

Earth Sciences BS: 2019-2020

Definition of Unit

Providing Department:

Earth Sciences

Department/Unit Contact:

Evan Hart

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 2019 semester was 48 (an increase of 20% from the Fall 2018) (Appendix 3). For F2019-S2020, we graduated 12 students, the same number as last year. As of summer 2019, our 5-year graduation average is 14.0 students/year—a decrease from last year's 5-year average of 14.6. (Program Goal 1).

Attachments:

Geoscience Student Presentations, Enrollment and Graduates 2020.docx

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 \$39,240, a decrease of 4%. Also, we now offer a new scholarship to geoscience students: the Shanks-Moran Scholarship. Donations from department alumni now are added to our Restricted account, not to the Endowment. In calendar year 2019, we received over \$11,010 in donations. As of August 2020, we have received \$8125. The restricted account can be used for field trips. (Program Goal 2).

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). In 2019 and 2020, the Department Chair met twice with representatives from University Advancement to discuss ways to better reach alumni and gain their support. In Fall of 2019, the Department hosted an alumni event during homecoming, showcasing our newly remodeled building.

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 (≥ 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:

ACAT Exam:

For the 2019-2020 AY, geosciences students (N=5) scored in the 40th percentile on the national ACAT Geology exam compared to 71st last year. This is our fifth year of data for this exam. The percentile range on this exam for 2019-2020 students was from 4 to 96, indicating a great disparity that does not likely reflect student aptitude.

2019-2020	Geomorphology	Stratigraphy	Physical Geology	Structural Geology	Overall	Percentile
Student 1	489	212	416	402	354	7
Student 2	504	618	482	427	530	62
Student 3	629	652	609	598	670	96
Student 4	469	465	543	347	457	33
Student 5	375	284	327	422	324	4
TOTAL	493.2	446.2	475.4	439.2	467	40.4

Departmental Exam:

From spring 2006-spring 2020, 156 students completed the department exit exam. During this time, 116 students scored ≥ 70 on the exam (11/13 for F2019-S2020 cohort). The 2019-20 exam average increased slightly, from 77% compared to 73% for 2018-19. We have begun breaking down the results on the departmental exam to get a better picture of our students' performance.

2020	Common Core	Environmental Geology	GIS/GEOG
A: Exemplary	15%	0%	67%
B: Above Expectations	38%	50%	0%
C: Meets Expectations	31%	50%	0%
D: Below Expectations	0%	0%	0%
F: Unacceptable	15%	0%	33%

Attachments:

Critical Thinking, Communication and Exit-Exam Scores 2020.docx

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:

each semester

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:

	2015-2016		2016-2017		2017-2018		2018-2019		2019-2020	
MAJOR	Mean	N*	Mean	N*	Mean	N*	Mean** point /100 point	34 N*	Mean** point /100 point	34 N*
GEOS	13.5	4	15.1	16	20.2	13	20.6/83	8	18.7/79	6
TTU Total	16.9	1485	17.0	1767	17.6	1295	16.8/76	1515	16/75	1365
CCTST	≈17.1		≈16.2		≈16.2		≈15.4/74		≈15.4/74	

Senior Thesis:

Between spring 2003 and spring 2020, 199 geosciences students have completed senior theses. The average course grade for that time is 92.4. For F2019-S2020, the average is 92.5 (N=12)—a slight decrease from the F2018-S2019 average of 93.5. Critical thinking and communication scores remained good with averages of 85.9 and 86.9, respectively (Appendix 2).

Communication	2019	2020
A: Exemplary	69%	50%
B: Above Expectations	23%	31%
C: Meets Expectations	8%	8%

D: Below Expectations	0%	8%
F: Unacceptable	0%	0%

Critical Thinking	2019	2020
A: Exemplary	38%	42%
B: Above Expectations	54%	42%
C: Meets Expectations	8%	8%
D: Below Expectations	0%	8%
F: Unacceptable	0%	0%

Attachments:

RELATED ITEM LEVEL 3

**Modifications: SLO 2: Communication and Critical thinking Skills
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:

For many years, we used the research project to assess student ability to think critically and communicate. A rubric is now being used to assess student research ability.

RELATED ITEM LEVEL 2

Results: SLO 3: Presentation of thesis research

Results:

Thesis and Research Scores:

Research	2019	2020
A: Exemplary	77%	67%
B: Above Expectations	23%	33%
C: Meets Expectations	0%	0%
D: Below Expectations	0%	0%
F: Unacceptable	0%	0%

Students presenting research:

Between spring 2003 and spring 2020, 139 out of 200 (70%) geoscience graduates who completed a senior thesis have presented senior-thesis research outside the department. For

F2018-S2019, 5/12 (42%) students presented their thesis research outside the department—a decrease from last year (100%). Although year-to-year percentages fluctuate, the overall trend is positive since 2003-2004, when the percentage was <20% (Appendix 3). (Also, due to COVID-19, few students were able to present outside the department, although many were planning to until the lockdown) (Student Learning Outcome 1).

Our department participated in the 5 year review in Spring 2020. We received high marks from the outside reviewer, especially with regard to Presentation of Student Research. Apparently, our requirement of senior thesis and our high rate of student presentations at outside meetings, is a exceptional for a program of our size.

Attachments:

Geoscience Student Presentations, Enrollment and Graduates 2020.docx