

SEMINAR NOTICE

Preston M. Green Department of Electrical and Systems Engineering

Zaborszky Distinguished Lecture Series 2010

Control Analysis of Robust Timekeeping in Circadian Clock Networks

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Thursday, September 16, 2010

9:30 – 11:00 a.m.

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

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

Abstract: Circadian timekeeping by intracellular molecular clocks is evident widely in prokaryotes and eukaryotes. The clockworks are driven by autoregulatory feedback loops that lead to oscillating levels of components whose maxima are in fixed phase relationships with one another. Circadian clocks are ideal systems for studying relations between noise, its propagation in complex networks and robustness. Tools from systems theory are introduced that elucidate design principles in these complex architectures through the analysis of robust and fragile regions of the network. Analysis of the performance properties of circadian gene networks in *Arabidopsis*, *Drosophila*, and *Mouse* reveals the design principles that emerge from these richly layered and hierarchical regulatory circuits. We highlight some recent results that analyze robustness properties at the tissue level, where intercellular coupling appears to be responsible for the generation of robust rhythms in the face of noise and other uncertainties. In the absence of intercellular signaling, the individual (cellular) oscillators lose these properties of robust performance.

Host: Dr. Hiro Mukai