UNIT REPORT

Earth Sciences - Institutional Effectiveness Final Annual Report 2019

Generated: 9/4/19, 11:59 AM

Definition of Unit

Department mission: Earth Sciences

Reporting Year:

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.

Goal/Objective/Outcome

Program goal 1: Recruitment

Define Goal:

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

Intended Outcomes / Objectives:

null

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:

null

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:

null

Student-learning outcome 2: Communication and critical thinking

Define Goal:

Graduates will demonstrate proficiency in communication and critical thinking.

Intended Outcomes / Objectives:

null

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:

null

Assessment Tools

Assessment: California Critical Thinking Skills Test

Goal/ Outcome/ Objective: Student Learning Outcome 1

Type of Tool: Exit Exam

Frequency of Assessment: biannualy

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: biannualy

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: annualy

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

Results: California Critical Thinking Skills Test

Goal/Objective/Outcome Number: Student learning outcome 1

Results:

The CCTST results (N=8) from F2018-S2019 show a mean of 20.6—an increase from last year (16.4). The national average for the same time is 15.4 and the TTU average was 16.8.

Attachments: Attached Files

CCTST chart 2019.docx

Results: Department and ACAT Geology exams

Goal/Objective/Outcome Number: Student learning outcome 2

Results:

From spring 2006-spring 2019, 143 students completed the department exit exam. During this time, 105 students scored ≥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: Attached Files

CT, communication, exit exam chart 2019.docx

Results: Donations and endowment growth

Goal/Objective/Outcome Number: Program goal 2

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:

Results: Majors and graduates

Goal/Objective/Outcome Number: Program goal 1

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: Attached Files

Presentations, enrollment, graduates chart 2019.docx

Results: Presentation of thesis research

Goal/Objective/Outcome Number: Student learning outcome 1

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: Attached Files

Presentations, enrollment, graduates chart 2019.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 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: Attached Files

CT, communication, exit exam chart 2019.docx

Modifications and Continuing Improvement to Goals/Objectives/Outcomes

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 'Tech Tomorrow' Strategic Plan: Experiential Learning
Programs, Certificates, and Training

Modifications: Program Goal 2

Goal/Objective/Outcome Number: 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.
Link to 'Tech Tomorrow' Strategic Plan: Efficiency and Effectiveness
Programs, Certificates, and Training

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 'Tech Tomorrow' Strategic Plan: Programs, Certificates, and Training

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. 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.

Link to 'Tech Tomorrow' Strategic Plan:

Programs, Certificates, and Training

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 grading rubric.

Link to Assessment:

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

Attached Files

Appendix 1. Thesis grading rubric.docx

Link to 'Tech Tomorrow' Strategic Plan: Technology Infused Programs

Programs, Certificates, and Training

Improvement to Assessment Plan

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.