

UC SANTA BARBARA

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New Ph.D. Emphasis at UC Santa Barbara Offers More Robust Bioengineering Training

Imagine an artificial pancreas device that frees diabetics from constant blood glucose testing, nanoparticles that selectively deliver chemotherapy to tumors with minimal impacts to healthy tissue, or brain imaging that detects serious conditions that escape conventional scans. These are only a few of the innovations that have been born from the marriage of biology and engineering at UC Santa Barbara.

With the creation of its newest academic offering -- an interdisciplinary Ph.D. emphasis in bioengineering -- UCSB will offer students even more robust training in this rapidly growing field. The new graduate degree emphasis will be offered starting this fall.

"Bioengineering research has been happening on campus for a long time, and it has been happening in different departments," said Samir Mitragotri, professor of chemical engineering and founding director of the Center for BioEngineering.

There has been a growing need for people who speak the language of both disciplines, said Mitragotri, explaining that, while students interested in this booming job market and research niche could find expert mentors in bioengineering, there was no formalized program to advance their studies.

Now, with the help of the campus Center for BioEngineering (CBE) at UC Santa Barbara, Ph.D. candidates with interests and research experience in bioengineering will find the resources, network, and support for their pursuits. The graduate emphasis program in bioengineering will offer lectures and seminars on how to approach research topics in biomedical engineering, biomimetics, systems biology, and other bioengineering applications.

"Integration is the key," said Mitragotri, who, along with his colleagues, spent the last year conferring with faculty and researchers from 13 departments and programs at UC Santa Barbara, each of which expressed interest in the new emphasis. "The strongest impact of this program is that it will allow graduate students to do their research in a more comprehensive way."

All five of the departments within the College of Engineering will offer the new emphasis. Eight departments within the Mathematical, Life, and Physical Sciences Division of the College of Letters & Science, as well as the Biomolecular Science and Engineering Program, will also give qualified students the chance to petition for the emphasis.

The need for bioengineers has grown by leaps and bounds in recent years, particularly within the state of California. According to the United States Department of Labor's Bureau of Labor Statistics, the 2010 -- 2020 outlook sees a 62 percent job growth in the field, much faster than average. In California, San Diego and the Bay Area may be hotspots for bioengineering, but countless biotech startups and spinoffs have been established in Santa Barbara and the central coast region.

"If you go to a hospital and you look at problems that cost billions of dollars a year, there is plenty of opportunity for technology to provide new solutions," said Adele Doyle, lecturer in bioengineering and assistant researcher at the Neuroscience Research Institute, who is in charge of developing new courses for the emphasis. "A bioengineering background can equip students to fill that need, and to address global health issues that need more affordable solutions for diagnostics and treatment."

The announcement follows news from earlier this year that a new undergraduate bioengineering pilot program was launched by Mitragotri and several other colleagues. The four-year bioengineering concentration is offered through the College of Creative Studies, and aims to prepare undergraduate students for

graduate school and a career in biomedical research.

Enabled by the campus's interdisciplinary nature, researchers have stepped beyond the academic boundaries dividing engineering and the life sciences for decades. In 2007, the Chronicle of Higher Education ranked UCSB No. 2 in the nation for bioengineering research impact, even without a centralized academic program. Today, UCSB remains a hotbed of biomedical and bioengineering innovation, including technology-based solutions to major medical concerns such as cancer, diabetes, brain injury, and Alzheimer's disease.

Bioengineering research at UCSB has resulted in major breakthroughs in recent years, such as the artificial pancreas that is being developed by Professor Frank Doyle's research group, in collaboration with the Sansum Diabetes Research Institute and a global team of researchers. The device continuously measures blood glucose levels in diabetes patients and, powered by the Doyle lab's computational feedback loop and algorithms, delivers doses of insulin to mimic healthy pancreas functions. The technology is a promising biomedical engineering solution for diabetics.

Meanwhile, in the Mitragotri lab, researchers have discovered methods of delivering chemotherapy drug-coated nanoparticles to specific tumor tissues, which increases the effectiveness of cancer therapy while minimizing side effects on other tissues. In Professor Scott Grafton's lab, researchers are studying and developing brain imaging techniques that can tell more about the effects of certain conditions ó such as minor traumatic brain injuries ó that often go undetected with traditional brain scans.

Interested doctoral students must be in good academic standing and will be eligible to apply to the emphasis upon completion of the first year in their home department or program. CBE is now accepting applications. For more information and application guidelines, please visit <http://www.bioengineering.ucsb.edu/academics>.

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[Center for BioEngineering](#)

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.