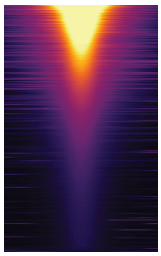
UCONN | THE GRADUATE SCHOOL

UCONN HEALTH BIOMEDICAL SCIENCE PROGRAM

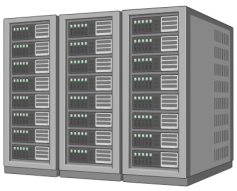
# Systems Biology Concentration

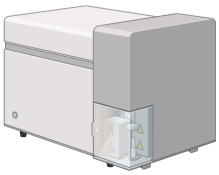
Multidisciplinary research that can span molecular biology, biochemistry, biophysics, genomics, chemistry, physics, mathematics, and computer science

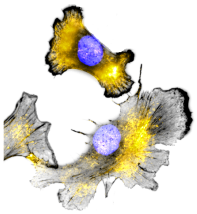
**Modeling & Simulation:**
Whole-cell modeling; Modeling cellular processes in space and time; Agent-based modeling; Compartment modeling of transcription dynamics
*Faculty: Agmon, Blinov, Guertin, Mendes, Moraru, Sarabipour, and Vera-Licona.*

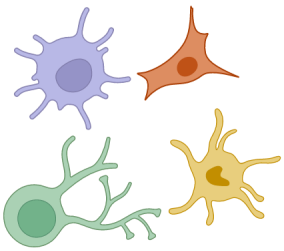


**Genomics & Proteomics:**
Gene regulatory networks; Integrative genomics; *in vivo* validation of models; Molecular medicine; Genetic epidemiology
*Faculty: Blinov, Guertin, Kshitiz, Mendes, Miura, Moraru, Song, and Vera-Licona*

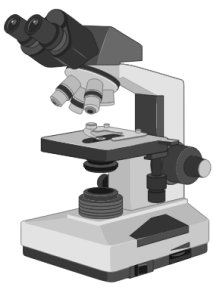


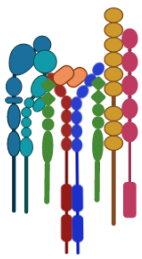






**Microscopy and Imaging:**
Fluorescent correlation spectroscopy; Optical probe development; Single molecule imaging
*Faculty: Deb Roy, Wu, and Yu*





**Cell Biology & Biophysics:**
Signal transduction; Single Molecule and Particle Tracking; Cytoskeletal Dynamics and Morphogenesis
*Faculty: Deb Roy, Kshitiz, Sarabipour, Wu, and Yu*

## Systems Biology Area of Concentration

Develop technical skills in a combination of molecular biology, cell biology, microscopy, computational biology, mathematical modeling, and/or software development.

Cell Analysis and Modeling Center (CCAM): https://health.uconn.edu/cell-analysis-modeling/
Sytems Biology Area of Concentration:
http://health.uconn.edu/graduate-school/academics/programs/ph-d-biomedical-science/cell-analysis-and-modeling-graduate-program/
Program Director: Dr. Michael Guertin (guertin@uchc.edu). Associate Director: Dr. Eran Agmon (agmon@uchc.edu)

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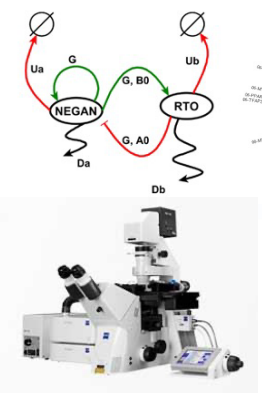
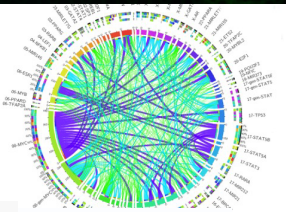
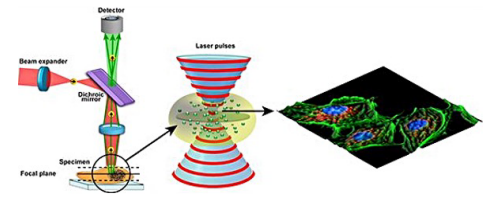
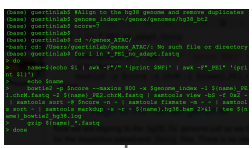
# Systems Biology Concentration

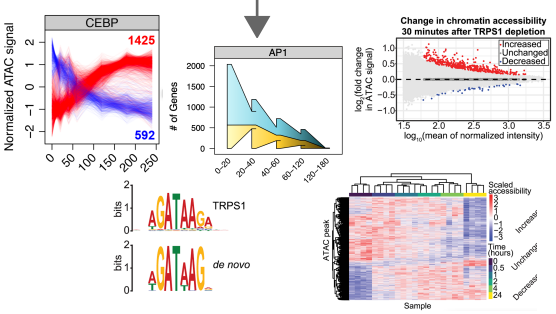









## Courses

### Molecular Genomics Practicum (MEDS5420)

-Use scripting to automate analysis of genomics data
-Retrieve and analyze publicly available genomic data sets
-Visualize genomics data on a genome browser
-Perform alignment, peak calling, and motif analysis starting of raw ChIP-seq data
-Perform alignment, differential expression, and gene set enrichment analysis of raw RNA-seq data

### Optical Microscopy and Bio-imaging (MEDS6450)

-Understand a broad array of optical microscopy techniques
-Overview geometrical optics and optical and fluorescence microscopy
-Review emerging optical imaging techniques
-Hand-ons lab sessions to to learn widely used microscopy techniques

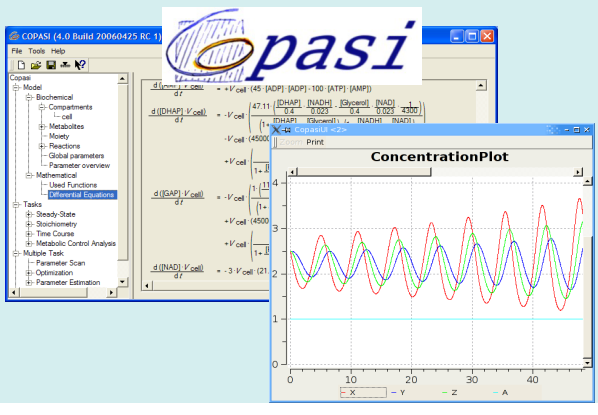
### Introduction to Systems Biology (MEDS6455)

-Choose compute resources for a project
-Differentiate between modeling techniques
-Implement predictive mathematical models and monitor their dynamical behavior
-Simulate and visualize model implementaitons
-Access public databases and software tools for modeling

### AI and Machine Learning in Biomedical Sciences (MEDS6498)

-Students learn the basics of artificial intelligence (AI) and machine learning (ML) data analyses
-Overview AI and ML applications in basic, translational and clinical biomedical sciences research
-Highlight the most productive results of applying AI/ML in the biosciences

## COPASI - biochemical simulator




## Virtual Cell - spatial modeling environment