

BIOEN 509 – DEPARTMENTAL SEMINAR SERIES

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Tuning Synthetic Gene Networks

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Individual cells have remarkable abilities. They can sense a wide range of molecular messages, compute responses, adapt to their environments, and communicate with each other to do useful work. To harness these capabilities, however, requires that we develop a design framework that can account for variability, noise, and uncertainty in the genetic components and networks available to us. One of the basic design principles is tuning. The overall architecture of a synthetic network might be correct for a given function, but the rates of transcription, translation, protein binding, may put the network into a non-functional regime. In this talk I will describe how we can engineer synthetic gene networks to have "tuning knobs" built into them. I will demonstrate the ideas with two experimental systems, one in *E. coli* and one in yeast, in which simple behaviors such as bistability and feedback are optimized.

Dr. Eric Klavins is an associate professor of electrical engineering at the University of Washington in Seattle. He received a B.S. in computer science in 1996 from San Francisco State University and the M.S. and Ph.D. degrees in computer science and engineering in 1999 and 2001, respectively, from the University of Michigan, Ann Arbor. From 2001 to 2003 he was a postdoctoral scholar in the Control and Dynamical Systems Department at the California Institute of Technology. In 2004, he received an NSF CAREER award: Programmed Robotic Self-Assembly. His research interests include control systems, stochastic processes, concurrency and systems biology.

