

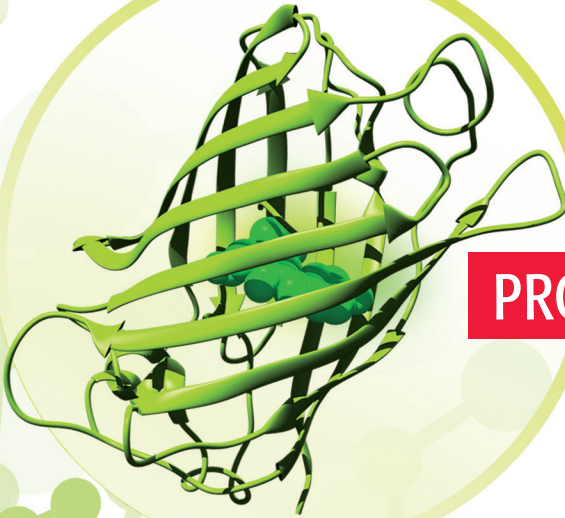


BioMaPS Institute for
Quantitative Biology

Graduate Program in
Computational Biology and
Molecular Biophysics

Interdisciplinary Quantitative Biology **BOOT CAMP** January 5-16, 2015

Center For Integrative Proteomics Research
Rutgers University, Piscataway, NJ



PROGRAM

Center for Integrative
PROTEOMICS
Research

RUTGERS
THE STATE UNIVERSITY
OF NEW JERSEY



Interdisciplinary Quantitative Biology Boot Camp

The Center for Integrative Proteomics Research, home to the BioMaPS Institute for Quantitative Biology and the BioMaPS Graduate Program in Computational Biology and Molecular Biophysics, are delighted to be hosting the second annual Rutgers Interdisciplinary Quantitative Biology Boot Camp designed to augment education for quantitative and biological scientists. Our overarching goal is to introduce students of all ages to the value of integrating biology and medicine with mathematics, physics, chemistry, computer science, statistics and biostatistics, and engineering.

The immersive two-week Boot Camp will provide broad introductory exposure to the language, culture, and experimental/theoretical underpinnings of molecular biology, macromolecular biochemistry/biophysics, structural biology, computational biology, systems biology, and bioinformatics.

Instruction will take the form of lectures on fundamental aspects of biology, a broad range of collaborative hands on wet- and dry-laboratory practical exercises (including experiments with fluorescent protein-encoding plasmids and production and purification of five different fluorescent proteins as well as simulations of biological phenomena using statistical physics, mathematical modeling, and computational chemistry), tours of some of Rutgers' state-of-the-art facilities for interrogating biological phenomena, student-driven topics-of-the-day, fun activities for relaxing at multiple points each day, and two end-of-week networking opportunities.

The final afternoon of the Boot Camp will be devoted to a student Symposium on Fluorescent Proteins that will synthesize experimental data and the results of computational analyses gathered on five evolutionarily related fluorescent proteins. Symposium materials will be incorporated into a comprehensive web resource for Fluorescent Proteins hosted by the Research Collaboratory for Structural Bioinformatics Protein Data Bank.


The Boot Camp would not have been possible without tireless efforts of more than ninety contributors from across the entire Rutgers system.

Special thanks go out to Maria Voigt, Luz Fajardo, Bernie Cariaga, Don Corrette, and Sam Shelley of the Center for Integrative Proteomics Research for their greatly appreciated support.

Special thanks also go to members of the Arnold, Baum, Kalodimos and Khare Laboratories for their generous laboratory support in preparing for Boot Camp.

Wet Laboratory facilities and support were generously furnished by Professor Andrew Vershon and Dr. Janet Mead of the Waksman Institute of Microbiology.

Note:

-  All sessions will be held in **PROTEOMICS, ROOM 120** unless designated otherwise
-  Wet lab will be held in **WAKSMAN INSTITUTE, ROOM 19** unless designated otherwise
-  Laptop computers are required for sessions designated with this icon

Monday, January 5th, 2015

MORNING

8:30 AM	Welcome and Overview: Stephen Burley & Gail Ferstandig Arnold
9:00 AM	Perspectives on Research in Quantitative Biology: Peter March
9:45 AM	Molecules of Life Nucleic Acids, Part I: Helen Berman
10:30 AM	<i>Coffee Break</i>
10:50 AM	Nucleic Acids, Part II: Helen Berman
11:30 PM	Proteins: Stephen Burley


12:15 PM *Lunch: Pizza – **Proteomics First Floor Lobby***

AFTERNOON


1:00 PM **Team Organization and Overview of Boot Camp**
Stephen Burley & Gail Ferstandig Arnold

1:45 PM **Wet Lab**
Gail Ferstandig Arnold
Introduction to the wet lab

Disha Patel
Preparation of lysozyme for crystallization

 **Bioinformatics Workshop**
(also offered on 01/12)
Bin Tian
Sequence and structure analysis of RNA




Tuesday, January 6th, 2015

MORNING	9:00 AM	Introduction to the Central Dogma: Stephen Burley	
	9:45 AM	DNA → RNA: Robert Roeder (The Rockefeller University) Transcriptional Regulatory Mechanisms in Animal Cells	
	10:30 AM	RNA → Protein: Stephen Burley	
	11:10 AM	<i>Coffee Break</i>	
	11:30 AM	Epigenetics: Vincenzo Pirotta	
	12:20 PM	Evolution: From Systems to Molecules: Andrew Kern	
AFTERNOON	1:00 PM	<i>Lunch (independent)</i>	
	1:45 PM	Wet Lab Gail Ferstandig Arnold <i>Transformation of E. coli with plasmids</i>	 Foldit Workshop <i>(also offered on 01/12)</i> Sagar Khare, Kristin Blacklock, Nancy Hernandez <i>Computational modeling of protein folding and mutation</i>



Wednesday, January 7th, 2015

MORNING	8:30 AM	Wet Lab: Gail Ferstandig Arnold <i>Inoculation of minicultures</i>	
	9:00 AM	Understanding Genomes: Joachim Messing Microbiology Spurred Massively Parallel Genomic Sequencing and Biotechnology	
	9:50 AM	Understanding Proteomes: Gaetano Montelione	
	10:40 AM	<i>Coffee break</i>	
	11:00 AM	The Protein Folding Problem and Chaperones: Babis Kalodimos	
	11:45 AM	DNA → Novel Proteins: Sagar Khare	
AFTERNOON	12:30 PM	<i>Lunch (independent)</i>	
	1:20 PM	Mass Spectrometry: Peter Lobel	
	2:20 PM	<i>Coffee Break</i>	
	2:50 PM	Overview of Cancer and Stochastic Model/Simulations of Colon Cancer: David Axelrod	
	4:00 PM	Team Checkpoint Meeting: Stephen Burley & Gail Ferstandig Arnold	
	4:45 PM	Wet Lab Gail Ferstandig Arnold <i>Inoculation of midcultures</i>	<i>No Computational Workshop</i>

Thursday, January 8th, 2015

MORNING	9:00 AM	 Protein Visualization, Workshop Part I: Shuchismita Dutta & Stephen Burley	
	10:40 AM	<i>Coffee break</i>	
	11:00 AM	 Protein Visualization, Workshop Part II: Shuchismita Dutta & Stephen Burley	
	12:00 PM	Mathematical Modeling of Biological Phenomena: Eduardo Sontag	
AFTERNOON	1:00 PM	<i>Lunch (independent)</i>	
	1:45 PM	Wet Lab <i>Gail Ferstandig Arnold</i> <i>Inoculation of maxicultures for FP production</i> <i>Preparation of agarose gels</i> <i>Purification of FP-encoding plasmids</i> <i>Induction of protein expression in cultures</i>	 Amber Project Workshop David Case, Darrin York, & Tai-Sun Lee <i>Molecular modeling with Amber</i> (Part 1 of 2)

Friday, January 9th, 2015

MORNING	8:00 AM	Wet Lab Jerry Joe Harrison <i>Harvesting of cells</i> <i>Preparation of bacterial lysates</i> <i>Protein purification using nickel columns</i>	
	9:00 AM		
			 Exploring Macromolecular Structures (also offered on 01/12) Luigi Di Costanzo <i>Analysis of data from the Protein Data Bank</i>
AFTERNOON	12:00 PM	<i>Lunch (independent)</i>	
	1:00 PM	Wet Lab Jerry Joe Harrison <i>Electrophoresis of proteins and plasmids</i>	 Amber Project Workshop David Case, Darrin York & Tai-Sung Lee <i>Molecular modeling with Amber</i> (Part 2 of 2)
	5:00 PM	Networking (including molecular origami, great science videos & popcorn)	


Monday, January 12th, 2015

MORNING

9:00 AM **Tools to Study Macromolecular Interactions: SPR:** Xiao-Ping Li
9:45 AM **Bio-Layer Interferometry (BLI):** Chris Marks

10:30 AM *Coffee Break*

10:50 AM **Data Collection & Activities**
Simultaneous offerings. Escorts from Proteomics Rm. 120

 **DNA Cloning & Sequencing Methods Workshop**

Joseph Bauman

Methods to maximize success with cloning and sequencing

Proteomics,
Rm. 120

 **Foldit Workshop**

Sagar Khare,
Kristin Blacklock,
Nancy Hernandez

Computational modeling of protein folding and mutation

(Also offered on 01/06)

Proteomics,
Rm. 206

 **Exploring Macromolecular Structures**

Luigi Di Costanzo
Analysis of data from the Protein Data Bank

Proteomics,
Rm. 306

 **Bioinformatics Workshop**

Bin Tian

Sequence and structure analysis of RNA

(Also offered on 01/06)

Proteomics,
Rm. 126

12:00 PM *Lunch (independent)*

1:00 PM **Team Checkpoint Meeting:** Stephen Burley & Gail Ferstandig Arnold

1:30 PM **Data Collection & Activities**
Simultaneous offerings. Escorts from Proteomics Rm. 120

 **Fluorescent Protein DNA Sequencing Data Analysis**

Joseph Bauman

Proteomics,
Rm. 126

 **Mass Spectrometry**

Peter Lobel,
Haiyan Zheng

Proteomics,
Rm. 008

 **X-ray Crystallography**

Joseph
Marcotrigiano

Proteomics,
Rm. 120

 **NMR Spectroscopy**

Gaetano
Montelione,
James Aramini,
Swapna Gurla

CABM,
Rm. 241

AFTERNOON

Tuesday, January 13th, 2015

MORNING

9:00 AM	Statistical Physics and Biology Biophysical Modeling of Gene Expression: Alexandre Morozov, Constantin Malliaris
10:00 AM	Stochastic Modeling of Cell-to-Cell Variability of Gene Expression: Anirvan Sengupta
11:00 AM	<i>Coffee Break</i>
11:20 AM	Application of Statistical Methods to Biological Problems: Steve Buyske

12:10 PM *Lunch (independent)*

AFTERNOON

1:00 PM **Data Collection & Activities**
Simultaneous offerings. Escorts from Proteomics, Rm. 120

Differential Scanning Calorimetry

David Remeta,
Conceicao Minetti

Wright-Rieman,
Rm. 260

Fluorescence & Circular Dichroism Spectroscopy

Vikas Nanda,
Smita Patel, Aishwarya Deshpande
Prot., Rm. 126

 **X-ray Crystallography**


Joseph Marcotrigiano
Prot., Rm. 120

 **NMR Spectroscopy**

Gaetano Montelione,
James Aramini,
Swapna Gurla
CABM, Rm. 241

Wednesday, January 14th, 2015

MORNING

9:00 AM	Cancer Biology What is Cancer? Shridar Ganesan
10:00 AM	Description of The Cancer Genome Atlas (TCGA): Chang Chan
11:00 AM	<i>Coffee break</i>
11:20 AM	 Cancer Biology Tutorial: <i>Introduction to R; clustering/analysis of TCGA data to characterize DNA sequences and expression profiles leading to treatment plans:</i> Chang Chan, Saurabh Laddha

12:45 PM *Lunch (independent)*

AFTERNOON

1:30 PM	Positioning Yourself for the Future: Stephen Burley, Gail Ferstandig Arnold, Janet Adler
2:15 PM	Successful Sharing – Presentation Skills 101: Kenneth McGuinness
2:45 PM	Preparation for Presentations: Review and clarification of FP data collected using different techniques (Coffee available)

Thursday, January 15th, 2015

MORNING

- 9:00 AM **Tour of the Keck Center for Collaborative Neuroscience:** Patricia Morton
Escort from Proteomics, Rm. 120 at 8:50 AM
- 10:00 AM **Flow Cytometry & Confocal Microscopy:** Theresa Hyejeong Choi, Carol Gardner, Vasanthi Sunil
Escorts from Proteomics, Rm. 120 and from the Keck Center at 9:50 AM
- 11:00 AM **Tour of the RUCDR – Cell culture processing, genomic analyses, and the repository:** Michael Sheldon
Escorts from Proteomics, Rm. 120 and from the Bioimaging facility at 10:50 AM
- 12:00 PM **Show-and-Tell: Fluorescent Corals & Zebrafish Embryos at Rutgers:**
Kevin Wyman & Hatem Sabaawy
Starts in Proteomics, Rm. 120 with escorts to Medical Research Tower, Rm. 226 ("Library")

AFTERNOON

- 1:00 PM *Lunch (independent)*
- 1:45 PM **Continued Preparation for Presentations:**
Sharing of data with teammates; synthesizing an understanding of the team's FP
Comparison of data for the different FPs; synthesizing an understanding of FPs as a whole
(Coffee available)

Friday, January 16th, 2015

MORNING

- 9:00 AM Continued Preparation for Presentations:
Synthesizing an understanding of FPs as a whole
(Coffee available)

AFTERNOON

- 12:00 PM *Lunch (independent)*
- 1:00 PM **Symposium on Fluorescent Proteins:** Contributions from each participant; discussion of how data from all 5 groups fit together, significance
- 3:00 PM *Coffee break*
- 3:20 PM **Symposium on Fluorescent Proteins:** (Cont'd)
- 5:00 PM **Networking**

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Center for Integrative Proteomics Research (Proteomics)

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Parking with valid Student Permit

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