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30332-0160. *Modeling Stochasticity and Variability in Gene Regulatory Networks with Applications  
for Optimal Control.*

Modeling stochasticity in gene regulation is an important and complex problem in molecular systems biology. This talk will introduce a discrete stochastic modeling framework for gene regulatory networks. This framework incorporates propensity parameters for activation and degradation and is able to capture the cell-to-cell variability. It will be presented in the context of finite dynamical systems, where each gene can take on a finite number of states, e.g. Boolean Networks, and where time is also a discrete variable. Applications using methods from control theory will be presented for the purpose of designing optimal control strategies. A background to stochastic modeling will be given and applications will use two of the best known stochastic regulatory networks, the outcome of lambda phage infection of bacteria and the p53-mdm2 complex. (Received September 02, 2013)