

Department of Geosciences – Weber State University  
Regents External Review

**STANDARD A. MISSION STATEMENT**

The Department of Geosciences has a well-defined mission statement that is appropriate for a modern geoscience department. The Mission Statement articulates the expected outcomes of the program, clearly defines educational programs, and is compatible with the broader goals of Weber State University. The Mission statement emphasizes field studies and this is clearly a strong part of the program.

**STANDARD B. CURRICULUM**

The Department of Geosciences offers degrees in Geology, Applied Environmental Geosciences, and Earth Science Teaching. Minors are also offered in Geology, Geospatial Analysis, and Earth Science Teaching, and a certificate is offered in Geomatics. The 2008 review team considered the following elements of the curriculum.

1. The present curriculum is clearly the result of thoughtful and careful planning. It has been reviewed frequently, and is consistent with similar high-quality geoscience programs in the United States. Its emphasis on field studies, and geomatics are particular strengths.
2. The curriculum is generally consistent with the program's mission. However, the review team notes that the lack of calculus as a requirement is somewhat inconsistent with the goal of having students seek advanced (graduate) training. Nevertheless, it is recognized that requiring calculus is likely to create a barrier for some students that may lead to a reduced number of majors and that majors planning to attend graduate school are strongly advised to take calculus. Some programs have adopted a strategy of offering both a B.A. and a B.S. depending on the language and math requirements. The Department of Geoscience might consider a similar (or other creative) approach to help assure that upon graduation majors are fully prepared for graduate studies should they choose this course.
3. The curriculum clearly takes advantage of available resources and it appears that existing resources are adequate for a modern program. Nevertheless, (and as noted in other parts of the document), the maintenance of these resources places a very heavy demand on faculty that otherwise already have heavy loads.
4. Courses that support the major/minor/general education/service programs are offered on a regular basis and it does not appear that course offerings become an obstacle to graduation.

Overall, the review team feels that the curriculum is excellent and on par with other outstanding geoscience programs in the United States.

**STANDARD C – STUDENT LEARNING OUTCOMES AND ASSESMENT**

The department has clear learning outcomes that are closely tied to the department's curriculum. It should be noted that outcomes for physical science (including geoscience) general-education courses, were developed by a university-level committee with departmental representation. These outcomes appear to be an excellent fit with departmental goals for their general education courses.

Department of Geosciences – Weber State University  
Regents External Review

Outcomes assessment by the department is adequate and typical of the WSU College of Science. The department conducts exit interviews with all graduates. Samples of student work from lower- and upper-division courses are evaluated on a regular basis.

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The committee recommends extending the assessment of the curriculum to recent graduates after they have joined the professional workforce. The department has made efforts to adjust the applied curriculum based on the regional job market. *Therefore, assessment of the curriculum by recent graduates working in the region could be a valuable tool for informing any curricular changes.*

#### **STANDARD D- ACADEMIC ADVISING**

In meeting with the majors, the committee was impressed that the students were very well informed about their options after graduation. In particular, the students were aware of the importance of calculus (an elective in the department) to pursue on graduate study in the field. *The committee sees the advising of majors as a strength of the department, and an important part of the close student-faculty interaction in the department.*

The committee did not meet with any students pursuing a BIS degree or a geosciences minor and did not evaluate the advising within those programs.

#### **STANDARD E. Faculty**

The faculty in Geosciences at Weber State University represent the very core of the program and are one of the departments strongest assets. The department currently has 6 full time faculty, all with terminal degrees in their disciplines, and 3 part time adjunct instructors. The faculty are experienced and dedicated teachers, and most of the faculty maintain active research programs that involve undergraduates. The core faculty are sufficient to provide long term stability to the program and have excelled in extending the program into new areas to meet student demand (e.g., distance education, geographic information systems, applied geosciences).

Teaching is systematically monitored by the department chair to assess faculty effectiveness, and this process is modified periodically to reflect improvements in assessment techniques and changing student demographics. In addition, all faculty are evaluated annually by the department chair to assess their effectiveness relative to their assigned roles in teaching, research, and service as part of a standardized faculty review process. Results are then reviewed by the Dean, in consultation with the department chair. New faculty are mentored by existing faculty and processes are in place to determine appropriate teaching loads and course assignments, with teaching assignments made by consultation between the chair and faculty. Adjunct faculty all have long-term associations with the department so their performance is well-established and monitored by the department chair annually along with other program faculty.

Faculty have been proactive in the creation of and delivery of innovative and effective instruction methods, including pioneering work (for WSU) in the development of online classes and distance delivery. The department's Geospatial and Applied Environmental Research (GEAR) laboratory is another example of innovative instructional methodology used by several courses and across disciplines. This lab reproduces situations that might be encountered in actual workplace settings and is one of the strongest components of their instructional program.

Department of Geosciences – Weber State University  
Regents External Review

The department provides funds for professional development and travel (one meeting per year if presenting), with additional funds available through the Research, Scholarship, and Professional Growth Committee, and from external grants. Each faculty has a research space. Faculty can also apply for sabbaticals, subject to administrative approval. Almost all faculty are active in research, much of it funded by external agencies such as NSF, the BLM, the National Park Service, and the National Forest Service. This research has resulted in 38 peer-reviewed publications over the last 5 years, as well as 41 abstracts for regional or national professional meetings. Undergraduate research is incorporated into most of this research and has resulted in several papers and abstracts with student co-authors. Their success in research is especially laudable given their standard teaching loads.

Some concern was expressed that the number of sections of some general education service courses was excessive and restricted the ability of faculty to teach majors-oriented courses as often as needed. The review panel suggested that this situation could be alleviated by a slight reduction in the number of course sections, accompanied by a slight increase in the enrollment limits in each section.

The primary concern of the review panel was the lack of program support in several key areas (addressed below) that have a severe detrimental impact on program faculty. The lack of key personnel in the area of Information Technology and computer support has resulted in one faculty member, who is an untenured assistant professor, being forced to take on the role IT tech support for the GEAR laboratory. This junior faculty member is critical to the Geoscience program's continued success, but his future success is being jeopardized by a service role that is inconsistent with his faculty role. A continuation of this situation could have serious negative impacts on this faculty member's tenure prospects and retention. Concern for the success of junior faculty is especially pointed in a department where most of the faculty are senior full professors, because the future health of the department will depend on the successful recruitment and nurturing of junior faculty. The review panel views the need for IT and lab support as critical and strongly recommends that steps be taken to alleviate this situation within the next fiscal year.

As members of the Geoscience faculty approach retirement age, the department needs to address proactively the question of what direction the program wants or needs to move in, and how these new hires will impact the strategic vision for the future.

**STANDARD F. Program Support**

The facilities, equipment, and library resources are adequate to meet the needs of the program, and in some cases (e.g., the GEAR lab) the facilities are exemplary. The GEAR laboratory includes 15 computers, a server, 2 laser printers, 1 large-format printer, digitizing tablet, site licenses for industry standard ESRI ArcGIS and Leica Geosystems ERDAS Imagine software, and other software (including MODFLOW). The petrography and paleo labs are well-equipped and organized, with 8 new petrographic microscopes and 10 older petrographic microscopes, an automated point counting system, 15 binocular scopes, and a petrographic display system for teaching, with high resolution color video camera, computer, high resolution display device, and software.

Department of Geosciences – Weber State University  
Regents External Review

The department maintains an education water well field that is used by both the University of Utah and Utah State University, with 5 wells, water pump, piezometers, water sampling equipment, water chemistry equipment (probes, spectrophotometers, and chemicals), permeameters, and groundwater flow analog model. It also maintains a meteorological station, a seismograph station, and a range of surveying and field equipment (1 total station, 2 leveling transits, 6 field GPS units and 6 higher precision (2- to 5-m) GPS units with PDAs and ArcPad for recording and plotting data in the field, 2 GPS receivers and base station with 1 m precision, field laptop computer, soil auger and sampling equipment, Brunton compasses, stereoscopes, and high resolution digital cameras). In addition, the Geoscience program shares an Atomic Force Microscope, obtained jointly with Physics from NSF Instrumentation grant.

In general, the physical plant resources are currently adequate, although the Science Lab building is showing signs of aging. The department has two multimedia classrooms and a portable projector and computer for multimedia presentations in other classrooms, and good research lab space that is separate from the teaching laboratory space.

The library has obtained licensing for electronic (online) access to a wide range of Elsevier geosciences journals, which now the preferred method for accessing recently published scientific papers. Geoscience data base search engines, such as GeoRef, are available and an excellent interlibrary loan system (Illiad) is in place.

The review panels primary concern for program support lies in the area of staff support for program faculty and facilities. The department currently has one half-time staff assistant (secretary) to assist the chair with clerical work, but the department has no one (aside from the head) to manage the department budget and monitor expenditures. The panel deems this inadequate to a department of this size and recommends a transition to a full-time staff assistant who can monitor the budget and department accounts, as well as carry out basic clerical functions. The department has the need for additional personnel in two other areas:

1. Information Technology/Computer Specialist Technician: The Geoscience program has critical need for an IT/computer technician who can maintain departmental computer resources. This is especially critical for success of the GEAR lab. Currently these computer resources are being maintained by an untenured assistant professor, but this is not part of his faculty role and is detrimental to his success. The IT/computer tech is not needed full-time in Geosciences, and could be shared with other departments that have similar needs (e.g., Physics). The review panel recommends creation of a IT position that can address the needs of Geoscience., as well as other programs in the College of Science.
2. Lab coordinator/Instructor: The Geoscience program needs a formal lab coordinator-instructor to relieve teaching pressures in the lower division service courses. Increasing enrollments in introductory labs have reached the point where additional lab sections must be offered to meet demand. While it is possible to increase enrollment in the lecture sections of these courses with minimal impact on teaching loads, the time required for additional laboratory sections is prohibitive for faculty.

Department of Geosciences – Weber State University  
Regents External Review

The review panel recommends that the hiring of a IT/computer technician be moved to the highest priority for the next fiscal year; this person would also be able to assist in college wide IT support. The lab coordinator and full-time staff assistant positions should be addressed as soon as feasible, with the order chosen in consultation with the department chair to address their most pressing needs first.

**STANDARD G. RELATIONSHIPS WITH EXTERNAL COMMUNITIES**

The Department of Geosciences well fulfills Standards G.a (clearly defined relationships with external communities of interest), and G.b (demonstrated evidence of these relationships as contributing to the program). It appears that the department does not maintain an external advisory committee (Standard G.c), and *the 2008 Review Team recommends that an external advisory committee be constructed*. The committee might draw its membership from department graduates, industry representatives, local, state, and federal agencies, earth science public education teachers, and perhaps geosciences faculty from other universities. *The department's relationships and demonstrable benefits of affiliating with external communities are well documented:*

- The department supports K-12 education in the community and is closely involved with the Center for Science and Math Education. Faculty have been actively involved with the Science Olympiad, science and engineering fairs, MESA program, giving lectures in the public schools, and offering summer workshops for in-service teachers.
- The department has extensive contacts with governmental agencies, including the Utah Geological Survey, U.S. Geological Survey, National Park Service, National Forest Service, Weber Basin Conservancy District, county, and city planning groups. They have also developed contacts with geotechnical firms, resulting in student internship and employment opportunities.
- They support GIS applications across the campus, including managing a site license for ArcGIS that is used by multiple programs. One faculty heads the local GIS Users Group and provides training sessions on GIS to interested faculty.
- Faculty are actively involved with professional organizations. One faculty is current National President of Sigma Gamma Epsilon, the national honor society for students in the Earth sciences.

**PROGRAM SUMMARY AND RESULTS FROM PREVIOUS PROGRAM REVIEW**

The previous review of the Department of Geosciences, conducted in 2002-03, identified the following Strengths, Challenges, and Recommendations. *Analysis of these three areas by the 2008 Review Team generated the following evaluations; those of greatest impact are italicized:*

**Strengths.**

1. *Faculty*. This is very clearly a well qualified, dedicated, productive, and collegial faculty, who ably balance teaching with research and service.
2. *Students*. The department's students enjoy success performing research, participating in internships, finding employment, and in graduate programs.

Department of Geosciences – Weber State University  
Regents External Review

3. **Curriculum.** The program well integrates traditional geology with geospatial analysis, environmental applications, close student-faculty interaction, numerous field experiences, modern technology, and laboratory work.

**Challenges.** The previous review identified several challenges that while addressed, were largely beyond the department's ability to adequately remedy.

1. **Staffing.** This is the single greatest challenge facing the department. Most department faculty teach full loads and often overload, pursue robust scholarship agendas, maintain considerable collections of lab. specimens and equipment, and lead field trips or direct field work and internships. On top of this, the faculty must do a considerable amount of busy work, wasting their time and expertise on administrative duties (secretarial paperwork), organizing lab. collections (getting out and putting away rocks, minerals, and fossils), and maintaining computers (hardware, software, printers, I.T.). This is especially glaring in the GEAR lab.
2. **Space.** While not abundant, The Review Team deemed the department's space as currently adequate. However any future growth in faculty or staff positions, or acquisition of major new equipment will require additional space. Giving the time required to complete construction, priority should be given to planning and obtaining funding for Phase II of the Science Lab Building.
3. **Equipment and Maintenance.** As noted under staffing, while the department has successfully improved laboratory and teaching facilities with modern equipment and technology, the routine and time-consuming maintenance duties fall exclusively to faculty. Of particular importance is the need for consistent, high-quality computer support, which could be accomplished by hiring a college computer technician. Additionally, one faculty member often has to use his own vehicles to support field excursions and defray costs.

**Recommendations.** The department's responses to recommendations from the previous review are listed and commented upon below.

1. **Increase Staffing.** Fill temporarily frozen GIS position and obtain new lab instructor position. The department filled a tenure-track position in GIS with Dr. Michael Hernandez. Dr. Hernandez has successfully developed classes, collaborated with other programs, fostered ties with government and industry for student internships, won a campus site license for industry-standard GIS software, obtained new computer equipment, and been primarily responsible for maintaining the GEAR lab. As a junior faculty member, however, Dr. Hernandez's IT duties have limited research and writing time necessary for garnering tenure. All Geoscience faculty would be greatly assisted by hiring a IT/laboratory tech person and adding an instructor/lecturer position. Additionally, the Review Team recommends funding to hire a qualified, full-time office coordinator for the department of Geosciences.
2. **Explore effects of class scheduling on graduation.** The department continues to monitor and appropriately assess this recommendation, adjusting schedules to meet student requirements and expectations.
3. **Increase funding and development efforts.** Adequate and on-going grants, awards, and fundraising, while not voluminous, appear sufficient for the department's current needs.

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Department of Geosciences – Weber State University  
Regents External Review

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