



Creating a New Tradition at a Non-Traditional School

Silicon Valley surrounds the campus, but for students at San Jose State University, the educational road to a high-tech career can be full of detours and dead ends. A new initiative to improve undergraduate biomedical education with the college's first HHMI grant is aimed at making that journey a little more direct.

"Our student population is non-traditional," says Julio G. Soto, an associate professor of biology and science education who will oversee the \$1.3 million HHMI grant. "We have older people going back to school or starting a second career. We have students working fulltime and going to school almost fulltime. We have a lot of immigrants or students who are the first in their families to go to college." San Jose State's 23,000 undergraduates—41 percent of whom are over age 29—represent every stripe of California's diversity rainbow.

The school has about 1,000 undergraduate biology students, including those who hope to work not only in the traditional health and research sciences but also in forensic labs, biotechnology companies, regulatory agencies, and science classrooms. The challenges for these students are formidable. Beyond language, time, and cost issues, many struggle to survive San Jose's large introductory survey courses. Lab time is so limited that students often come up short on the bench experience needed to pursue internships—or the connections needed to find them. Soto says almost all of the students need more time doing real research to understand how modern scientific inquiry works.

As a start, the San Jose State biology curriculum will be overhauled to make all classes more inquiry-based, more hands-on, and more multidisciplinary. Freshmen will get more research-directed labs, transfer students will take a summer course focused on local ecological problems, and biology majors will enroll in a yearlong, team-taught eukaryotic cell and molecular biology course tied to cancer biology. To fill current gaps in faculty expertise and expand opportunities for students, a bioinformatics specialist will be hired.

The grant will also fund 12 HHMI undergraduate research fellowships. The students will essentially live the research life for two years, joining a faculty mentor's lab to learn how to design, analyze, and write up experiments before traveling to scientific meetings to present results. Soto says the students could find themselves working on projects with

real life applications such as signaling pathways in cancer cells, insect biodiversity, the evolution of snake toxin genes, or Y chromosome analysis in DNA forensics.

To make better use of opportunities off campus, the HHMI grant will be used to set up a clearinghouse to match students with internships at government agencies, like the California Department of Fish and Game or local biotech companies. Twenty students will be picked for professional development coaching—how to polish a résumé, write an application, or ace an internship interview.

Soto is most excited about the on-campus research fellowships. The previous undergraduate research program was much too small, he explains. "We'd always get these great applicants. The hardest part for us was to decide who was going to participate. I always hated doing that part."