



Final Annual Report

Tennessee Tech University

President

Provost

College of Arts and Sciences

Earth Sciences



Department mission: 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

Define Goal

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

Intended Outcomes / Objectives



Program goal 2: Endowment

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.

Intended Outcomes / Objectives



Student-learning outcome 1: Competency

Define Goal

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

Intended Outcomes / Objectives

Student-learning outcome 2: Communication and critical thinking

Define Goal

Graduates will demonstrate proficiency in communication and critical thinking.

Intended Outcomes / Objectives

Student-learning outcome 3: Undergraduate research

Define Goal

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

Intended Outcomes / Objectives

Assessment: California Critical Thinking Skills Test

Goal/ Outcome/ Objective: Student Learning Outcome 1

Type of Tool: Exit Exam

Rationale

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

Frequency of Assessment: biannually

Assessment: Department and ACAT Geology exams for graduating seniors

Goal/ Outcome/ Objective: Student Learning Outcome 2

Type of Tool: Exit Exam



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.

Frequency of Assessment: each semester

Assessment: Donations and endowment growth

Goal/ Outcome/ Objective: Program Goal 2

Type of Tool: Tracking Spreadsheet

Rationale

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

Frequency of Assessment: biannually

Assessment: Number of majors and graduates

Goal/ Outcome/ Objective: Program Goal 1

Type of Tool: Tracking Spreadsheet

Rationale

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

Frequency of Assessment: annualy

Assessment: Presentation of student research

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

Type of Tool: Tracking Spreadsheet

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.

Frequency of Assessment: every semester



 **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

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).

 Appendix 1. Thesis grading rubric

Frequency of Assessment: each semester



Results: California Critical Thinking Skills Test

Goal/Objective/Outcome Number: Student learning outcome 1

Results

The CCTST results (N=16) from F2016-S2017 show a mean of 15.1—an increase from last year (13.5). The national average for the same time is 16.2. The TTU average was not available for this report. Normally, our students score above the national average (Student Learning Outcome 1).

Attachments

 CCTST chart



Results: Department and ACAT Geology exams

Goal/Objective/Outcome Number: Student learning outcome 2

Results

From spring 2006-spring 2017, 120 students completed the department exit exam. During this time, 86 students scored ≥ 70 on the exam (12/16 for F2016-S2017 cohort). The 2016-17 exam average is 75% compared to 73% for 2015-16.

For the 2016-2017 AY, geosciences students (N=10) scored in the 56th percentile on the national ACAT Geology exam compared to 78th last year. This is our second year of data for this exam.



Attachments

 CT, communication, exit exam chart



Results: Donations and endowment growth

Goal/Objective/Outcome Number: Program goal 2

Results

As of June 2017, our Alumni Endowment is \$41,299, a slight decrease from May 2016. 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).

Attachments

No items to display.



Results: Majors and graduates

Goal/Objective/Outcome Number: Program goal 1

Results

The number of majors has increased from 38 (spring 2008) to 58 (fall 2016). For F2016-S2017, we graduated 18 students. As of summer 2017, our 5-year graduation average is 16.2 students/year—an increase over last year's 5-year average of 15.6. (Program Goal 1).

Attachments

 Presentations, enrollment, graduates chart



Results: Presentation of thesis research

Goal/Objective/Outcome Number: Student learning outcome 1

Results

Between spring 2003 and spring 2017, 106 (64%) geoscience graduates who completed a senior thesis have presented senior-thesis research outside the department. For F2016-S2017, 11/18 (61%) students presented their thesis research outside the department—a decrease from last year (82%). Although year-to-year percentages fluctuate, the overall trend is positive since 2003-2004, when the percentage was <20% (Student Learning Outcome 1).



Attachments

 Presentations, enrollment, graduates chart



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 2017, 157 geosciences students have completed senior theses. The average course grade for that time is 91.9. For F2016-S2017, the average is 90.6 (N=18)—a decrease from the F2015-S2016 average of 93.2. Critical thinking and communication scores averaged 85.6 and 82.1, respectively, for F2015-S2016. Critical-thinking and communication scores increased and decreased, respectively, from last year (85.5 and 85.5).

Attachments

 CT, communication, exit exam chart



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 2017, 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) and Kristin Wells 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. 2017 marks our second year using the national geology ACAT exam. Our percentile dropped from 76th to 56th. 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.