UC SANTA BARBARA

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Making Learning Social

Imagine being an undergraduate student surrounded by the intensive scientific research activity of a world-class research university and experiencing the close engagement and intimate atmosphere of a small liberal arts college. A $1.5 million award from the Howard Hughes Medical Institute (HHMI) to UC Santa Barbara will make that experience possible for biology students.

Sixty percent of all undergraduates who enter college intending to major in science, technology, engineering and mathematics (STEM) areas of study do not complete bachelor's degrees in any of those disciplines. The new BioMentors program at UC Santa Barbara, funded by the HHMI, is designed to address the challenge of increasing the success and retention of STEM majors by building learning communities that engage students and instructors in a highly interactive environment.

"This generous award from the HHMI will allow us to enhance the experience that students at a large research university enjoy, with the close mentoring and involvement of instructors typical of a small institution," said Joel Rothman, director of the UCSB-HHMI Undergraduate Science Research Program and Professor in the Department of Molecular, Cellular, and Developmental Biology (MCDB). "This new program brings to the students active engagement during the learning process in a rich spirit of community and cooperation."

The program has three main components, all designed to address the challenges — academic and otherwise — facing students seeking to major in biological sciences,

the largest major on the campus. Among the components is a yearlong peer-mentoring course for first-year pre-biology students, which will focus on developing study skills and problem-solving in order to create motivated, confident learning groups. In addition, the project will develop enhanced introductory biology courses for sophomores that will employ active learning strategies and collaborative learning in small groups.

Discussion groups will meet in a redesigned classroom that facilitates active learning and makes optimal use of digital technology. “Instead of just having a bunch of students in neat rows facing a chalkboard, with the instructor as the focus, they will participate in the learning experience in small groups with a student-centered approach to learning,” explained Rolf Christoffersen, Associate Professor of MCDB and co-director of the program. “Such a participatory approach to learning has been shown to be more effective than the traditional instructor-centered classroom. This environment dramatically changes what happens in the classroom because the students actually talk to each other about course content throughout class meetings.”

In addition, newly developed science education courses, complemented by a seminar series, will serve to educate and train undergraduate learning assistants, graduate student teaching assistants, postdoctoral scholars, and faculty. Yes, even faculty will be students, as new learning methods and approaches are integrated into biology teaching at the university.

“It’s not easy for people to change the way they teach,” Christoffersen said. “We not only need to change our approaches to teaching science, but also need to help new faculty adopt these new methods. It’s particularly important that new faculty have an environment where there are resources and a culture that promote best practices in science education.

“Award-winning lecturers who are entertaining, who students love, can actually be less effective than an unseasoned instructor who has never lectured before but involves the students in active learning,” he added. “Students might love the faculty member who tells great jokes and stories in formal lecture settings, but when actually tested, students have been shown to learn more through active, participatory learning methods.”

The key is engagement. Biology students have had the opportunity to participate directly in scientific discovery early in their undergraduate careers through the current UCSB-HHMI Undergraduate Science Research Program, which was funded for a five-year period. The new award will allow the program to move into a new phase of redesigning science education.

“This funding from HHMI provides a tremendous stimulus for us,” Rothman said. “We can do this as a pilot project for science training that, if proven successful, will radiate out through all of biology as well as through the other sciences. We hope it will ultimately be used as a model across the whole campus.”

Since 1988, HHMI has awarded more than $935 million in grants to 274 public and private colleges and universities to support science education. These grants — HHMI’s longest running science education program — have focused on transforming science education in the U.S. by encouraging science teaching that is hands-on, research-oriented and interdisciplinary.

About UC Santa Barbara

The University of California, Santa Barbara is a leading research institution that also provides a comprehensive liberal arts learning experience. Our academic community of faculty, students, and staff is characterized by a culture of interdisciplinary collaboration that is responsive to the needs of our multicultural and global society. All of this takes place within a living and learning environment like no other, as we draw inspiration from the beauty and resources of our extraordinary location at the edge of the Pacific Ocean.