Systems Biology Concentration

Multidisciplinary Research: Interface of Biology, Physics, Chemistry, Biophysics, Mathematics, CS&E.

Modeling & Simulation

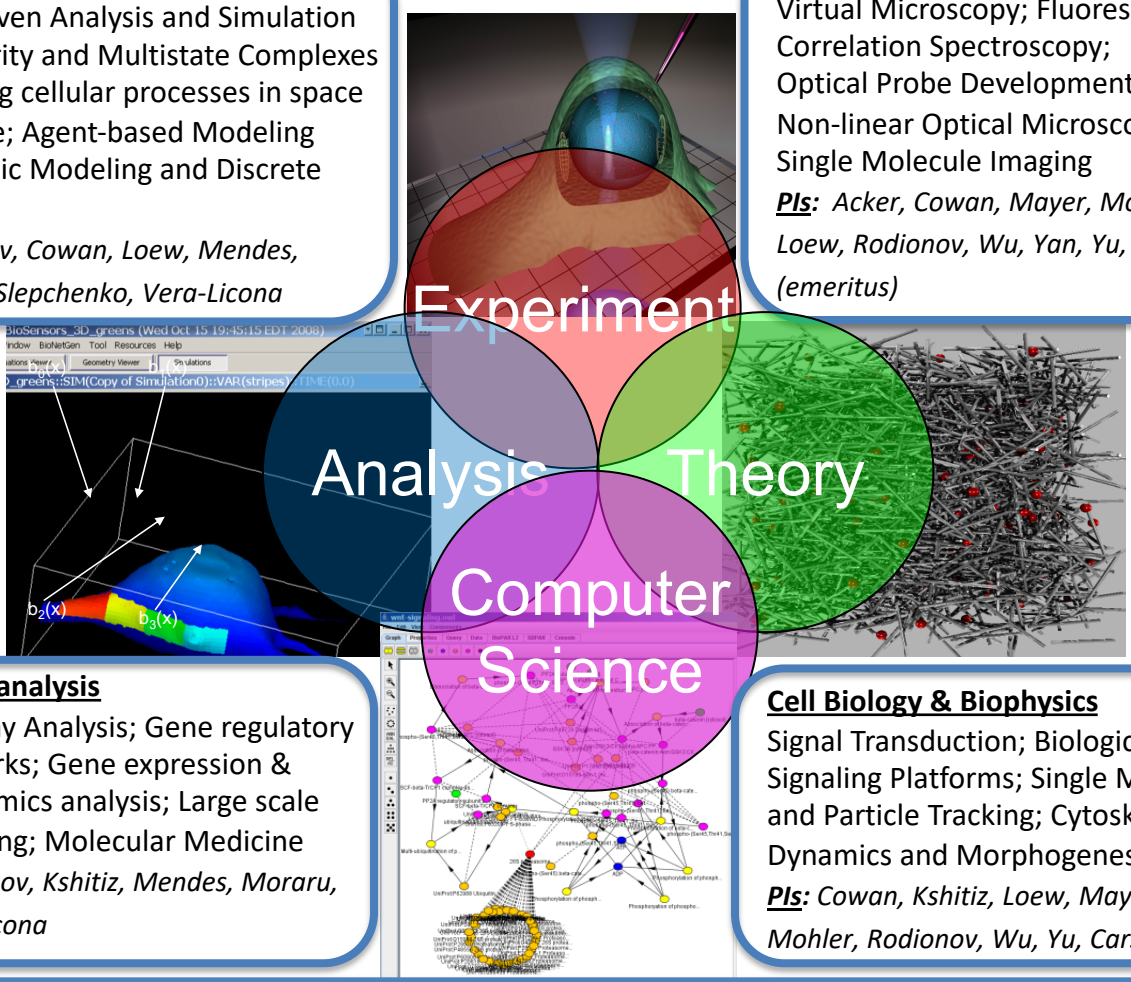
Data Driven Analysis and Simulation
Modularity and Multistate Complexes
Modeling cellular processes in space and time; Agent-based Modeling
Stochastic Modeling and Discrete Particles

PIs: *Blinov, Cowan, Loew, Mendes, Moraru, Slepchenko, Vera-Licona*

Optical Imaging

Virtual Microscopy; Fluorescent Correlation Spectroscopy;
Optical Probe Development
Non-linear Optical Microscopy
Single Molecule Imaging

PIs: *Acker, Cowan, Mayer, Mohler, Loew, Rodionov, Wu, Yan, Yu, Carson* (emeritus)*



Omics analysis

Pathway Analysis; Gene regulatory Networks; Gene expression & Proteomics analysis; Large scale modeling; Molecular Medicine

PIs: *Blinov, Kshitiz, Mendes, Moraru, Vera-Licona*

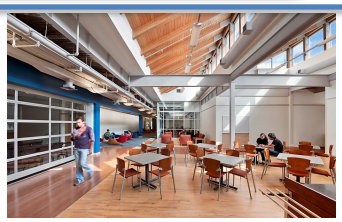
Cell Biology & Biophysics

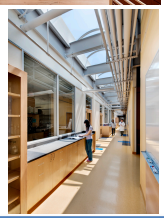
Signal Transduction; Biological Signaling Platforms; Single Molecule and Particle Tracking; Cytoskeletal Dynamics and Morphogenesis

PIs: *Cowan, Kshitiz, Loew, Mayer, Mohler, Rodionov, Wu, Yu, Carson**

Systems Biology Area of Concentration:

- ✓ Multidisciplinary Faculty
- ✓ Multi-mentor graduate training
- ✓ Special courses:
  - ➢ Introduction to Systems Biology
  - ➢ Optical Microscopy and Bioimaging
  - ➢ CAM Journal Club/Research in Progress
- ✓ Located in a new state-of-the art facility (R&D Magazine's "Renovated Lab of the Year 2011")
- ✓ Shares facility with Genetics AoC & Technology Incubator.

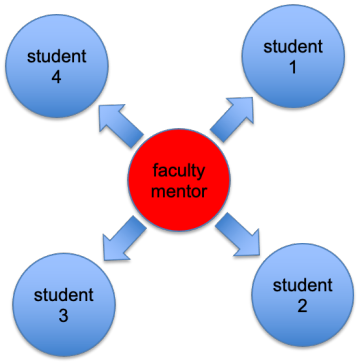





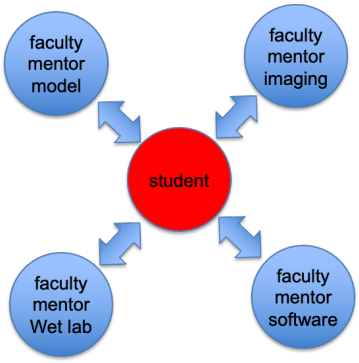
Cell Analysis and Modeling Center (CCAM): https://health.uconn.edu/cell-analysis-modeling/
Center for Quantitative Medicine (CQM): https://health.uconn.edu/quantitative-medicine/
AoC: http://health.uconn.edu/graduate-school/academics/programs/ph-d-biomedical-science/cell-analysis-and-modeling-graduate-program/
Program Director: Dr. Michael Blinov (blinov@uchc.edu). Associate Director: Dr. Yi Wu (yiwu@uchc.edu)

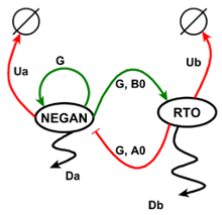
Systems Biology Concentration

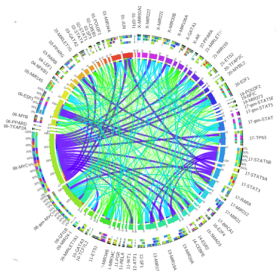
Conventional graduate training



Multi-mentor graduate training (Systems Biology)







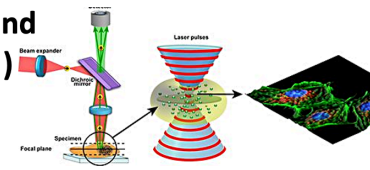
Introduction to Systems Biology (MEDS-6455)

- A biology world as seen by engineers, physicists, mathematicians and computer scientists. The goal is to provide the necessary background to read modeling papers, choose computer resources that will help in biological projects, and be able to select a modeling technique appropriate for a given biological project.
- Contents:
  - Predictive mathematical models and their dynamical behavior;
  - Stability, switching and stochasticity of a biological system;
  - Resources needed to start building a model;
  - Models exchange, simulation and visualization;
  - Public databases and software tools available for a modeler.

Optical Microscopy and Bio-imaging (MEDS-6450)

- Introductory course to help students understand the broad array of optical microscopy techniques employed in current biological literature.
- We will begin with an overview of geometrical optics and optical and fluorescence microscopy, with an emphasis on instrumentations. The bulk of the course will focus on state-of-the-art imaging techniques including Confocal microscopy, nonlinear optical processes, optical sensors, optogenetics and super-resolution imaging.
- Key features:
  - Interdisciplinary topics. Learn physics, protein engineering and computational concepts.
  - Literature-based learning.
  - Three labs to gain some hands-on experiences.

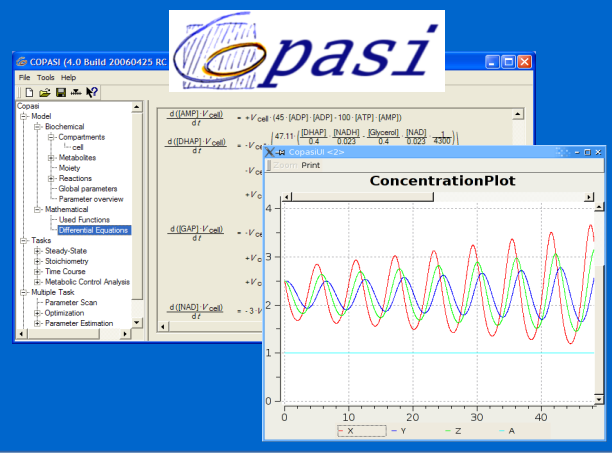
Practical Microscopy and Modeling (Meds 5382)



Hands-on experience in wide variety of microscopy techniques

- fluorescence microscopy of living cells
- Microinjection
- fluorescence recovery after photobleaching (FRAP)
- fluorescence correlation spectroscopy (FCS)
- total internal reflection microscopy (TIRFM)
- 4D imaging
- time-lapse microscopy
- forster (fluorescence) resonance energy transfer (FRET) microscopy
- high resolution electron microscopy.

COPASI – biochemical simulator



Virtual Cell – spatial modeling environment