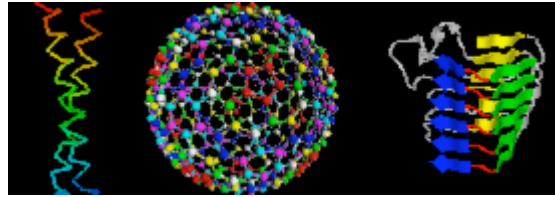**MIT**
Department of Mathematics
& The Theory of
Computation Group
At CSAIL

Bioinformatics Seminar

Speaker: J.J. Collins
Center for BioDynamics and Dept. of Biomedical Engineering
Boston University
Title: Engineering Gene Networks
Date: Monday, 9 May 2005
Time & Location:
Refreshments: 11 am in the Star Conference Room at MIT's Building 32, Stata Center Room D-463
Talk: 11:30 am the Star Conference Room at MIT's Building 32, Stata Center Room D-463
URL: http://www-math.mit.edu/compbiosem/

Abstract:

Many fundamental cellular processes are governed by genetic programs which employ protein-DNA interactions in regulating function. Owing to recent technological advances, it is now possible to design synthetic gene regulatory networks, and the stage is set for the notion of engineered cellular control at the DNA level. Theoretically, the biochemistry of the feedback loops associated with protein-DNA interactions often leads to nonlinear equations, and the tools of nonlinear analysis become invaluable. In this talk, we describe how techniques from nonlinear dynamics and molecular biology can be utilized to model, design and construct synthetic gene regulatory networks. We present examples in which we integrate the development of a theoretical model with the construction of an experimental system. We also discuss the implications of synthetic gene networks for biotechnology, biomedicine and biocomputing. In addition, we present integrated computational-experimental approaches that enable construction of first-order quantitative models of gene-protein regulatory networks using only steady-state expression measurements and no prior information on the network structure or function. We discuss how the reverse-engineered network models, coupled to experiments, can be used: (1) to identify the pathways and gene products targeted by pharmaceutical compounds, and (2) to gain insight into the regulatory role of individual genes and proteins in the network.

The seminar is co-hosted by Professor Peter Clote of Boston College's Biology and Computer Science Departments and MIT Professor of Applied Math Bonnie Berger. Professor Berger is also affiliated with CSAIL & HST.

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