

**External Report
Department of Geology
Central Washington University
May 7, 2010**

This is the final report concerning an external examination of the Department of Geology at Central Washington University. Two sources of data were used to compile this report: a departmental self-study authored by the department Chair, Dr. Wendy Bohrson, and an on-site visit that occurred on April 8-9, 2010. The self-study included an excellent 50 page description of the department and 400 additional pages of supporting information including university strategic plans, catalog copy, alumni lists, faculty resumes, syllabi, and two MS theses. The on-site visit included meetings with three central administrators, every departmental faculty and staff member, graduate students, and undergraduate students as well as a tour of all facilities. Based on these data, I consider the CWU Geology Department to be a vibrant science department with many strengths and few challenges. These are explained in more detail below and followed by a summary of major points.

Undergraduate Curriculum

Undergraduate students at CWU can pursue four different degrees: the BA or BS in Geology, BA in Earth Science Teaching, or BS in Environmental Geological Sciences. Most students opt for the BS in Geology. Nearly all faculty participate in delivering the undergraduate courses and all spoke with enthusiasm about instructing.

The sequence of required and elective courses for UG degrees is typical of equivalent degrees at most universities in America. One exception is the lack of emphasis on GIS (Geographic Information Systems) training – in the past decade this tool has become widely used in earth sciences and many departments now require students to complete a GIS class for the BS degree. This training is also in demand by employers, so CWU students with a GIS class would compete better in the job market.

The sample syllabi provided for this review appeared thorough and complete – if typical of all courses, they are well-crafted and indicate the curriculum is strong. Undergraduate students report that mixed undergrad/grad classes provide an especially good educational experience because these classes are pitched at a higher level and the presence of graduate students increases the rigor of classes. While the undergraduate students I met may have been more motivated than the typical student, they clearly appreciate the opportunity to take challenging classes.

A few professors indicated that some 3xx classes are very difficult to teach, if they are filled with non-majors who have taken 0-1 geology classes as well as majors who have taken 4-5 geology classes. An example is the “Oceans” class which is filled with both majors and non-scientists. The Geology Chair may want to re-evaluate the objectives of such classes and consider whether one type of audience should be directed into alternative courses.

A few geology students mentioned that some prerequisites are insufficient or not enforced in their majors classes. This results in the instructor having to teach remedial material rather than the subject at the appropriate level. On a related note, two faculty members noted that students commonly wait until their senior year to take Calculus and

supporting sciences, though these subjects are needed before most upper division geology classes. Better advising, more effective communication, and enforced prerequisites could probably resolve this issue.

A related problem is the difficulty some undergraduate students have in scheduling their classes. Required upper division geology classes sometimes conflict with required math, chemistry, and physics classes, forcing the student to choose between them. If the student chooses the geology class, then the delay in taking supporting sciences eventually leads to a lack of prerequisites. If they choose the science class, their graduation may be delayed until the geology class is taught again. Two solutions to this conflict are to (a) be more flexible in the geology graduation requirements, such that upper division classes can more freely substitute for one another; and (b) offer more math/chemistry/physics classes during the summer.

According to the faculty, a number of geology majors have substandard writing skills. One solution proposed by the Chair is to create a new Geology class in scientific writing. Such a class would accomplish its goal but at the cost of using a Geology professor's time for teaching an (arguably non-science) course. A better use of time and skill sets might be to ask the English Department to teach Scientific Writing: it could increase English FTEs while giving the Geology professor more time to conduct research.

Graduate Curriculum

Graduate students at CWU can pursue a MS degree in Geology. A standard 60 credits including completion of a thesis is required to earn the degree. Graduate classes are mostly electives and their subject matter reflects the disciplinary strengths of the faculty. The range of offerings is appropriate for a department this size.

With regard to classes with both undergraduate and graduate student enrollment, a number of graduate students said these courses involve graduate-level instruction mixed with "busywork" that did not enhance their education. They felt the instructional pace was slowed by the presence of (some) undergrads. To better challenge both levels of students, faculty could (a) create distinct and more clearly defined expectations for undergraduate and graduate students, or (b) have graduate students attend a separate session that focuses on critical analysis of the subject.

Rather surprisingly, graduate students did not mention their graduate-only classes even once in an hour-long group discussion -- normally someone mentions a particularly difficult or entertaining class.

I reviewed the two MS thesis provided in the self-study and was impressed not only with their thoroughness and organization, but also their scientific insight. CWU should be proud that some of their students are producing work of this quality, comparable to that produced at the best research universities.

Faculty

The CWU Geology faculty includes ~8 tenured/tenure-track Geology faculty, 2 tenure-track faculty formally assigned to Science Education and Science Honors, and ~2.5 lecturers. During my visit they appeared well trained, passionate, and outspoken -- overall a very collegial faculty. The faculty includes more women than men, a characteristic quite rare in geosciences and one that indicates significant success in recruitment and retention.

Course evaluations indicate the faculty are successful in classroom instruction. Students have consistently ranked the classes and instructors “greater than 4” on a 5 point scale, yielding averages that perfectly match the college and university averages.

Faculty workloads are not strictly specified. The instructional load is about five classes per year, divided such that each faculty member has one quarter with no instructional assignments. This arrangement was widely praised by the faculty, for it gives them a block of time to complete research projects. Nationally, five classes/year is typical of teaching-intensive departments that are not expected to generate significant external funding. That several faculty do attract funding and regularly publish peer-reviewed papers is a testament to their personal motivation, organizational skills, and dedication.

There does not seem to be consistent agreement regarding the research goals of the department. The department consists of faculty who were initially trained as research scientists, and at some time in their careers each faculty member produced papers of such quantity and quality that the department overall earned a national reputation for research excellence. As indicated by their CVs, some faculty still publish regularly while others do not. The downward trend in publication rate was evident 6 years ago and identified as a major concern in the previous external review.

Overall, the department and university may want to re-assess the appropriate balance of time devoted to classroom instruction, thesis advising, research, service, and other faculty tasks. A collective emphasis on research productivity (as measured by external grants and peer-reviewed publications) would bring increased revenue and academic prestige to the university, but would require a general reduction in teaching loads and some additional resources allocated to the department. Alternatively, the department could accept the current workload balance practiced by each faculty member (which yields excellent results beyond research productivity) and merely ensure that each faculty member contributes to the collective instructional and research goals of the department. A well-formulated and flexible workload policy, though onerous to create and implement, could be used to better define departmental objectives and how each faculty member contributes to them. Assigning appropriate credit to classroom instruction, thesis advising, grants & contracts, publications, and professional service would not only document the cumulative achievements of each faculty member but also serve as a tool to modify workload balances as a function of faculty interest and productivity.

In addition to reduced teaching loads, there may be other ways to increase the collective research productivity of the department. Faculty CVs indicate that nearly everyone publishes abstracts and gives conference talks on an annual basis. Since even these brief activities take time to complete, faculty could consider minimizing these low-impact publications and instead spending time writing peer-reviewed journal articles. Faculty CVs also indicate that some external grants have not produced peer-reviewed papers – completing those papers before writing additional proposals would be a better way of sustaining research programs. Finally, the faculty includes some early-career scientists who, being fresh out of graduate school, have special skill in pursuing research. Giving them a partial release from other academic tasks would give them the time needed to develop a viable research program. And creating a formal mentoring system, with senior faculty assigned to assist untenured faculty, would more quickly show them how to become efficient multitasking professors.

PANGA

The department hosts a federally funded laboratory, PANGA, that monitors crustal movements in the Pacific Northwest as measured by Global Positioning System (GPS) technology. Lab personnel install and maintain the GPS network, process the data, and publish it daily via the Web. This lab brings international recognition to CWU as well as significant external funding that generates a large amount of indirect costs for the university. Still, it seems an under-utilized resource within the department. As they are the first to receive the vast amounts of data, this lab has the potential to leverage the monitoring task and become much more active in interpreting the data through student projects, post-doctoral studies, and faculty research. If the department is looking for ways to enhance their collective productivity, the PANGA lab is an obvious area of emphasis.

Facilities

The geology department is currently designing a new building to house their entire operations. This major improvement would alleviate two significant challenges associated with the existing facilities. First, due to growth over the past decade, the department is currently divided into two non-adjacent buildings, creating a faculty schism that permeates all departmental activities. The loss of synergy between the two disparate units has a negative impact on teaching, research, and the strategic vision. Second, much of the existing space is antiquated and ill-suited to hosting a science department. Faculty offices and some classrooms appear satisfactory but student offices, storage, and especially research labs fill spaces that are too small, randomly arranged, or mislocated within the building. Geology has done the best they can to accommodate lab expansion associated with growth, but they are past due for a well-organized facility that brings them into the 21st Century.

I have two suggestions regarding the new building. First, the total space allocated to Geology should be ~25% greater than what they currently use. This would alleviate overcrowding in the current classrooms, labs, and offices and allow for expected faculty/student expansion. With the additional space savings realized through more efficient use of the square footage, the new building should serve the Geology department for 20 years. Second, the department might consider including a dedicated computer lab with ~20 workstations, so that research productivity of graduate students and seniors is not restricted. In fact, the department might consider adding a computer lab to their current facility, rather than waiting 5 years for the new building. External funding (e.g. NSF) may be available to fund the purchase of workstations.

Budget

A persistent comment from all faculty and graduate students concerns the graduate TA and RA stipend. At \$900 per month, this stipend is 55-85% of those paid at 15 comparable geology departments in the northern Rocky Mountains (my personal survey, 2009). Potential graduate students (especially the good ones) will preferentially choose the higher stipend at other schools, and if they do chose CWU some students apparently end up using federal assistance (food stamps) to make ends meet. As good graduate students are critical to research productivity, it makes financial sense to increase the graduate stipend to a competitive level. At the very least, increase the RA stipend associated with externally

funded grants to a competitive rate of \$1200 per month (or more), which would not cost CWU any state-appropriated dollars.

A second suggestion pertains to class and laboratory fees. This fee is controversial: it generates revenues for the department but hurts the student, since it's an education tax unrecognized by FAFSA or external grant awards. Many universities now use these fees to compensate for reduced state appropriations. Class and lab fees in CWU Geology are currently low, and I hope they remain so. But with rising costs and reduced appropriations, the department should monitor the fees and raise them as required. Just as important, CWU central administration needs to respond more rapidly to requests for fee changes – instituting fee requests takes about 6 months at most schools, not longer, allowing a rapid response to abrupt fluctuations in state revenue or class-related costs.

External Relations

Geology faculty and students interface with numerous constituencies beyond the department. Within the university, the department receives administrative support from offices like the College Dean, Graduate School, Financial Services, Transportation, and Maintenance. Working relations appear good enough to accomplish most tasks but several examples of inefficiency or poor communication were mentioned. Two examples include: numerous forms that require excessive signatures, such as the Provost's on Travel Requests, and a slow response by Purchasing and Facilities in outfitting a new research lab or buying computers. Improving the Customer Service provided to this department (and others?) would make CWU a more efficient, cost-effective organization.

Beyond the university, the department interacts with the regional community, the professional community, and alumni. Several faculty have ongoing research projects that will potentially improve the quality of life for nearby cities and counties. Faculty and students attend numerous professional meetings where their presentations help raise the research profile of CWU. Students praised the faculty's efforts to attract potential employers and help them find jobs. And the department does an excellent job of tracking its alumni and reminding them that they are still members of the departmental community. Overall, this department seems unusually adept at external relations beyond the university.

Summary

Students spoke highly of their education experience and especially praised the personal relationships they develop with faculty. The culture of informality, mutual respect, and educational passion is impressive and one of the department's greatest strengths. Other strengths include a well-trained and diverse faculty, the curriculum associated with all five degree programs, the quality of instruction, the research productivity of several professors, and the external relations with alumni and potential employers.

The department also faces several challenges. Chief amongst these is a need to consolidate the department into one building with an efficient room arrangement and modern research laboratories. This would not only provide the additional space needed for increased amounts of externally funded research, but also unify the faculty to preserve departmental collegiality.

Another challenge concerns research activities. Though the department collectively emphasizes research productivity and every faculty member has, at some time, obtained grants and published peer-reviewed papers, productivity over the past 5 years has varied

widely amongst the faculty. Insufficient time to complete research endeavors is the biggest challenge – with an assigned teaching load of ~5 classes/year, only the most motivated or efficient professors can make time to attract funding and publish papers on a regular basis. Given the academic prestige and indirect cost recovery associated with research, the central administration has at least two good reasons to facilitate more time for all Geology professors to conduct research. In addition, the department itself may want to assign workloads such that faculty have teaching assignments that vary inversely with research success. A clear but flexible workload policy that recognizes the value of both teaching accomplishments and research productivity (as measured by grants and peer-reviewed papers) would be a useful tool to allocate sufficient time for each activity.

A third significant challenge concerns graduate stipends. They are currently far below the stipends paid by competing schools making it difficult to attract most top-notch graduate students and, for the students who do matriculate, to afford living in Ellensburg. Raising stipends associated with external grants is an easy solution to part of this problem, while raising TA stipends will require additional funds or consolidation of existing TAs.

Other challenges are listed in the detailed analysis presented elsewhere in this report. Many of these can be resolved within the department by making minor changes to the curriculum, classes, and advising. Others may require additional resources or better working relations amongst units within the university.

I note that the two greatest challenges listed within this report (facilities and research time) were identified as two of three major concerns in the 2004 external report. While there has been progress on both issues, it is evident that institutional difficulties have prevented the Geology department and central administration from quickly resolving the challenges. Meanwhile, the faculty has matured and the field of geology has evolved. If CWU could take advantage of the flexibility associated with its relatively small size, it could keep pace with these changes and continue to host a strong, vibrant Geology Department.

Report submitted by

A handwritten signature in black ink that reads "David Rodgers". The signature is written in a cursive, flowing style.

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