

Review of the Department of Geoscience, UNLV

Prepared by

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The Process

The purpose of this review is to provide an external evaluation of the B.S. and M.S. degree programs presently offered in the Department of Geoscience at the University of Nevada, Las Vegas. Our on-site review was conducted March 8–10, 2009. Prior to our visit, we were provided with information about the Department, including its recent self-study report for the UNLV Faculty Senate Program Review Committee and another extensive report for NWCCU. During our on-site visit, we were also provided other useful documents such as examples of recent Geoscience Department newsletters. As active researchers in the fields of petrology (Anderson) and structural geology/tectonics (Snoke), both of us had considerable prior knowledge of research activities and other aspects of programs in the Department related to our fields. We were pleased to learn much more about the Department during our site visit.

During our visit, we toured departmental facilities, including the new Science and Engineering Building. We met with the faculty, at times in one-on-one sessions as well as in group settings. We also had meetings with groups of graduate students and, likewise, with undergraduate students. Our schedule provided opportunity to meet often with the Department Chair, **Dr. Michael L. Wells**, and gain his input to our questions. **Professor Eugene I. Smith** was our wonderful guide through the process, and he also was very helpful at providing insight. We met with several university administrators who offered oversight on the process and important feedback, including: **Dr. Wanda J. Taylor**, Interim Dean of the College of the Sciences; **Dr. Ron Smith**, Vice President for Research and Dean of the Graduate College; **Dr. Michael W. Bowers**, Senior Vice Associate Provost for Academic Affairs; and **Dr. Stanley D. Smith**, Associate Vice President for Research.

An Overview

We found the Department to be vibrantly active at all levels of teaching, research, and service. All of the Faculty of the Department of Geoscience have active research programs, and most faculty members have external funding to support these programs. Those faculty members who currently lack extra-mural funding are continuing to submit proposals to the NSF and other agencies in order to obtain funding for their research

projects as well as support for graduate/undergraduate students. We found the Faculty to be a collegial group that easily work together—willing to determine goals and to find means toward common objectives for continual improvement of the Department. Academic departments can have strong political factions or are otherwise dysfunctional, and we observed no evidence of such a situation in the Department of Geoscience. We found the Faculty to be very dedicated to both their teaching and research activities.

The Department of Geoscience at UNLV is fortunate to be situated in an exceptional natural laboratory, facilitating the study of a wide variety of fundamental geoscience problems in the environs, which surround Las Vegas. For decades, geoscientists from throughout the United States as well as the world have come to southern Nevada to study various geological features from stratigraphy and structural geology to the igneous rocks and landforms exquisitely exposed throughout the region. Furthermore, many fundamental geoscience-related problems, which face humankind in the 21st Century, are important issues in southern Nevada including: water availability and quality, seismic hazards, renewable energy and minerals resources, and effects of urbanization on the native environment/ecology. A strong program in the geosciences at UNLV provides a research basis for the study of these geological problems in concert with other State agencies and institutes as well as private industry. Furthermore, the Department of Geoscience provides critical training for undergraduate and graduate students who will eventually fill geoscience-based jobs, which presently have growing and future importance with regard to energy and environmental issues for the State of Nevada as well as the Nation.

Effective leadership by the Department Chair, Michael L. Wells, is an important strength in the Department. He has a clear vision on how shared faculty governance can move the Department to the next level of success. Faculty members and students appreciate his proactive and unselfish leadership. Also, Michael transmits a very positive view with regard to his Department and its potential future.

The Department strives to be connected to its alumni. One or two alumni newsletters are published each year. These publications highlight recent activities by the Department in general (e.g., Annual GeoSymposium) as well as the accomplishments of individual faculty members and students. Commonly profiles of graduate students are included in the newsletter. Such informative newsletters thus provide a communication network for potential employment opportunities for current students. Many Earth science departments nationwide offer less frequent communications to their former students and departmental friends.

Teaching by the Faculty is current to the field and importantly utilizes all forms of new technology available to the classroom. In its NWCCU self-report, the Department offers a clear assessment of its current program. Item #4. Description of Department Assessments Measures (p. 7) states: “By the end of the Geology program, students will: ...” and then provides substantial detail on what is expected of graduating undergraduate majors. It is a remarkable vision that both of us will take back to our own departments.

The Department has a strong record in placing its graduating students, undergraduate and graduate, toward that next step, be it in industry, graduate school, or

an academic position. For example, the continued recruitment by the ExxonMobil Corporation of graduates of the Department is a special and valuable relationship. This recruitment activity by a major energy company reflects well on the Faculty and their research and investment in their graduate students.

Almost all aspects of the metrics of evaluation of the Department are stable (M.S. program) or show significant growth, the latter including new undergraduate majors and Ph.D. students. However, the most remarkable area of growth over the past five years, has been in the area of external funding, mostly from competitive grants awarded to Geoscience faculty members. From 2002–3 to 2006–7, the increase has been over an order of magnitude. UNLV Geoscience Faculty clearly compete well for external sources of funding, including significant funds from the NSF, USGS, and other federal agencies. Such a success would not occur if the faculty members were not active in their fields and publishing their research work. Such activities are well documented in the self-study reports.

Detailed Observations and Comments

Through our review we found several issues, which require some discussion—some are minor, whereas others are more substantial.

Department Office Staffing

The Department of Geosciences has only 2.5 administrative staff positions, which is low and inappropriate given the size of the Department and the number of students. An additional full-time position is essential.

Teaching Classrooms and Laboratories

The Department should evaluate the adequacy of its teaching classrooms and laboratories and forward this study to the administration. Modern classroom and teaching-laboratory space are essential to the vitality of any geoscience department. In another section, we made recommendations that certain 100-level classes include a laboratory section. However, we are uncertain if the Department has sufficient facilities to implement this suggested change in the curriculum. In another section, we recommend that the Department have access to large lecture halls, including ones capable of holding 200 or more students.

Research Laboratories

The Geoscience Faculty has worked hard to build and support several high-quality research laboratories. These laboratories, all of which are very active with regard to research activities, are a notable achievement and are a proud aspect of the Department. The continued success of these laboratory facilities is strongly dependent on technical support in the form of State-funded laboratory technician positions. With the completion of the superb new laboratory facilities in the Science and Engineering Building, the continuation of adequate State-funded support for scientific technicians to

maintain these complex laboratories is essential. In turn, this investment could potentially lead to increased extra-mural research funding for faculty members in the Department of Geoscience. Adequate technical support for modern, high-tech research laboratories is clearly a sound investment for any growing research university.

Future Faculty Hiring

1. The Department lacks faculty positions in the area of geophysics. Although an adjunct faculty member covers part of the teaching and advisement in this field, this situation does not provide the opportunity for geophysics to be thoroughly integrated into either the undergraduate or graduate curriculum. Furthermore, geophysics is the most highly funded area of Earth science and is a growth area. Fundamentally, the Department needs a cluster hire of at least three geophysicists to develop a self-sustaining program in this discipline. A single hire will not be able to maintain a viable graduate program, although such a hire could provide more teaching breadth and research expertise in this important discipline. A nested group could potentially double the extramural funding of the Department. We base this judgment from experience in our own departments.
2. During our on-site visit, paleoclimatology was also mentioned as a potential discipline for a future hire in the Department. A new hire in this discipline could contribute enormously to the already existing strengths in surface processes, hydrology, sedimentary geology, and paleontology.

Graduate Students

The Department has a strong graduate-student program in spite of minimal University (State-level) support. We note two issues enumerated below (#1 and #2) that are beyond University control.

1. Graduate-student stipends at \$10–12K are simply noncompetitive with respect to other research universities (either public or private). Geoscience faculty members routinely use research-grant funds to augment the support of their graduate students, by raising the stipend to values in the \$14–20K range. Furthermore, there are apparently considerable fees and other expenses that are not covered by the graduate-student stipends. UNLV is developing into a very good research university, but it cannot raise its standings or compete with peer institutions under such circumstances.
2. The health plan offered to graduate students does not include hospitalization. If a student has an accident, significant illness, or pregnancy, they will have to drop out of the graduate program. Most peer institutions have addressed this issue over the past decade. UNLV needs to address this issue.
3. Due to space limitations, the Department cannot provide appropriate office space for all of its graduate students. This is a serious issue.
4. New graduate students lack support in their offer package to move to Las Vegas and do not receive their first pay until after the first month of employment. Given

that apartments require two rental payments upfront, this situation strikes us a significant financial burden on new graduate students moving to the Las Vegas area. Some peer institutions have dealt with this situation by offering a “signing bonus” or scholarship on the order of \$2K to make the transition to a new location.

5. The graduate students have expressed concern about the lack of 700-level classes. Our findings include that the Faculty face unusual demands to teach multiple sections of 100-level courses (see next comment below).
6. Graduate-student Teaching Assistants teaching 100-level courses find it difficult to teach labs for multiple sections of the same course taught by different instructors. We consider this to be a serious problem that can be solved by teaching just one section per class in a larger lecture hall. One of us (Anderson) regularly does this with a class with up to 240 students. He endeavors to learn the name and otherwise know every student. Teaching only one large section of 100-level class would free Geoscience Faculty to teach more classes, including those for graduate students.

Undergraduate Program

The Department of Geoscience has a strong undergraduate program. Unlike other peer research universities, these students are often older and take longer to complete the degree program (six, instead of four years) as many undergraduate students are working their way through college.

1. The interaction between undergraduate and graduate students needs to be increased. Although many of the undergraduate students are working, we judge it essential that more of them have a research experience to enable them to have an out-of-the-classroom experience with faculty mentors and graduate students. Peer research universities commonly offer special internal funding to underwrite some of the expenses associated with an undergraduate-student research experience.
2. The undergraduate program is hampered by the common need for waivers with regard to prerequisite courses. A review of this situation is needed and perhaps prerequisites should be modified. In this light, we ask why is “Principles of Stratigraphy and Sedimentation” taught at the 400-level rather than at the 200-level?
3. The lack of a required second semester of calculus for the Geology major is a shortcoming in the existing program and should be reconsidered during a comprehensive Faculty review of the undergraduate curriculum. Most graduate programs in the geosciences nationwide expect at least two semesters of calculus for incoming M.S. graduate students.
4. Apparently the low enrollment of students in the Environmental Geology major is in part related to the requirement of two semesters of calculus. Perhaps by changing the mathematics requirement for the Geology major will in turn lead to some growth in the Environmental Geology major. We find it curious that this

program has low enrollments, whereas other such programs are commonly a healthy component of many undergraduate geoscience programs on a national basis.

5. With regard to the present Environmental Geology major, could that degree be modified to “Environmental Geology/Hydrogeology” to include the obvious existing strength in hydrogeology in the Department.
6. The undergraduate students expressed concerns about changes in assigned advisors midway through their degree program. Such changes should be avoided to maintain continuity in advisement. Also, such changes in advisors disrupt the relationship between advisor and student, which is essential for letters of reference and other evaluative duties.
7. There is no undergraduate representative at Department faculty meetings. This situation can be easily solved and would provide representation of the undergraduate students at these important meetings.

GEOL/GEOG Courses

1. The Department offers a range of 100-level courses without labs, which are not gateways to the major. We suggest that several of these courses be offered with laboratory sections and be allowed as gateways to the major. Others could be discontinued unless they are regularly characterized by strong enrollments.
2. We suggest that GEOG 101/104 be dropped to allow the teaching of new gateway courses, such as Environmental Geology or Climate Change.
3. As noted above, the practice of teaching multiple lecture sections of the 100-level course should be eliminated in favor of teaching one large lecture section, capped at room capacity. The Department of Geoscience should have access to the University’s large lecture halls equal to that of other departments.