

Rebuilding an undergraduate program

or

Career preparation starts with recruitment

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Some background:

After several years of declining enrollment in the undergraduate major, the Department of Geological and Environmental Sciences decided to create a new staff position, an **Undergraduate Program Coordinator** (UPC), and the first person was hired in 2001.

This person has several roles and responsibilities:

- Promoting the major and **recruiting** students
- **Advising** students within the major
- **Directing** the summer undergraduate research program
- **Teaching** the main intro class (GES 1 Dynamic Earth) and the senior seminar (GES 150 Issues in the Earth Sciences)

We are now in the 6th year of this position (my third year), and the number of majors has rebounded significantly, though not to the oft-cited “historic” levels.

Just as important, however, is that students who graduate with a GES degree have been successful in gaining admission to top graduate schools and finding employment where they use their scientific background, and the majority of recent graduates are pursuing careers within the discipline.

The strategies that have brought students into the major have also served the purpose of preparing them for a career in the geosciences.



Students on a recent field trip to the Owens Valley, astride a dead tree at Horseshoe Lake. A record 22 students signed up for the trip - several of whom were undeclared freshmen and three who were experienced seniors in the major. Two freshmen have now declared based on their experience on the trip, and the seniors acted as TAs, taking on more responsibility for trip logistics.

photo by Anne Egger

Undergraduate Research Program

An authentic research process

Step 1. Proposal submission

Students write proposals, including budget, in conjunction with a faculty member and/or graduate student. Proposals are reviewed by UPC largely for the nature of the project and commitment of the faculty member/graduate student. Funding notices are made prior to spring break.

Step 2. Background research, proposal revision

During spring quarter, students conduct background research (some enroll in directed reading units with faculty advisor), rewrite proposals to reflect background research, and present their planned research to their cohort.

Step 3. Summer research

Students spend up to 10 weeks working full time on their research projects, becoming part of research group. Some conduct field work, some are in a lab all summer. As a group, they attend a weekly seminar where faculty who mentor students give short research presentations.

Step 4. Presentation

Students prepare a poster for the campus-wide Symposium for Undergraduate Research and Public Service (SURPS) and give an oral presentation in the departmental brown bag seminar. Several poster-making workshops help students create an effective poster.

The numbers

2006	16
Fr	3
So	7
Jr	3
Sr	3
2005	13
Fr	0
So	4
Jr	8
Sr	1
2004	11
Fr	1
So	2
Jr	8
Sr	0



Freshman Anna Aziz presents her research on Cambodian groundwater to students at SURPS in October 2006.

photo by Anne Egger

CAREER BENEFITS

Undergraduate students

- Motivation to learn more, take additional classes
- Authentic research experience prepares them for graduate school
- Research ability also attractive to employers
- Potential for publication
- Often make connections with other scientists at USGS or nearby universities

Graduate students

- Gain experience mentoring in preparation for faculty career
- Add component to thesis work

Capstone courses: Writing and field research

Two required core courses

GES 190 Field Research

Stanford ran its own field camp from 1896 until 1996, when it was cancelled due to lack of students and cost. We sent students to other field camps for ten years, but have recently developed what we think is a solution.

- Two-week field courses taught by a variety of faculty
- Involves real research problems - after field work, students compile data and write report or make poster
- Credit assigned during spring or fall quarter - no additional tuition
- Students complete three to graduate
- Diversity of topics gives students exposure to a variety of field techniques, including geophysical methods and other digital mapping techniques

GES 150 Issues in the Earth Sciences: A Senior Seminar

Stanford University has a Writing-in-the-Major requirement which every department must offer for their students. In 2005, we developed a single course to serve this purpose as well as provide a capstone, community experience for students who may have diverged widely in research interests and classes.

- Winter quarter seminar for seniors
- Students choose topics to research, present (including leading a discussion), and write a 15-page paper
- Instructors introduce topics about reading, researching, writing, and presenting well
- Significant peer review at all stages
- Brings students back together near the end of their undergraduate careers - we all learn from each other



Sophomore Annie Scofield and junior Christina Contreras mapping in the summer of 2006 in the Warner Range, NE CA.

photo by Anne Egger

CAREER BENEFITS

Undergraduate students

- Learn to describe research effectively and concisely
- Learn more about diversity of earth sciences by interacting with other students
- Gain familiarity with library research and field research, evaluating quality of sources

Graduate students

- Field experience for new graduate students who may not have had field camp
- Gain experience planning and running field camp

Building community: Field trips, social events

GES 191 Field trips

In addition to the more intense field research course, we also offer a 1-unit, CR/NC field trip class, which is a catch-all designation for field trips that are organized during Thanksgiving Break, Spring Break, or during the summer. These are open to all students in the School of Earth Sciences, as well as prospective majors, and are led by a variety of people.



Students at Badwater, Death Valley, over Spring Break 2006. It was a very windy day.

photo by Anne Egger

CAREER BENEFITS

Undergraduate students

- Exposure to a wide variety of field areas
- Learn more about diversity of earth sciences by interacting with other students from other departments
- Build network of peers and mentors - vertically and horizontally integrated groups interacting in informal settings