

Small but Fierce

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We are by national standards a relatively small department: five tenured and tenure-track faculty, to grow to seven this year, plus three lecturers. Our specialties, by faculty member, include: geochemistry and experimental petrology; hydrology, geomorphology and fluid mechanics; igneous petrology and tectonics; paleoecology, sedimentology and ichnology; and environmental geochemistry. We have about 20 undergraduate students including several minors, and about 15 graduate students, two at the Ph.D. level. Our small size presents certain disadvantages. For example, we can offer only a limited breadth of courses to our students; and we do not have “critical mass” faculty groups as conventionally defined. But there are clear advantages, too. These center on our cohesiveness as a faculty-student community, a shared sense of our mission, and a clear vision for the future — compatible with the mission and vision of the College and University. I summarize these points below, notably as they pertain to our current efforts to grow an interdisciplinary graduate program while continuing to give ample attention to the quality of our undergraduate program, and in relation to faculty recruiting, and item that looms large in our identity. Suffice it to say, here, that in aiming at excellence we collectively agree that all cylinders have to be firing, at all times. As a small department within a university that places the quality bars quite high for both graduate and undergraduate education, we cannot afford otherwise. Oh... and we have our own version of critical mass.

Formerly the Department of Geology, we officially became *Earth and Environmental Sciences (EES)* in September 2004, a change set in motion several years ago following an external review of the Department by a blue-ribbon panel of scholars. This change was in part a reaction to the same issues — enrollments, visibility, an evolving scope of our science — prompting departments across the nation to consider changing their names. But most importantly, *EES* correctly reflects who we are, where we are aimed, and how we fit within the University. Specifically, our vision starts with the idea that Earth science in the 21st century involves engaging a strong, balanced presence both in the past (the interpretation of Earth’s dynamic history) and in the present (modeling processes in modern Earth and environmental systems). This view derives from the recognition that, among the natural sciences, ours is the quintessential interdisciplinary science, providing vital perspective on how Earth’s physicochemical template — involving processes whose range of operative timescales is second only to cosmology — simultaneously sustains and threatens life, and influences human interactions with Earth. *EES* therefore is committed to nurturing student interests spanning traditional and emerging Earth-science fields, emphasizing unifying themes and tools in the study of Earth and environmental dynamics. We are aimed at educating students wherein they gain both essential depth in their studies, and exposure to ideas and skills that facilitate communication across disciplines, such that they are poised to excel in a diversity of life opportunities in all sectors of society. Moreover, this vision permeates all aspects of how we do business, from recruiting new faculty, to the design and revision of courses and curriculum, to our mentoring of students at all levels.

Vanderbilt University is currently pursuing to two goals that bear on our department mission and future. First, the University is investing significant energy and resources toward strengthening a cross-disciplinary culture on campus. This includes substantial seed funding for interdisciplinary

centers that bring faculty and students together from traditional departments and programs, colleges and professional schools, aimed at nurturing critical, emerging educational and research opportunities that cross traditional boundaries. Second, the University is aimed at significantly strengthening the research and graduate education component of its mission. (The University is ranked 25th in the nation in external funding, and 5th in the nation in external funding per faculty; all faculty in *EES* are currently funded by NSF.) For us these themes translate most notably to our recent entering of a one-of-a-kind educational alliance with the Department of Civil and Environmental Engineering, wherein we are jointly offering a Ph.D. program in *Environmental Science* aimed at excellence in research and graduate education in emerging areas of national priority. (*EES* historically has offered the M.S. as its highest degree.) A key element of this program is centered on Earth surface and subsurface system dynamics involving the intersection of engineering and geological timescales — a direct manifestation of the vision described above (<http://sitemason.vanderbilt.edu/ees/GraduateProginEnvironmentalSci>).

An important, parallel change at the undergraduate level includes the centering of the administration of individualized majors and minors involving environmental themes, available to students in the College of Arts and Science, out of our department. This change is aimed at increasing the visibility of this option as well as maintaining consistency in the supervision of students enrolled in this option. Simultaneously, the College has recently revised its general education curriculum. Whereas this does not directly affect our own majors curriculum, it does open certain opportunities to develop courses that are aimed at exposing freshmen and sophomores to particularly compelling topics in the Earth and environmental sciences. Nonetheless, an ongoing challenge that we face is maintaining the needed balance and intensity in our efforts in the context of a small science department where demands on the time of all its members are necessarily, continuously high in relation to sustaining essential activities in all areas of our mission.

Central to our departmental identity is the makeup of the faculty — our specialties, the courses we offer, our level of engagement in department, university and professional activities. And, fundamentally underlying this makeup is our recruiting effort. Adding one new member to our small faculty (or in the example of this year, adding two new members) can have a very significant impact on all aspects of the department, including its collective temperament. It is therefore no surprise that our faculty possesses a heightened sense of responsibility to identify and recruit the right individuals — and we do this very effectively. Our recruiting efforts involve the full faculty at all stages (an advantage of our small size). We do considerable homework on individual candidates, including making use of recruiting services at professional meetings, and soliciting input from numerous individuals outside those listed as references by candidates. Our deliberations are refreshingly candid, and involve thorough, holistic assessments aimed at evaluating whether candidates have a balanced commitment to excellence in research and teaching, at both graduate and undergraduate levels, notably including non-majors. Our assessments are also holistic in relation to evaluating the potential for candidates to interact with current faculty and students; and whereas we do not necessarily expect collaborations among new and current faculty to occur, we definitely aim for individuals possessing a flare for intellectual engagement across fields and specialties. Moreover, a key element of this process is a *continuing* discussion of where we are aiming as a department as we consider candidate specialties.

In addition to recruiting individuals who will likely excel within our program, our attention to the potential for intellectual engagement is particularly important, as this is part of an explicit strategy to artificially grow the (intellectual) size of our program. Using our current faculty as an example, each of us collaborates with at least one other faculty member in the department, and several of us collaborate with faculty in other departments. This involves Co-PI research projects,

student thesis projects wherein two or more faculty members are actively helping in the design and implementation of the project, or similar collaborations involving unfunded, exploratory projects. In addition, we have a nice departmental culture that aims to involve our students (both graduate and undergraduate) in work with our collaborators around the nation and internationally, sometimes involving student travel to the labs and field sites of these colleagues as well visits by these colleagues to Vanderbilt. These collaborations, within and outside the department, thus have the form of faculty-student working groups that evolve over time. In effect, this is our version of achieving “critical mass” in certain areas; and it has the very nice effect of teaching, by example, desirable (collaborative) research habits and skills.

So what, in summary, are our current challenges? Our immediate agenda includes growing the department with new faculty hires and student recruiting, and instituting our interdisciplinary Ph.D. program with Civil and Environmental Engineering — a challenge that requires maintaining a solid Earth-systems perspective in the curriculum while broadening student training to nurture effective communication with other disciplines. Our challenge also involves balancing this growth in graduate education with continued care given to quality undergraduate education. Our success rests on maintaining a shared sense of our mission and an intellectual setting where ideas, and individuals, thrive.