

UC SANTA BARBARA

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## **UCSB To Be a Pioneer in Systems Biology**

UC Santa Barbara is poised to become a world leader in the emerging field of systems biology as a result of an innovative philanthropic gift that will provide special opportunities for the campus to launch major new academic research initiatives.

The \$2 million contribution from UCSB Chemical Engineering Professor Duncan Mellichamp and his wife, Suzanne, will fund a coordinated cluster of four endowed chairs, all devoted to a carefully selected programmatic area of rising importance, which will change over time.

This unique clustering of professorships, the first gift of its kind in UC history, will enable UCSB to jump-start new fields of scholarly inquiry and to strengthen existing cutting-edge research programs across disciplines through the recruitment of eminent scholars.

Noting that it is only with a strong faculty that a university can maintain and advance its position as a leader in the development and transfer of knowledge, UCSB Chancellor Henry T. Yang described the couple's gift as "magnificent."

"Professor Mellichamp already has given so much to UCSB through his teaching, research, and leadership, and providing such an extremely generous gift to carry out this vision is just extraordinary," said Yang. "The Duncan and Suzanne Mellichamp

Academic Initiative Professorships will give UCSB essential, powerful tools to help define and develop research and learning at the forefront of discovery."

Endowed chairs are highly prized academic positions that enable a university to develop more fully a field of study by providing ongoing financial support for enhanced research and instruction.

"Suzanne and I are very pleased that systems biology has been chosen as the focus of the first academic initiative chairs, providing the incentives to attract four outstanding new faculty," said Duncan Mellichamp, a distinguished professor, campus leader, and founding member of the Chemical Engineering Department. "This exciting new program will augment UCSB's significant strengths in biological systems engineering and support a collaborative program with our distinguished biological sciences faculty."

The Mellichamp chairs will be awarded as a group to top faculty for a period of up to 15 years and then reallocated to a different area following a campuswide call for proposals. In doing so, the initiative will provide an opportunity for researchers across the disciplines to build a program to the point where it can attract significant ongoing resources normally identified with major centers of excellence.

In keeping with the donors' wishes, selected areas must be viewed as a major campus priority, such as the establishment of a new program or school, a timely opportunity to move into a special area of research, a one-time infusion of positions into a critical area of existing excellence, or an opportunity to secure major long-term funding.

### Melding Molecular Biology and Systems Engineering

Initially, the four Mellichamp professorships will be designated for pioneering research in systems biology centered in the College of Engineering. Chemical Engineering Professor Frank Doyle, III, holder the Duncan and Suzanne Mellichamp Chair in Process Control---established by the couple last year---will lead the new research effort.

Systems biology involves the synergistic application of experiment, theory, and modeling toward understanding biological processes as whole systems instead of isolated parts. This requires the collective efforts from multiple research areas, such as molecular biology, high-precision measurement, computer science, control

theory, bioinformatics, and other scientific and engineering fields.

The new field has the potential to revolutionize our understanding of how and why organisms function as they do, with the possibility of tremendous payoffs in predicting, preventing, and treating disease.

"With the addition of several key faculty members in specific areas, systems biology at UCSB will not only produce a world-leading research effort, but will profoundly enhance the education provided to generations of UCSB students," said Matthew Tirrell, dean of the College of Engineering. "Increasingly, biology will be recognized as a pervasive and essential part of every engineer's education, comparable to analytical and computational skills."

The professors in the new cluster at UCSB will seek to understand, at the system level, biological processes that are made up of components revealed by molecular biology. Tools that have been developed in systems engineering provide the ideal methodologies for analyzing complex biophysical networks.

UCSB's distinguished College of Engineering is home to the Center for Control Engineering and Computation, which brings together faculty expertise and a wealth of courses to train researchers on analytical and computational methods in systems engineering.

Engineering research is already underway in bioinformatics and on other topics relevant to systems biology, including biomedical control, stochastic simulation for biological problems, systems analysis of gene regulation and, on the experimental side, in metabolic networks.

UCSB's renowned Department of Molecular, Cellular and Developmental Biology is comprised of 25 research groups with interests ranging from the structure and function of biological macromolecules to the fundamental processes that are used in cellular function and the integration of these processes during plant and animal development.

"It is essential that we address the recruitment of colleagues that bring important and relevant biological problems to these collaborations," Tirrell said.

Complementing UCSB's related areas of excellence in systems biology are its strong collegial ties to Caltech's program in Control and Dynamical Systems.

"This combined critical mass empowers the region of Southern California to take a lead role in this emerging discipline," said Tirrell.

Over the years, Duncan and Suzanne Mellichamp have been generous benefactors of UCSB. With this recent gift, they will have endowed a total of five chairs. The four new endowed chairs established at the \$500,000 level bring the total number of endowed professorships at UCSB to 41. This is the largest gift ever made by a UCSB faculty member.

#### About the Donors

Duncan and Suzanne Mellichamp are partners in their philanthropic support for higher education.

A devoted UCSB faculty member for more than 36 years, Duncan Mellichamp is a pioneering professor, campus leader, and founding member of the Chemical Engineering Department. Highly regarded in the field of process control, he is author or co-author of nearly 100 research papers, monographs, and books, including an award-winning textbook, *Process Dynamics and Control*, which has been translated into Japanese- and Korean-language editions. He will retire from UCSB next month.

Over the years, he served as chair of the UCSB Academic Senate and later represented the faculty of the entire UC system on the UC Board of Regents as vice chair and chair of the UC Academic Senate. For the past five years, he has been special assistant for long-range planning to UCSB Chancellor Henry T. Yang, playing a pivotal role in the planning process for the future development of North Campus and the Isla Vista redevelopment plan. Professor Mellichamp has also served as a trustee of The UCSB Foundation. In the community, he serves on the board of directors of Opera Santa Barbara.

Suzanne Mellichamp is a retired schoolteacher. For nearly 30 years, she taught elementary classes, including special education classes, in Iowa, Indiana, North Carolina, and California. She received her master's degree in education in 1970 from UCSB's Gevirtz Graduate School of Education, with an emphasis in studio art, and taught for a number of years in Santa Barbara City Schools. Since 1991, she has served as a docent for the Santa Barbara Museum of Art.

Last year, the Mellichamps established an endowed chair in chemical engineering and made additional gifts for campus priorities.

They are members of the Lancaster Society, UCSB's premier donor society.

## About Systems Biology

Systems biology is expected to revolutionize our understanding of how and why organisms function as they do, with profound implications for predicting and preventing diseases such as cancer, arthritis, and diabetes.

Quantitative models showing the interconnections among cellular components---much like the wiring diagram for a computer chip---hold the promise to predict unexpected properties of anticancer drugs, for example.

The disciplines of biology and information science and technology are moving inexorably closer. This provides an important new entree for engineers into biology and biological engineering, beyond the flourishing biomaterials and device arenas.

Although molecular biology has led to progress in understanding biological systems, the current focus is mainly on identification of genes and functions of their products, which are components of the system. The emerging field of systems biology looks at all the elements in a living system, not one gene or one protein, to understand how they all function and connects processes that traditionally have been studied in isolation, looking at how the parts fit and work together to obtain a view or model of the system as a whole.

Engineers bring interests in design and in the ability to predict outputs from inputs via reliable, mathematical models that function and integrate across space and time.

Thinking of DNA as the "program" and cells, tissues, and organisms as the "processors," engineers can create a useful, functional analogy between biology and computer-controlled process systems.

The long-standing excellence of controls systems research at UCSB has been enhanced by key new faculty members in both control and process systems engineering in chemical engineering, mechanical engineering, and electrical and computer engineering.

As a result, UCSB is well-positioned to launch a new academic initiative in systems biology.

For more information about systems biology, contact the Institute for Systems Biology: [www.systemsbiology.org/](http://www.systemsbiology.org/)

Related Links

[Duncan Mellichamp](#)

[UCSB College of Engineering](#)

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## **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.