

UNIT REPORT

Earth Sciences - Final Annual Report

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Department mission: Earth Sciences

Start: 07/01/2017

End: 06/30/2018

Providing Department: Earth Sciences

Department/Unit Contact: Mike Harrison

Mission/Vision/Goal 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

Progress: Ongoing

Define Goal:

Recruit and retain sufficient majors to maintain an average of 10 graduates/year.

Program goal 2: Endowment

Progress: Ongoing

Define Goal:

Increase the Alumni Endowment so the department can offer more scholarships, domestic and international undergraduate field experiences, and to help fund student research.

Student-learning outcome 1: Competency

Progress: Ongoing

Define Goal:

Graduates will demonstrate sufficient geoscience knowledge that allows them to either pursue a graduate degree or enter the geoscience workforce.

Student-learning outcome 2: Communication and critical thinking

Progress: Ongoing

Define Goal:

Graduates will demonstrate proficiency in communication and critical thinking.

Student-learning outcome 3: Undergraduate research

Progress: Ongoing

Define Goal:

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

Assessment: California Critical Thinking Skills Test

Goal/ Outcome/ Objective: Student Learning Outcome 1

Type of Tool: Exit Exam

Frequency of Assessment: biannually

Rationale:

We use the California Critical Thinking Skills Test (CCTST) to compare the skills of our majors to national and TTU averages.

Assessment: Department and ACAT Geology exams for graduating seniors

Goal/ Outcome/ Objective: Student Learning Outcome 2

Type of Tool: Exit Exam

Frequency of Assessment: each semester

Rationale:

Graduates should achieve a passing score (≥ 70) on the department exit exam and score above the 50th percentile on the national ACAT Geology exam. 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.

Assessment: Donations and endowment growth

Goal/ Outcome/ Objective: Program Goal 2

Type of Tool: Tracking Spreadsheet

Frequency of Assessment: biannually

Rationale:

Since spring 2008, the number of geoscience majors has increased $>50\%$. More students are applying for department scholarships.

Assessment: Number of majors and graduates

Goal/ Outcome/ Objective: Program Goal 1

Type of Tool: Tracking Spreadsheet

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.

Assessment: Presentation of student research

Goal/ Outcome/ Objective: Student Learning Outcomes 1 and 3

Type of Tool: Tracking Spreadsheet

Frequency of Assessment: every semester

Rationale:

For students presenting thesis research outside the department, we feel that the communication outcome is achieved, in part, if the student has an abstract accepted and completes a poster or gives a talk.

Assessment: Senior-thesis grades with separate grades for communication and critical-thinking skills

Goal/ Outcome/ Objective: Student Learning Outcomes 1 and 3

Type of Tool: Tracking Spreadsheet

Frequency of Assessment: each semester

Rationale:

Graduates should achieve a passing grade for 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).

Attached Files

[Appendix 1. Thesis grading rubric](#)

Results: California Critical Thinking Skills Test

Goal/Objective/Outcome Number: Student learning outcome 1

Results:

The CCTST results (N=16) from F2017-S2018 show a mean of 16.4—an increase from last year (15.1). The national average for the same time is 16.2. The TTU average was 17.6 during the same time. Normally, our students score above the national average (Appendix) (Student Learning Outcome 1).

Attachments: Attached Files

[CCTST chart 2018.docx](#)

Results: Department and ACAT Geology exams

Goal/Objective/Outcome Number: Student learning outcome 2

Results:

From spring 2006-spring 2018, 129 students completed the department exit exam. During this time, 95 students scored ≥ 70 on the exam (9/9 for F2017-S2018 cohort). The 2017-18 exam average is 83% compared to 75% for 2016-17 (Appendix).

For the 2017-2018 AY, geosciences students (N=9) scored in the 45th percentile on the national ACAT Geology exam compared to 56th last year. This is our third year of data for this exam.

Attachments: Attached Files

[CT, communication, exit exam chart 2018.docx](#)

Results: Donations and endowment growth

Goal/Objective/Outcome Number: Program goal 2

Results:

As of August 2018, our Alumni Endowment is \$40,970, a slight decrease from summer 2018. However, it's a substantial increase from 2005, when the amount was \$31,332. We now offer two more scholarships to geoscience students: the Melvin Smith and the Moran Scholarships (Program Goal 2).

Results: Majors and graduates

Goal/Objective/Outcome Number: Program goal 1

Results:

The number of majors has increased from 38 (spring 2008) to 48 (fall 2017) (Appendix). For F2017-S2018, we graduated 17 students. As of summer 2018, our 5-year graduation average is 14.8 students/year—a decrease from last year's 5-year average of 15.2. (Program Goal 1).

Attachments: Attached Files

[Presentations, enrollment, graduates chart 2018.docx](#)

Results: Presentation of thesis research

Goal/Objective/Outcome Number: Student learning outcome 1

Results:

Between spring 2003 and spring 2018, 118 (68%) geoscience graduates who completed a senior thesis have presented senior-thesis research outside the department. For F2017-S2018, 12/17 (71%) students presented their thesis research outside the department—an increase from last year (67%). Although year-to-year percentages fluctuate, the overall trend is positive since 2003-2004, when the percentage was <20% (Appendix) (Student Learning Outcome 1).

Attachments: Attached Files

[Presentations, enrollment, graduates chart 2018.docx](#)

Results: Scores for senior thesis, critical thinking and communication

Goal/Objective/Outcome Number: Student learning outcomes 1 and 3

Results:

Between spring 2003 and spring 2018, 174 geosciences students have completed senior theses. The average course grade for that time is 91.6. For F2017-S2018, the average is 87.9 (N=17)—a decrease from the F2016-S2017 average of 90.6. Critical thinking and communication scores averaged 80.5 and 79.2, respectively, for F2017-S2018 (Appendix). Critical-thinking and communication scores decreased, respectively, from last year (85.6 and 82.1).

Attachments: Attached Files

[CT, communication, exit exam chart 2018.docx](#)

Modifications: Program Goal 1

Goal/Objective/Outcome Number: 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.

Link to Flight Plan: Freshmen Flight Path

Improve Undergraduate Student Experience

Modifications: Program Goal 2**Goal/Objective/Outcome Number:** Program Goal 2**Program Changes and Actions due to Results:**

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

Link to Assessment:

Track endowment growth.

Link to Flight Plan: Enrollment, Tuition, and Scholarships

Improve Undergraduate Student Experience

Modifications: Student Learning Outcome 1**Goal/Objective/Outcome Number:** Student Learning Outcome 1**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.

Link to Flight Plan: Improve Undergraduate Student Experience**Modifications: Student Learning Outcome 2****Goal/Objective/Outcome Number:** Student Learning Outcome 2**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. 2018 marks our third year using the national geology ACAT exam. Our percentile dropped from 56th to 45th. We will monitor this to see if the decrease is an anomaly or a trend. Also, we dropped the target percentile for the ACAT exam from 70th to >50th as this denotes scores above the median which is more consistent with an average of >70% (letter grade C) on the department exit exam.

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.

Link to Flight Plan: Improve Undergraduate Student Experience**Modifications: Student Learning Outcome 3**

Goal/Objective/Outcome Number: Student Learning Outcome 3

Program Changes and Actions due to Results:

We have been tracking Senior-Thesis grades for years, but the emphasis has been on communication and critical thinking (SLO-1). We will now assess the quality and thoroughness of research by the student. This will be reflected in the grades assigned for thesis, as described in the modified grading rubric.

Link to Assessment:

Track separate grades for critical thinking and communication of the senior thesis.

Link to Flight Plan: Undergraduate Co-Curricular Program

Improve Undergraduate Student Experience

Improvement to Assessment Plan: Geology ACAT Exam

Improvements to Assessment Plan:

We lowered the target percentile for the ACAT exam from 70th to >50th as this denotes scores above the median which is more consistent with an average of >70% (letter grade C) on the department exit exam.