

Center for Undergraduate Research in Mathematics (CURM)

In the last couple of decades, Research Experiences for Undergraduates (REU) programs have multiplied. Often with funding from the National Science Foundation (NSF), REU programs typically bring undergraduate mathematics majors to a college or university campus for an intensive research experience lasting several weeks over the summer. The REU model has been highly successful, creating a lasting impact on students, many of whom go on to doctoral programs in the mathematical sciences or other areas, as well as on to the faculty of the institutions where the REU programs are held.



Photo courtesy of the Center for Undergraduate Research in Mathematics, Brigham Young

The Center for Undergraduate Research in Mathematics (CURM), founded in 2007 in the mathematics department at Brigham Young University, operates on a model complementary to that of traditional REUs. CURM provides support and training to faculty so that they can build, at their home institutions, small groups of two to five undergraduate students to work on research projects during the academic year. With a focus on minority-serving institutions, CURM has two main aims. The first is to get undergraduate students excited about research and to encourage them to

finish their degrees and consider graduate school. The second is to help untenured faculty successfully negotiate the critical career transition point at which they become full-fledged mathematics professors.

Faculty apply to participate in CURM, and those who are accepted receive “mini-grants” that range from US\$15,000 to US\$25,000. The mini-grants provide stipends for participating faculty and students, travel, and supplies. CURM is funded by two grants totaling US\$2.6 million from the NSF’s Division of Mathematical Sciences, as well as support from the VWR Foundation and Brigham Young University. Participating faculty come to Brigham Young for a three-day workshop designed to train them as mentors to undergraduate students doing research. After the faculty return to their home institutions, CURM provides them with support and advice throughout the academic year as they work on research projects with their students. Faculty return to Brigham Young, together with their student groups, for CURM’s annual Student Research Conference, where students present their findings.

“I cannot think of a mathematics program that has made a larger difference in undergraduate mathematics research than [CURM],” wrote Kathryn Leonard in a letter supporting CURM for the Programs That Make a Difference award. Leonard, who is at California State University–Channel Islands, received CURM grants for two years. “CURM transformed the lives of my

students, all of whom were from underrepresented groups or were first-generation college students.... Their experience with CURM built confidence, experience and a sense of their place in the mathematical world.”

CURM has had a profound and widespread effect. Since its inception, the center has provided financial support to over three hundred undergraduate students (48 percent female, 26 percent minority, and 21 percent first-generation college students). CURM students have written 130 joint research papers and have given over 250 single or joint conference presentations or poster presentations. Their work has garnered a total of thirty awards. What is more, CURM gives undergraduates the inspiration and the confidence to consider graduate education. Among all mathematics majors at CURM-participating institutions, only 18 percent go on to graduate school. By contrast, 63 percent of CURM students do so.

The effects of CURM on faculty have also been significant. Almost one hundred faculty members from close to ninety institutions have participated in CURM. After completing the CURM year of mentoring, over 90 percent of them have continued to work with undergraduates in research. These faculty members have also been energized to change the practices and cultures within their own departments to emphasize excellent teaching and mentoring and to encourage students to reach their highest potential.

“[T]he CURM program has been highly effective in bringing the full undergraduate research experience to students and faculty at institutions [like mine],” wrote Rebecca Garcia of Sam Houston State University in a letter supporting CURM’s nomination for the award. Using her CURM experience and with funding from the NSF and from the National Security Agency, Garcia launched PURE Math (Pacific Undergraduate Research Experience in Mathematics), the first and only mathematics undergraduate research program located in the US Pacific Islands. Garcia, who was born and raised in Guam, is probably the first female Pacific Islander to receive her doctoral degree in pure mathematics and the only female Pacific Islander mathematician in higher education.

Leonard also successfully applied for funding from the NSF to launch an REU at her home institution. “The simplicity and effectiveness of the CURM model to inspire and sustain active undergraduate research programs is unmistakable, and is particularly noteworthy at schools where research might not be a high priority,” Leonard said in her letter. “Most important, CURM provides a life-changing experience for students who need it most. CURM truly makes a difference.”

CURM Director: Michael Dorff, Brigham Young University