DEPARTMENTAL GOALS

LEARNING OUTCOMES AND ASSESSMENT

PROGRAM: GEOSCIENCES (GEOS)

CONCENTRATIONS (ABBREVIATIONS)

EGEO Environmental Geology
GIS Geographic Information Systems
GEO Geology

CATALOG PROGRAM LISTINGS

EGEO: The Environmental Geology concentration is designed to prepare graduates for immediate access to entry-level positions in environmental companies.

GIS: The Geographic Information Systems concentration is designed to prepare students for entry-level positions in industry or government. In addition, the concentration provides a basic understanding of GIS/geography for those students who desire to enter a graduate program.

GEO: The geology concentration is intended to prepare graduates for entry into graduate school.

PROGRAM OUTCOMES

1. The department will increase the number of geoscience majors to the level that will produce 10 B. S. degrees per year on the average.

   Assessment method: The number of geoscience majors and geoscience graduates are tracked. Both numbers are expected to increase over a multi-year period. The ultimate goal will be to have about 50 majors and 10 graduates each year.

   Action Plan: Faculty and chair will make presentations to high schools and college groups to make students aware of the discipline.

   Results: In the last three years the number of majors has increased from a low of 18 to a maximum of 31 before May, 2004. The number is currently at about 30.

2. The department will consider initiation of a Master's degree program in Geographical Information Systems.

   Action Plan: Faculty will make a decision whether or not to initiate the graduate degree during the 2004-2005 academic year. If the decision is positive the department will begin the on-campus process during the 2005-2006 academic year.

3. The department will increase the dollar amount of externally funded research by the faculty of the department by 10 percent.

   Action Plan: The department Chair will monitor the dollar amount of grants generated by departmental faculty. Faculty will meet with the Chair to consider ways to support opportunities for seeking grants. Further, the department has organized a smaller group of faculty who are actively seeking, as a group,
funding for GIS projects.

4. The department will eliminate seldom-taught courses from our program and concentrate on teaching a smaller number of more focused courses.

Action Plan: During a recent departmental peer review it was suggested that there were too many departmental courses listed in the catalog. As a result the faculty eliminated 13 listed courses. The curriculum was altered to have fewer required courses, but to offer the remaining courses on a more frequent basis. This process of curriculum revision is continuing.

5. The department will prepare a newsletter and send it to our graduates on an annual basis.

Action Plan: In response to a suggestion in a recent departmental peer review the department published a newsletter for its graduates and current students during the fall of 2004. That newsletter was well received based on emails and other comments from our graduates. We intend to continue this way of keeping in contact with our graduates.

Results: Comments from alumni suggest that the newsletter has and will continue to strengthen ties between the department and its graduates.

6. The department will increase by 10 percent each year the value of the endowment principal from which the Alumni Scholarships are made available to departmental majors.

Assessment: The endowment principal sum will be tracked for several years in order to establish whether or not it is increasing.

Action Plan: We will solicit funds from our alumni to increase the principal on the department's endowment account. This is the only way that the department can influence the value of the endowment as it is part of university-wide investment funds.

Learning Outcomes Common to All Concentrations

1. We will provide for a greater level of development of the critical thinking skills for departmental majors. Current focus will be on a Senior Thesis.

Action Plan: The department initiated a required Senior Thesis for all of its majors, effective for majors starting Fall, 2003. Seniors will be required to complete a carefully circumscribed research project during a sequence of two 3-credit hour courses. Each Senior Thesis will be designed in consultation with a faculty member who will monitor student progress. Students must publish and present the thesis in the department, and each student will be expected to present the results outside of the department.

Assessment: The department will require majors to publish the results of the research in a format that was formulated during the 2004-2005 academic year. We will track the number of student presentations at the local, state, regional and national levels.

Results: The Senior Thesis is just starting, but our ultimate expectation is to increase the percentage of seniors who present their research beyond the walls of the university.

2. We will increase funding for classroom travel at least to the level that was present before recent budget...
cuts eliminated part of the departmental travel budget.

**Action Plan:** During the 2004-2005 we will attempt to restore lost funding for classroom travel through university, industry and private giving.

3. Graduates will perform at or above the average for the university on the Science portion of the College Base Exam.

**Action Plan:** The College Base Exam provides an readily assessable way to compare departmental majors with the entire cohort of university students. Our expectation is that departmental majors will average at or above the average for the university.

**Learning Outcomes Specific to Individual Concentrations**

1. Majors with concentration in geology (GEO) will demonstrate mastery of nine discipline areas on a national standardized geology exam. We defined mastery as, on the average, meeting or exceeding the 5th stanine (which includes the 50th percentile) for the discipline and total score.

**Assessment:** We use the national ACAT exam to evaluate mastery of the discipline areas considered important for well-prepared geology graduates. We currently have a 7-year record of ACAT results.

**Results:** Scores for the department's graduates during the period from 1998 to 2004 are shown below.

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**Discussion:** Because we graduate a small number of students each year, a three-year running average has been included in the data set. Thus, for the year 2000, the number 69 represents the average weighted percentile score for the years 1998-2000. Our students did very well during the first six years of this exam, but did noticeably lower in 2004. There are at least two reasons for the lower average score in 2004. First, some GIS majors took the exam because we had no appropriate content exam for them. They did not do as well as the geology majors because they did not take a large number of geology courses. In the future they will not take the ACAT. We are currently looking for a GIS content exam for this cohort. Second, the Chair was unable to administer the exam to this group of students and they may have not been made aware of the importance of the exam. In the future the significance of the exam will be made clearly known.

2. Majors with concentration in environmental geology (EGEO) will demonstrate mastery of five discipline areas on the national standardized geology ACAT exam (geomorphology, historical geology, physical geology, and two of the following; stratigraphy, structure, or petrology depending on their individual curriculum). Mastery is defined as exceeding the 50th percentile for the total score.

**Action Plan:** The departmental will track these data as we begin to graduate majors with this concentration. Because this program was initiated for the Fall semester, 2004, there have as yet been no graduates with this concentration.
Assessment: We will monitor results in the same manner as we do for the geology ACAT.

The department will continue to search for a national exam for our majors in geographical information systems (GIS). We have been unable to find a national exam in this discipline.

Action Plan: The department has been unable to find an acceptable major field test in this discipline. We will continue to look for one, but may be forced to produce our own exam.

Results: We need a field exam because GIS students do not take as many traditional geology courses as our other majors. The geology ACAT exam is not, therefore, an acceptable measure of a student who is majoring in GIS.

Assessment Methods Used

1. College Base Exam
   This exam is administered to all graduating seniors at TTU. It provides a metric for evaluating our senior majors in comparison with other majors in the College of Arts and Sciences and with University seniors as a whole.

2. ACAT exam
   This is a national exam administered by Austin Peay State University that measures geological knowledge in 11 subdiscipline areas. It will be taken by students in GEO and E GEO concentrations.

3. Periodic Peer Review (last done in 2004)
   Allows for subjective evaluation of students by a faculty member in geology or a related discipline from another university.

4. Internal tracking
   Various metrics (number of majors, travel funding, number of student presentations made, etc.) will be recorded by the departmental chair in order to access progress on program and learning goals.

5. Senior Thesis Presentations
   Departmental presentation are required for Senior Thesis. Presentation outside the department are strongly encouraged but not required. We will keep a record of student participation in presenting their research results at other venues outside the department as a measure of assessment.

6. Faculty Discussion (especially of Senior Thesis Results-Critical thinking skills)
   Each semester the department faculty will meet to evaluate the results of student thesis research and to establish appropriate ways to improve critical thinking skills involved in this area.

Analyzing and Using Assessment Results

On a frequent basis (at least once a semester) the faculty look at the results of senior content exams, discuss progress on program and outcomes goals, contribute new goals, and suggest modifications (or elimination) of old goals. The faculty discuss the results of Senior Thesis efforts and evaluate student progress in the development of critical thinking skills. Furthermore, the Chair discusses departmental program and learning goals at least once each year during the Chair's Annual Evaluation. Departmental plans and goals for the future are also a focus of this annual meeting.
EXAMPLES OF HOW ASSESSMENT RESULTS HAVE AFFECTED OUR PROGRAM

The several program and student learning outcomes listed above are a mix of both older and newer expected outcomes. For the newer outcomes there has not been enough time to accumulate data for assessment on how well departmental expectations match results. For older outcomes there are data to allow assessment decisions and action plans based on them. Two examples of those follow.

1. Program Outcome
   During a program peer review (2004), our outside reviewer suggested that we offered too many geology courses considering the small number of faculty. As a result of this comment departmental faculty reviewed the entire set of courses listed in the most recent catalog. We identified courses that met one or more of the following criteria: 1) the course had not been taught for many years; 2) was no longer required as part of any departmental concentration; 3) attracted very few students when offered in recent years; 4) the course's most important content could be included in another course; or 5) there no longer was a faculty member specialized in the content area.

   As a result of this study we identified 13 courses for which there was general agreement that the courses could be eliminated. In fact, the elimination of those courses should allow the department to offer a few required or otherwise more important courses on a more frequent basis. As a result those 13 courses were eliminated from the curriculum during the 2004-2005 academic year. Overall, we believe that our program was strengthened by this action.

   Our departmental deliberations on this subject identified a few other courses that met some the criteria, although faculty were more divided on the efficacy of eliminating these courses. We will continue to discuss possible action on these courses. Also, it became clear during these discussions that any addition of a new course in our curriculum might have to be accompanied by the elimination of another extant course.

2. Student Learning Outcome Specific to Individual Concentrations
   We have seven years of scores from the ACAT exam, which is a national exam that measures student knowledge in nine subdiscipline areas. Results of that exam for the period 2000-2005 are shown on the next page.

   We expect that graduating seniors will meet or exceed the average for their total scores and for each score on the nine subdiscipline areas. For many years we were pleased with the results of our graduating seniors on this exam. However, the graduates from the year 2004 showed, on the average, a steep decline from previous years. We attributed this to a number of potential factors, and we have taken two steps that we hope will stem this decline in scores. First, we determined that there was a possibility that some students had taken a nonchalant attitude about the exam. Therefore, the departmental Chair will impress upon the students who take the exam each year that it is important and, therefore, that each student should make the best performance that is possible on the exam. Secondly, we realized that some of our majors in our newer concentration areas no longer received the coursework necessary to be competitive on this exam, which is specifically for traditional geology majors. As a result we have changed the name of our degree program from a B.S. in Geology to a B.S. in Geosciences. Geology majors are now expected to meet or exceed the national average in all nine areas. Environmental geology majors are expected to meet or exceed the national average on at least five of the nine subdiscipline areas. We
recognized that Geographical Information Systems (GIS) majors were no longer taking enough geology courses to allow them to be competitive on this exam. Therefore, we are now looking for an alternative exam that will compare our graduates with a cohort that would have a similar group of skills and discipline knowledge that would be expected of graduates in this concentration area. So far we have been unable to identify such an exam, and we are still searching.

We also use scores in each area to identify subdisciplines in which our graduates appear to be weak. For instance, the one area that our students are slightly below national norms is historical geology (average = stanine 4.9) We have recently taken steps to add historical geology content to some of the courses that our GEO majors are required to take.

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Scores are stanine, Total % scores are percentile