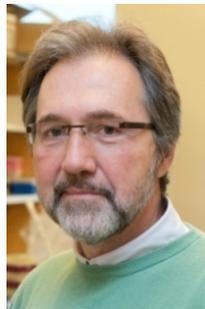# Northeastern University
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Please join us for a
Special Jointly-Sponsored Seminar
Chemical Engineering
and
Electrical & Computer Engineering

Wednesday, November 13, 2013
108 Snell Engineering
11:45 am – 1:00 pm

"Computational Methods to Decipher the Dynamic
Processes of Cells and Living Organisms"

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ABSTRACT

The rapid advances in high-throughput genomics and bioimaging technologies have accelerated considerably our ability to learn how the elements in a cell's "parts list" (genes, proteins, etc.) interact and control biological processes. However, to decipher the complex dynamics of biological systems and engineer interventions steering them in a desirable direction, we need to develop a new generation of bio-computation methods and tools that will have to be: (i) Scalable in performance with the system's complexity, (ii) Fully automated, and (iii) Real-time, in the sense of providing reliable results on time for effective decision control. We will present results of two ongoing research efforts contributing to this objective. First, we will demonstrate a fully automated bioimage analysis pipeline for tracking growing microbial communities, used to study bacterial biofilms formation under different conditions. Second, we will present methods that enable the stochastic simulation of large-size biochemical reaction networks. Our vision going forward is to create the first system that combines in the same platform biological network inference (system identification) with on-line network simulation. Depending on its bio-sensing front-end (micro-fluidic, bio-imaging etc.) such a hybrid embedded device can find many useful applications in robotic automation for sample-to-answer diagnostics, biodefense, drug screening for personalized medicine, etc.

BIOGRAPHY: Prof. Manolakos is a Visiting Scholar at the Wyss Institute for Biologically Inspired Engineering, Harvard University and the Director of the Multidisciplinary Graduate Program "Information Technologies in Medicine and Biology", University of Athens. He has been a tenured faculty member with the ECE Dept. at NEU and has directed the Communications and Digital Signal Processing (DSP) Center for Research and graduate studies, promoting student-centered innovation through academia-industry collaborations. His research interests include signal/image analysis, machine learning, high performance embedded computing, and their applications in bioengineering and the environment. His multidisciplinary research has attracted substantial support from US and EU funding agencies. Prof. Manolakos holds a Ph.D. degree in Computer Engineering from USC, M.Sc. from University of Michigan, Ann Arbor, and Diploma in Electrical Eng. from the National Technical University of Athens. He is a Senior Member of the IEEE.

Refreshments will be served.