

## More Than Getting Your Feet Wet: SURF, the Summer Undergraduate

Research Fellowship Program

by Carolyn Ash

**T**his summer Caltech's SURF program celebrated its 25th birthday! Even the original founders of the Summer Undergraduate Research Fellowships had no idea of the phenomenal success the program was going to enjoy. Founded in 1979 by then-professor of chem-

soned mentors. Students experience the process of research as a creative intellectual activity and gain a more realistic view of the opportunities and demands of a professional research career. After collaboration with potential mentors, students write research proposals. A faculty committee reviews the proposals

the unparalleled opportunity to probe nature's secrets or to create new devices or processes. Participants begin to learn the language and concepts of their disciplines. Their research roots develop in the environment of inquiry, analysis, and scientific ethics. The joys and struggles of solving new



ical engineering Fred Shair, with 18 students and 17 faculty, SURF has served over 3,440 students and has become a model for similar programs at universities throughout this country and abroad. This summer 440 students, including 192 from other institutions, participated in SURF. Today, 48% of all living Caltech alumni who received their bachelor's degree from the Institute since 1980 have done SURF projects. Close to 20% of SURF students become co-authors of peer-reviewed articles, present at conferences, or contribute to significant technical reports.

Modeled on the grant-seeking process, the SURF program introduces undergraduate students to research under the guidance of sea-

and awards are made on the basis of reviewer recommendation.

Students awarded SURFs carry out their projects during ten weeks in the summer. At the conclusion of the summer, participants submit technical papers and give oral presentations at SURF Seminar Day, a symposium patterned after professional technical meetings. As with any fellowship, students receive a stipend; the stipend in 2003 was \$5,000 for the ten-week period.

President Baltimore writes, "I am proud of this program, which is one of the jewels in Caltech's crown. SURF helps to make Caltech a world leader in research and education." Through SURF, students join the community of researchers and scholars. They have

problems deepen their understanding of the process of science and engineering. Through their presentations on SURF Seminar Day, students are introduced to the importance and value of communicating their work.

SURF founder Fred Shair says, "SURF allows students to grow personally as well as professionally. An important aspect of SURF is the encouragement of each student to believe that she or he can accomplish tasks that others have not. SURF has strengthened the Caltech and JPL learning community, which is centered around bright and enthusiastic students being coached by mentors, graduate students and postdoctoral scholars, and alumni."

It has been noted that science and engineering not communicated are essentially science and engineering not done. The SURF communication requirements help students develop their oral and written presentation skills. Two donors to the SURF program endowed prizes to provide an incentive for students to prepare outstanding research reports. Ten years ago, Robert C. Perpall (BS '52 ME, MS '56 ME), endowed a prize in memory of his late wife, Doris S. Perpall, as an incentive for Caltech SURF students to give excellent oral presentations. Cash prizes of \$500, first place; \$300, second place; and

workshops addresses issues related to career options and preparation for graduate school. These workshops aim to help students develop their short-term career decisions in the context of long-term life and career goals. Weekly suppers at local restaurants allow faculty and students to interact informally. Each summer, students can attend the “behind the scenes” tour at the Huntington Library, Art Collections, and Botanical Gardens.

The essence of SURF is the mentor-protégé interaction. Serving as a mentor to a young scientist is an important role.

process. Students can bring a fresh perspective to the work because they have not developed biases about what should or should not happen, and they might ask the simple questions that are often overlooked when one has been immersed in the research for a long time.

Caltech alumni play many important roles in helping SURF to thrive. Aside from making donations large and small, alumni attend SURF Seminar Day (the third Saturday in October), and some even serve as session chairs for SURF Seminar Day. Alumni may attend informal suppers with SURF

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\$200, third place are awarded following a three-round event. Marcella Bonsall endowed the Marcella and Joel Bonsall prize for technical writing to encourage students to develop strong writing skills. Each year up to eight awards are made following a rigorous faculty review of SURF final reports nominated for the prize by SURF mentors. Students are giving much stronger presentations as a result of the competition established by these prizes.

To enhance the research experience, SURF students have the opportunity to attend many educational, professional, and social and cultural events. Weekly seminars given by Caltech faculty and JPL technical staff provide SURF students with an overview of research pursued on campus and at JPL. A series of professional development

Students are welcomed into the community of researchers and scholars as colleagues. Mentors pass on the nature and culture of science to the next generation and play a significant role in providing intellectual stimulation for their students. Mentors provide advice, make observations, and give feedback, often helping students to develop a career focus. Sometimes the relationships formed through scholarly collaboration last long after the student completes his or her degree and ultimately develop into strong professional interactions.

Mentors also benefit. They gain personal satisfaction from working with students. They often enjoy training the next generation, watching students mature intellectually, and knowing that they played an integral part in that

students arranged by the Alumni Association during the summer. They participate on the SURF Board and SURF Administrative Committee, and some make presentations at SURF’s professional development workshops. Alumni help judge student oral presentations. We welcome alumni participation in all forms, and encourage you to contact us if you’d like to get involved.   

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*The author, Carolyn Ash, is the Director of Student-Faculty Programs, which includes the SURF and MURF programs.*

For more information visit these websites:

[www.surf.caltech.edu](http://www.surf.caltech.edu)

[www.murf.caltech.edu](http://www.murf.caltech.edu)

[www.sfp.caltech.edu](http://www.sfp.caltech.edu)