new research initiatives challenge science and math students

Student research is thriving in the College of Science and Mathematics.

Mathematics students are maintaining the database for the California condor restoration project. Biological sciences majors are studying the monarch butterfly, including migration patterns on the Central Coast, nuptial flights of males carrying their female mates, and even the chemistry of the metabolic energy expenditure in these reproductive encounters. And a chemistry/physics double major pursues research on "the second harmonic rotational anisotropy of the <1,1,0> and <1,1,1> faces of silicon." These are among the research topics of more than 100 students, mostly undergraduates, who made oral or poster presentations in the first annual CSM student research conference in May, a Centennial event.

The college is building on Cal Poly's time-honored senior project as it develops a comprehensive and sustainable undergraduate research program. Undergraduate research engages the curiosity, imagination, and critical thinking skills of students in creative ventures directed by faculty advisers. These special teaching and learning experiences are becoming increasingly important for students applying for graduate or professional schools or entering industry. In turn, faculty members have the opportunity to enter into meaningful intellectual and mentorship relationships with their students, and the professional development and research programs of the faculty are advanced by undergraduate research.

The increasing opportunities for sponsored research in the College of Science and Math are also exciting. The Unocal Corporation has funded several million dollars of bioremediation and restoration ecology research to investigate innovative ways to address oil-contaminated land, with more than 100 students participating in these projects. Chemistry and biochemistry students in the polymers and coatings concentration benefit from sponsored

Students have joined in collaborative studies of monarch butterflies. Standing (left to right) are Saun Watkins, Kristen Lamb, Dennis Frey and Elena Levine (Biological Sciences Dept.), Eric Knudten, Bryan Stowe, and Jim Walth. Kneeling (left to right) are Brandon Da Valle, Valentina Hayashi, and David Tajima.
THE COLLEGE OF SCIENCE AND MATHEMATICS: FROM AGRICULTURE TO ACADEMICS

In the 1940s, Cal Poly's baccalaureate degrees were granted only in agricultural and industrial curricula and only to "boys," and the faculty was mostly male. The 1946-47 catalog indicated that young men responded well to these disciplines: "...boys who have been required to complete a college preparatory curriculum of the conventional pattern often do not receive the best grades; but when confronted with courses involving the science and techniques of agricultural and industrial operations ... they do very well."

Science and mathematics courses existed to support applied majors. Math was offered through differential equations. There was a full year of general chemistry, one quarter of organic chemistry, a full year of physics, and 18 biology courses, many of which were agriculture-related (diseases of livestock, etc.). Also from the 1946-47 catalog: "Emphasis needs to be given generally to vocational and technical training at the college level ... Occupational training complements the older concept of higher education as a process of the development of the mind toward creative thinking."

Science and mathematics evolved to the "Science and Humanities Division" and eventually to the present-day College of Science and Mathematics. The college still provides an academic foundation for the polytechnic colleges but also offers a full array of degree programs in its disciplines. Although the modern curriculum embraces Cal Poly's "learn-by-doing" philosophy, it is interesting to contrast the following statement from the college's most recent strategic plan to the 1946-47 catalog:

"To further explore the differences and relationships between teaching and learning, information and knowledge, training and educating will be essential priorities. Our curricula and pedagogies will engage the student's intellect, curiosity, imagination, and capacity for creative and critical thought."

Other contrasts abound. Almost 60 percent of CSM majors now are women, and more than a third of new freshmen enter with high school GPAs of 4.0 or higher. Of 50 faculty members hired in the past seven years, 40 percent are women and 25 percent come from minority groups. The college boasts the first three endowed faculty chairs ($1 million each) in Cal Poly's history, and supports many industry-sponsored student research projects.

Perhaps the most important project in the history of the College of Science and Mathematics coincides with Cal Poly's Centennial Celebration. The current "spider building" will be razed. Just as science and mathematics is central to the polytechnic curriculum, a new Center for Science and Mathematics will be located at the campus center, next to the planned Centennial Park, a place of comfort and beauty that will surely become one of Cal Poly's defining landmarks. Together, the center and Centennial Park symbolically will integrate the mission and values of the university with the physical campus, and provide a rich and inspiring living and learning environment for the Cal Poly community.

research and summer internships funded by the California coatings industry. The Mathematics Department has a National Science Foundation REU (Research Experiences for Undergraduates) grant and two RUI (Research at Undergraduate Institutions) grants. Biological sciences students have been involved in other projects, some on the East Coast, funded by the Office of Naval Research.

Finally, new opportunities for student research are on the horizon with the imminent and generous donation of the Unocal Pier at Avila Beach to the college. This 0.6-mile steel and concrete structure will be the site of expanded educational and research efforts in marine science. It is expected that Cal Poly will become nationally recognized in this area and unique with a major marine science research station operated largely by undergraduate students.

(Photos courtesy CSM)