

Department of Mathematics

Applied Math Seminar

DATE: Wednesday, October 14, 2009

PLACE: JR 202

TIME: 3:00-4:00 P.M.

**SPEAKER: Elisa Franco
California Institute of Technology
Department of Control and Dynamical Systems**

TITLE: Programming Bio-synthetic Dynamical Systems

ABSTRACT:

The functionalities of every living organism are wired in the biochemical interactions existing among proteins, nucleic acids and all the other molecules that constitute life's building blocks.

Understanding how to embed any function in this "hardware of life" via "molecular programming" is an exciting and challenging task for modern bioengineers and synthetic biologists.

A simple in vitro tool kit to investigate molecular programmability can be built by using exclusively nucleic acids and a few protein species for transcription and degradation. Despite its simplicity, this setting allows us to achieve a high computational complexity, which is an attractive feature for the implementation of engineering design principles into synthetic biochemical networks.

In this talk, I will describe the design, modeling and experimental synthesis of molecular circuitry built using in vitro genetic circuits. In particular, I will focus on two alternative modules able to achieve transcription rate regulation, the first based on negative feedback (self-repression), the second based on positive feedback (cross-activation).