

Summarized Review and Assessment, 2007
Department of Geology, Kansas State University

1. Mission, Centrality, Uniqueness

The central mission of the Department of Geology is to bring to the students of Kansas State University, and thereby the residents of Kansas, the nation, and the world, an understanding of the earth we live upon, including its resources, its hazards, and especially our shared symbiotic relationship. To this end the department recognizes separate (but not independent) teaching, research, and service missions, which reach thousands of students each year.

It is worth noting that geology is unique among the natural sciences, in that it draws upon each of the others, including mathematics, and applies them to a comprehensive study of the earth. At the bachelor's degree level, our graduates have a basic concept of *all* the natural sciences, and of the concept of 'science' in general. They make thoughtful, well-informed citizens. At the master's degree level, students may specialize in areas such as geochemistry, geophysics, or geobiology, as well as 'mainstream' geology. At this level, our graduates are fully prepared to apply their education to a career track, or go on for a higher degree. This approach to education is a direct fulfillment of the land grant charge placed upon Kansas State University.

Research within the geology department is equally diverse, and because our faculty members are drawn from various parts of the nation and the globe, it has the cosmopolitan flavor necessary to make serious contributions to the worldwide body of knowledge. Another unique aspect of geology is that its research commonly involves studying and collecting from the earth itself, often at distant places. Students with such field experience are highly valued by major corporate employers, and contribute to the increasing demand for our graduates.

2. Degree Programs and Quality of Faculty

The Department of Geology offers a bachelor's degree (B.S. or B.A.) and a master's degree (M.S.) in geology. Both are strong programs. The bachelor's program provides a student with a core understanding of geology, supported by math, physics, and chemistry, as well as the opportunity to take a limited number of advanced courses toward a future career choice. In general, it is understood that the bachelor's degree is not a full preparation for a geology career, and that further study, or a professional training program such as those provided by some international corporations, will be needed. Our master's degree will provide the advanced education needed for a successful career in geology, or for additional study toward the Ph.D. degree.

The geology faculty has undergone several transitions in the past few years, with four members leaving for professional advancement, two retirements, and two recent hires. We expect to hire two persons this year, and two more the next, bringing our numbers up to 12 by the fall of 2009. It is also likely that two of those will be retiring within a few years more, and if they are replaced with new assistant professors, the department will have a nearly new face by 2012.

Aside from these expectations, the current faculty has an international reputation and a highly productive record. Every member presents his or her research at national or international meetings, and most have international colleagues or collaborators. Geologists tend to travel widely, and attract visitors to K-State. Our students benefit from interaction with such visitors, and sometimes travel themselves. Although research funding varies widely with the subdiscipline, geology faculty members have received substantial funding from sources such as the National Science Foundation, the United State Geological Survey, the Department of Defense, the National Park Service, the Petroleum Research Fund of the American Chemical Society, and the Kansas Department of Transportation.

Every member of the Geology faculty contributes to our teaching mission. Our standard teaching assignments include one freshman-level service course and one upper-level undergraduate, or graduate-level course each semester. Many of our faculty members teach more, especially when graduate students request a specialized course. Most of our faculty have received at least departmental recognition for quality teaching.

3. Quality of Students

Geology majors (those seeking bachelor's degrees) tend to be above average, largely due to the perceived rigor inherent in our supporting courses (calculus, physics, and chemistry). Over the past five years, our juniors and seniors have had ACT scores averaging around 24.

Another measure of the quality of our undergraduate majors is their dedication to the field, as evidenced by the high proportion that are members of Sigma Gamma Epsilon (the geology honor society), of Williston Geology Club, and the student chapters of several professional societies, including the Geological Society of America, the American Association of Petroleum Geologists, and the Society of Exploration Geologists, among others.

It could be argued that the best measure of success for our B.S./B.A. graduates is their success in obtaining employment in the geologic profession, and in moving on to graduate studies. In the past five years, approximately 40% have obtained satisfactory employment in the geosciences, and 60% have entered graduate programs, here or at other universities.

Graduate students in our department (those seeking the M.S. degree) must satisfy the requirements of the graduate school, which ensures that only the best qualified students will enter our program. Students in residence must complete a master's thesis, which demand critical thinking, creativity, extensive methodologies, and dedicated hard work for completion. Many of these are of publishable quality, and their presentations at meetings have led to several internships and job offers. Although most of our M.S. graduates accept career-track employment, many (7 of the past 18) of our recent graduates have enrolled at other universities (Arizona State, Boston University, Illinois, Michigan, and North Carolina, among others) to work toward the Ph.D.

4. Employer Demand

There is a critical, immediate need for geologists in such areas as environmental consulting, petroleum exploration, government regulating agencies, and geoscience education. As a consequence, our graduates are being offered very attractive salaries in some of these areas (in the range of \$60k for a B.S. geologist, \$80k for those with master's degrees). Students at K-State have a reputation as dedicated, well informed, and creative, and we have had a number of large companies recruiting at the department. Many small companies, often headed by our own alumni, also make offers, perhaps not as high, but with the comfort of working in this part of the world. There is no sign of this demand lessening in the next ten years; more likely it will intensify.

A very positive corollary to this demand is the interest displayed by some corporations in getting the geology department some advanced teaching tools, such as the workstations and industry-level computer software needed to process 3-D seismic data. Such donations have aided the department in making our geology and geophysics students especially attractive to the petroleum industry.

5. Service to the University and Society at Large

The Department of Geology makes a major contribution to the general education mission of the University. Our undergraduate service courses, including Earth in Action, Earth through Time, Geology Laboratory, Oceanography, Environmental Geology, and Natural Disasters, are all 100-level general education courses. Together, these courses enroll about 3000 students each year. Beyond this service to K-State, though, is the service to society and to the State of Kansas. Through these courses, mostly taken by non-majors, students learn about our planet and our place upon it, as well as gaining a general understanding of what science is all about. These students will leave K-State as better-informed citizens of their communities.

Faculty members of the geology department spend 20% of their time on service obligations, aside from teaching the courses mentioned above (nearly all our faculty teach sections of these courses). Among other things, we serve on departmental, college, and university committees. We also maintain memberships in professional societies, including serving on their committees, and as officers. We review manuscripts for various journals and books, review proposals for funding agencies, and maintain collaborative relationships with colleagues at other universities, national and international. As a land grant university, we are also expected to deal with members of the public. We spend many hours each

month identifying objects brought to us, and occasionally travel to various off-campus sites to identify something too large to carry here. Some of us have put in additional hours serving as judges at science fairs, rock and mineral shows, and the like. We also maintain display cases in our main hallway, which attract local school field trips and individuals interested in rare minerals. We provide guides to the displays when requested.

6. Cost Effectiveness

The Department of Geology is very cost-effective. Over the period of this review we taught an average of over 10,000 student credit hours per year. This should have brought tuition dollars to the university amounting to well over twice the department's total budget. In addition, externally funded research projects involving geology faculty members has averaged several hundreds of thousands annually, although much of this has been shared with other departments (and schools). Some of our most productive faculty members have left for better opportunities, but we are filling their positions with, hopefully, even more productive replacements. And all of our faculty member produce; some publish many small papers, and others publish fewer but more extensive papers. We all present research at meetings, and we encourage students to do the same. In all, the department's contribution to geologic knowledge is considerable.

We are also fortunate in having a group of highly supportive alumni, who over the past thirty years have contributed both funds and insight into the future directions of employment in geology, which together have been a significant force in improving the education of our students. In just the past few years, they have helped us renovate one of our teaching laboratories and purchased \$50k worth of microscopes. These benefits go far beyond any definition of cost effectiveness.