

Computational and Experimental Analytic Approaches in Biological Systems

Spring 2013

BIOE 498: CRN 59581, Section JMA

3 credit hours

Live videoconferenced lectures

Illinois campus on Mondays and Wednesdays, 1:00 - 2:30 PM CST

January 14 – April 24, 2013

Taught by faculty at Boston University and Georgia Tech: Muhammad Zaman, Mo Khalil, Wilson Wong and Jim Collins (Boston Univ), Melissa Kemp (Georgia Tech)

Local instructors: Professors Jian Ma and Victor Jongeneel

Prerequisites: Prior graduate level coursework in biology and computational modeling; background in differential equations and proficiency in one of the following: Matlab, Mathematica, Python, or C/C++

Course Topics:

- Fundamentals of single and multi-scale modeling of cellular structure and processes
- Modeling approaches for elucidating communication between cells
- Coupling model modules that describe inter- and intracellular interactions
- Modeling mechanics of single cells, small and large clusters
- Integration of biochemical signaling with mechanical signaling
- Bridging time and length scales when simulating multicellular systems
- Experimental methods (synthetic circuits, microfluidics, dynamic data) needed to advance the design of functional multicellular systems and discover regulatory features of naturally occurring systems
- Future directions in systems and synthetic biology modeling and experiments



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