**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.

**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)

**Omnics 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*

Cell Analysis and Modeling Center (CCAM): [https://health.uconn.edu/cell-analysis-modeling/](https://health.uconn.edu/cell-analysis-modeling/)

Center for Quantitative Medicine (CQM): [https://health.uconn.edu/quantitative-medicine/](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/](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)
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 instrumentation. 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