

**THURSDAY  
MARCH 27, 2008**

**Scaife Hall Auditorium  
Room 125**

**4:30 p.m.**  
Refreshments—4:00 p.m.



**Mustafa Khammash**  
PROFESSOR

UNIVERSITY OF CALIFORNIA AT SANTA BARBARA

Mustafa Khammash is the Director of the Center for Control, Dynamical systems, and Computations (CCDC) at the University of California at Santa Barbara (UCSB). He also holds a Professor appointment in the Mechanical Engineering at UCSB. He received his B.S. degree from Texas A&M University in 1986 and his Ph.D. from Rice University in 1990, both in electrical engineering. In 1990, he joined the Electrical Engineering Department at Iowa State University. While at Iowa State University, he created the dynamics and control program and led that control group until 2002, when he joined the dynamics and control group in the department of Mechanical and Environmental Engineering at UCSB. Khammash's research interests are in the area of control theory and its applications to engineering and to biological systems. His theoretical work lies in the area of robustness analysis and synthesis of interconnected dynamic systems, where he has developed methodology for the analysis and design of robust control systems under persistent disturbances and model uncertainty. His work also focuses on using control theory for the quantitative analysis of networks of dynamically interacting biological components, with the goal of reverse engineering these networks to understand how they robustly achieve biological function. He is currently developing computational methods for the analysis of stochastic dynamics and their applications in the area of Systems Biology. Khammash is a Fellow of the IEEE. He is the recipient of the National Science Foundation Young Investigator Award, the Japan Society for the Promotion of Science (JSPS) Fellowship, the Iowa State University Foundation Early Achievement in Research and Scholarship Award, the ISU College of Engineering Young Faculty Research Award, and the Ralph Budd Best Engineering PhD Thesis Award.

**ECE Seminar Hosts:**

**Radu Marculescu,**  
[radum@ece.cmu.edu](mailto:radum@ece.cmu.edu)

**Yi Luo,**  
[y1827@andrew.cmu.edu](mailto:y1827@andrew.cmu.edu)

**Bruno Sinopoli,**  
[brunos@andrew.cmu.edu](mailto:brunos@andrew.cmu.edu)

## GENE REGULATION IN A NOISY ENVIRONMENT

The cellular environment is abuzz with noise. A key source of this noise is the randomness that characterizes the motion of cellular constituents at the molecular level. Cellular noise not only results in random fluctuations (over time) within individual cells, but it is also a source of phenotypic variability among clonal cellular populations. In some instances fluctuations are suppressed downstream through an intricate dynamical networks that acts as noise filters. Yet in other important instances, noise induced fluctuations are exploited to the cell's advantage. Researchers are just beginning to understand that the richness of stochastic phenomena in biology depends directly upon the interactions of dynamics and noise and upon the mechanisms through which these interactions occur. In this talk, we explore the origins and impact of cellular noise, drawing examples from endogenous and synthetic biological networks. We motivate the need for stochastic models and outline some of the key tools for the modeling and analysis of stochastic noise.

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