

Transformative Experiential Learning and Career Advancement Experiences

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The Southern California Earthquake Center (SCEC) Office of Experiential Learning and Career Advancement (ELCA) is committed to investing in future earthquake scientists to meet current and future earthquake science challenges. Through its Internships and Transitions programs, ELCA provides research opportunities, networking, and resources to the SCEC community as a key strategy in effective student development, to encourage and sustain careers in STEM fields, and to support a diverse and inclusive geoscience pipeline.

ELCA's **Internships Program** provides meaningful research experiences to undergraduate students through their Summer Undergraduate Research Experience (SURE) and Undergraduate Studies in Earthquake Information Technology (UseIT) internships:

- Established in 1994, SURE has paired over 280 students with researchers at various SCEC institutions to provide hands-on summer research experience and expand student participation in the earth sciences and related disciplines. SURE interns have worked in a very wide variety of fields related to earthquake science, including paleoseismic field investigations, remote sensing, risk mitigation, seismic velocity modeling, effects of earthquakes on natural resources such as groundwater, science education, information technology, and earthquake engineering. Due to the success of the program and benefits to both the student and researchers, SURE expanded to include an academic year component in 2020.
- UseIT is an undergraduate research program that recruits students from institutions all over the nation, as well as students from local community and state colleges, to conduct research for 8 weeks at the SCEC UseIT Lab located at USC. Since its inception in 2002, over 350 students have participated in UseIT. A key aspect of the UseIT program is its flexible, yet structured, multidisciplinary team approach. The program's team-based, cross-disciplinary learning approach improves retention and prepares students to enter a complex, multi-disciplinary, interprofessional, global workforce. UseIT research teams span different STEM disciplines including earth sciences, computer science, engineering, physics, mathematics, geographic information science, and mathematics. The elements of the UseIT program that provide a meaningful and well-rounded research experiences include: (1) research activities are structured around a well designed research question (Grand Challenge) in earthquake science; (2) a focus on applying team-based learning by creating teams with diverse educational backgrounds; (3) structured multi-tiered mentoring that consists of faculty, researchers, graduate and undergraduate students; (4) the use of ongoing program feedback from students that is essential for mid-program

course correction; and (5) clearly defined goals and hard deadlines which are critical for the successful completion of individual activities and team activities. UseIT is a transformative experience where in 8 weeks students, most from underrepresented groups, discover that they can do real-world research.

All SCEC Interns are required to showcase their summer research at the SCEC Annual Meeting (SCECAM), and are supported to participate in other professional conferences such as SACNAS' National Diversity in STEM Conference, AGU's Virtual Poster Symposium, and the AGU Fall Meeting. Interns are given training to prepare them for understanding how to engage in a research conference, which is important so they develop a sense of identity and community within the geosciences. SCEC's summer research experiences are successful in recruiting and retaining students from underrepresented groups who are less likely to be exposed to geoscience.

ELCA's **Transitions Program** aims to foster the growth of a more capable and diverse STEM workforce. The program's research and workforce development initiatives provide students and early-career researchers (ECRs) support and resources in career development, research, and mentoring. Early-career events (i.e. SCECAM Breakfast Club and AGU's Early Career/Student Networking Luncheon) bring together students, postdocs, ECRs and senior researchers from academia and industry to share career experiences and advice to navigate critical career transitions. The Transitions program implemented Lightning Talks at the SCEC Annual Meeting to provide opportunities for ECRs to promote their research. To reach underrepresented groups that would otherwise not be exposed to geoscience pathways, SCEC Transitions co-chaired a session (in partnerships with UNAVCO) at the 2019 SACNAS' Diversity and Inclusion Conference to provide undergraduate and graduate students information about geoscience academic pathways and how to apply for geoscience internships, fellowships, and graduate programs. The all-women panel featured scientists from the Society of Latinxs/Hispanics in Earth and Space Science (SOLES) and the Cooperative Institute for Research in Environmental Sciences (CIRES) at the University of Colorado Boulder, and the United States Geological Survey (USGS).

The Transitions Program Student Research Travel Awards support students to present their research at scientific conferences. Presentations at a national level are important opportunities for graduate and undergraduate students to build their professional profile by presenting their own research, networking with active scholars at other institutions, and broadening their research and career interests. In its initial year, SCEC Transitions awarded 12 students with Research Travel Awards to support student presentations to the SCECAM and AGU Fall Meeting, where one of the Travel Awards recipients (a SCEC UseIT Alumnus) earned an AGU Outstanding Student Presenter Award.

Finally, the Transitions Program has spearheaded mentoring as one of the core components of experiential learning and career development. The Transitions mentor workshops are designed to enhance mentoring skills and relationships, particularly between faculty and students who have been traditionally underrepresented in STEM fields. The mentor workshops provide evidence-based, interactive mentor training curricula that engages mentors and mentees in collective problem solving and connects them with resources to optimize their mentoring practices.

SCEC's experiential learning and career advancement initiatives provide valuable educational experiences and career-development opportunities for the SCEC community. SCEC is uniquely positioned to forge the partnerships needed, with academic and industry professionals, to strengthen and support the geoscience pipeline.

In order to continue on the progress and successes, the next Earthquake Center should:

- Provide valuable research experiences for students that would otherwise not be exposed to geoscience education and career pathways
- Forge partnerships with academics and industry professionals to develop career development initiatives that support a STEM educated workforce
- Be dedicated to improving mentoring relationships by providing mentor/mentee trainings and facilitating mentoring opportunities
- Foster and sustain a culture of diversity and inclusion

SCEC's Office of Experiential Learning and Career Advancement is committed to its mission to provide research opportunities, networking, and other resources to encourage and sustain careers in STEM fields and looks forward to continuing to create and sustain opportunities that build a stronger, more diverse, STEM educated workforce.