

Evolution and robustness in genetic networks

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Genetic activity is partially regulated by a complicated network of proteins called transcription factors. I will describe a mathematical framework to relate the structure and dynamics of these genetic networks. The underlying idea is to capture the topology and logic of the network interactions by a Boolean network, and to then embed the logical network into continuous piecewise linear differential equations. The equations can be analyzed using methods from discrete mathematics and nonlinear dynamics. By changing the logical structure randomly, it is possible to evolve the networks in an effort to identify networks that display rare dynamics - e.g. networks with long stable cycles or with a high level of topological entropy. I also consider the concept of robustness in the context of these equations and argue that robustness should be a key feature of genetic networks underlying important biological functions.

The lecture will take place in Thackeray 704 at 3:30pm.
Refreshments will start at 3:00pm.