: Donations and endowment growth**

#### **Results:**

As of August 2019, our Alumni Endowment is \$40,956, about the same this time last year. Also, we now offer a new scholarship to geoscience students: the Shanks-Moran Scholarship

#### **Attachments:**

RELATED ITEM LEVEL 3

### **Modifications: Program Goal 2**

#### **Program Changes and Actions due to Results:**

Currently working with department alumni to increase contributions to the Alumni Endowment. This ongoing work resulted in two new geoscience scholarships and the acquisition of an XRD instrument to assist with faculty and undergraduate research. Faculty continue seeking more funding for senior-thesis research on and off campus (e.g., NASA, NSF, TTU URECA and CISE grants)

**Link to Assessment:**

Track endowment growth.

**Student-learning outcome 1: Competency****Define Goal:**

The department will prepare students to pursue a graduate degree or enter the geoscience workforce.

**Intended Outcomes / Objectives:**

Graduates will demonstrate sufficient geoscience knowledge that allows them to either pursue a graduate degree or enter the geoscience workforce. Graduates should achieve a passing score ( $\geq 70$ ) on the department exit exam and score above the 50th percentile on the national ACAT Geology exam.

DRILL DOWN-----

RELATED ITEM LEVEL 1

**Assessment: SLO 1: Competency****Frequency of Assessment:**

each semester

**Rationale:**

ACAT Exam:

Graduates should score above the 50th percentile on the national ACAT Geology exam. The ACAT measures multiple areas of geology knowledge including: Geomorphology, Stratigraphy, Physical Geology, and Structural Geology.

Departmental Exam:

90% of graduates will meet or exceed expectations on the departmental exams. The departmental exams evaluate core knowledge for all students and concentration knowledge: Environmental Geology and GIS/GEOG.

The exams are used to assess a student's understanding and retention of fundamental knowledge and to help us identify content gaps in our curricula.

## RELATED ITEM LEVEL 2

### **Results: SLO 1: Competency**

#### **Results:**

From spring 2006-spring 2019, 143 students completed the department exit exam. During this time, 105 students scored  $\geq 70$  on the exam (10/14 for F2018-S2019 cohort). The 2018-19 exam average is 73% compared to 83% for 2017-18.

For the 2018-2019 AY, geosciences students (N=6) scored in the 71st percentile on the national ACAT Geology exam compared to 45th last year. This is our fourth year of data for this exam

#### **Attachments:**

CT, communication, exit exam chart 2019.docx

## RELATED ITEM LEVEL 3

### **Modifications: Student Learning Outcome 1**

#### **Program Changes and Actions due to Results:**

Historically, students who completed GEOL 2500 (Geologic Fundamentals) score higher on the exit exam than those who did not. Thus, we will continue to require students to complete GEOL 2500. 2019 marks our fourth year using the national geology ACAT exam. From last year, our percentile increased from 45th to 71st.

#### **Link to Assessment:**

Development of the department exit exam in 2006 to assess content knowledge of graduating seniors. The results of the exams have illuminated weaknesses in the curriculum, particularly with map reading, rocks and minerals. The exit exam data suggest that GEOL 2500 contributes to the success of SLO 2. Also, the results of the ACAT exam assess how our majors compare to their peers across the U.S. The results from these assessments guided us in the major revision of our four Geoscience curricula from fall 2018-spring 2019.

## **Student-learning outcome 2: Communication and critical thinking**

### **Define Goal:**

The department will prepare graduates to communicate and think critically.

### **Intended Outcomes / Objectives:**

Students will demonstrate proficient communication and critical thinking skills on a senior thesis project.

Students will demonstrate proficient critical thinking ability by scoring above the institutional mean on the university senior exit exam.

DRILL DOWN-----

RELATED ITEM LEVEL 1

### **Assessment: SLO 2: Communication and Critical-thinking skills**

#### **Frequency of Assessment:**

biannually

#### **Rationale:**

The California Critical Thinking Skills Test (CCTST) is used to evaluate critical thinking. The test is administered to all graduating students at TTU.

Graduates are required to complete a thesis project: Senior Thesis 1 and 2 (GEOL 4930 and GEOL 4931). The course grade issued by the adviser reflects a student's critical thinking and communication ability, as well as their thoroughness, initiative, and effort. To better assess only the critical thinking and communication components, the faculty adopted a separate grading rubric (Appendix 1).

RELATED ITEM LEVEL 2

### **Results: SLO 2: Communication and Critical-thinking Skills**

#### **Results:**

CCTST:

MAJOR	2015-2016		2016-2017		2017-2018		2018-2019		
	Mean	N*	Mean	N*	Mean	N*	Mean**	34 point	N*
GEOS	13.5	4	15.1	16	20.2	13	20.6/83		8
TTU Total	16.9	1485	17.0	1767	17.6	1295	16.8/76		1515
CCTST	≈17.1		≈16.2		≈16.2		≈15.4/74		

### Senior Thesis

Between spring 2003 and spring 2019, 187 geosciences students have completed senior theses. The average course grade for that time is 91.7. For F2018-S2019, the average is 93.1 (N=13)—an increase from the F2017-S2018 average of 87.9. Critical thinking and communication scores averaged 87.1 and 88.4, respectively, for F2018-S2019. Critical-thinking and communication scores increased, respectively, from last year (80.5 and 79.2).

### Attachments:

CCTST chart 2019.docx; CT, communication, exit exam chart 2019.docx

### RELATED ITEM LEVEL 3

## Modifications: Student Learning Outcome 2

### Program Changes and Actions due to Results:

Requirement of the senior thesis and the greater emphasis on student research and communication in our upper-level courses. Senior-thesis students give an oral presentation of their research to the department faculty and students. We continue to strongly encourage thesis students to present their research outside the department. In addition, more faculty have now made poster sessions or oral presentations a part of their courses. Also, more emphasis on writing abstracts in GEOL 2500, 3230, 4110, 4200 and 3830. Dr. Michel's courses contain multiple writing exercises.

### Link to Assessment:

Assessment of thesis communication ability shows the need to continue this activity.

## **Student-learning outcome 3: Undergraduate research**

### **Define Goal:**

The department will develop student skills in research.

### **Intended Outcomes / Objectives:**

Graduates will demonstrate the ability to independently develop, conduct, and complete a novel research project.

DRILL DOWN-----

RELATED ITEM LEVEL 1

### **Assessment: SLO 3: Undergraduate research**

#### **Frequency of Assessment:**

every semester

#### **Rationale:**

The Department tracks the number of students presenting thesis research outside the department.

RELATED ITEM LEVEL 2

### **Results: SLO 3: Presentation of thesis research**

#### **Results:**

Between spring 2003 and spring 2019, 133 (71%) geoscience graduates who completed a senior thesis have presented senior-thesis research outside the department. For F2018-S2019, 13/13 (100%) students presented their thesis research outside the department—an increase from last year (71%). Although year-to-year percentages fluctuate, the overall trend is positive since 2003-2004, when the percentage was <20%.

#### **Attachments:**

Presentations, enrollment, graduates chart 2019.docx