

SEMINAR NOTICE

Preston M. Green Department of Electrical and Systems Engineering

Zaborszky Distinguished Lecture Series 2010

Robustness in Nature: Challenges and Opportunities for the Systems Biology Community

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Tuesday, September 14, 2010
9:30 – 11:00 a.m.

Stephen F. & Camilla T. Brauer Hall, Room 12

<http://ese.wustl.edu/zaborszky>

Abstract: Robustness, the ability to maintain performance in the face of perturbations and uncertainty, is a key property of living systems. While ‘homeostasis’ has long been recognized as an important phenomenon, the molecular and cellular bases of robustness have only recently begun to be understood. Biology and engineering employ a common set of basic ‘control’ mechanisms to achieve such robust regulation, namely redundancy, feedback control, modularity and hierarchies to ensure robust performance. New systems theoretical approaches to complex engineered systems are required that allow the reverse engineering of general design principles that can provide insights into cellular robustness. While preliminary results are available for simple (low-dimensional, deterministic) biological systems, general tools for analyzing these tradeoffs are the subject of active research.

In this talk, I will outline methods that are drawn from the field of control and dynamic systems to generate insights into the functioning of these robust biophysical networks. Examples will be used to motivate problems and methodologies, including two from the medical field (Alzheimer’s Disease, Post-traumatic Stress Disorder) and one from Ecology (Synchronization in Annual Spawning of Coral).

Host: Dr. Hiro Mukai