

Molecular Biophysics Trainees

Selected Current and Previous Trainees (Mentor):

Mena Aioub (El-Sayed)
Curtis Balusek (Gumbart)
Alyson Colin (Reddi)
Kathryn Lanier (Williams)
Karl Lundquist (Gumbart)
Tyler McCaslin (Barry)
Kerry McGill (Schmidt-Krey)
Joseph Richardson (Dickson)
Nik Muaz Nik Rushdi (Zhu)
Scott Thourson (Payne)
Yusuf Uddin (Schmidt-Krey)
Gable Wadsworth (Kim)
Ryan Atlee Watson (Barry)



Students in the Molecular Biophysics training program may conduct thesis research with any of the faculty members listed in this brochure.

Interested in graduate study in Molecular Biophysics? Complete the online application or pre-application for admission via the School of Chemistry and Biochemistry at: <http://www.chemistry.gatech.edu/graduate/application/>

The Molecular Biophysics graduate training program aims to increase diversity and to create a supportive environment for members of traditionally underrepresented groups.

Professor Bridgette Barry, Program Director

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Research may be conducted in any of the research **Foci**:

- Structure, Function, and Evolution of Nuclei Acids
- Membranes, Protein Misfolding, and Protein Function
- Cellular Sensors and Cellular/Extracellular Dynamics

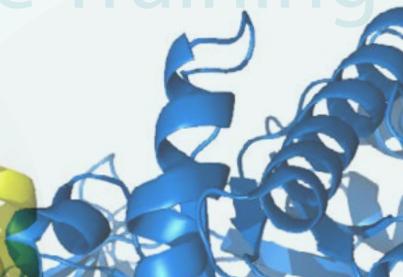
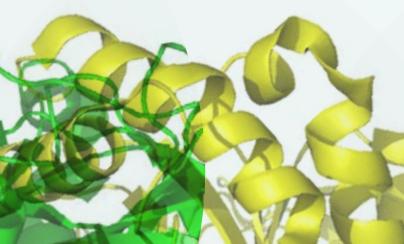
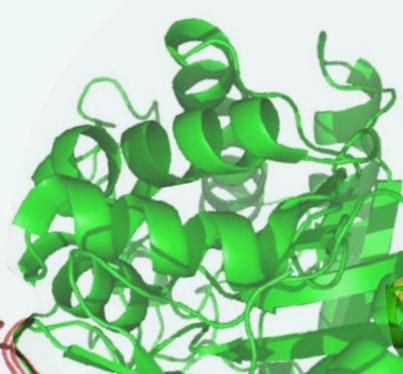
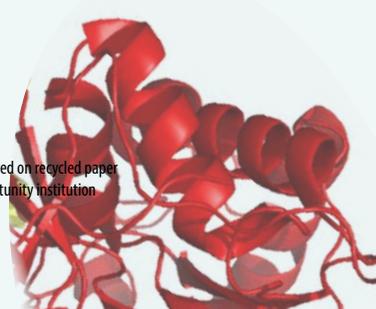


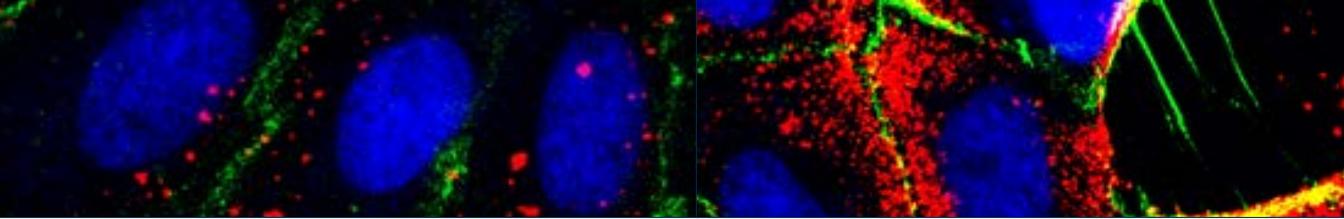
Molecular, Cellular & Extracellular Biophysics

Graduate Training

Training Program

Graduate Training





Graduate Training in Molecular, Cellular, and Extracellular Biophysics

Molecular Biophysics is an exciting interdisciplinary research area. Georgia Tech has a vibrant, interactive biophysics research faculty and state-of-the-art instrumentation. Biophysics research projects at Georgia Tech involve investigations of macromolecular structure, function, and catalysis. A wide variety of approaches, including spectroscopy, X-ray crystallography, cryo-EM, microscopy, single molecule techniques, and computation are employed.

Molecular Biophysics faculty are drawn from the departments of Applied Physiology, Biology, Biomedical Engineering, Chemistry and Biochemistry, Mechanical Engineering, and Physics.

Ed Balog: (*Applied Physiology, Biology*) Studies of intracellular ion channels known as ryanodine receptors (RyRs). These proteins are the primary efflux pathway for the release of calcium from the sarcoplasmic reticulum.

Bridgette Barry: (*Chemistry and Biochemistry*) Biological electron transfer, membrane biophysics, DNA synthesis, peptide maquettes, vibrational spectroscopy, EPR spectroscopy, photosynthesis.

Jennifer Curtis: (*Physics*) Investigation of the structure, mechanics and function of the pericellular coat and hyaluronan-protein macromolecular assemblies; the mechanics of phagocytosis using biophysical and nanopatterning tools.

Robert M. Dickson: (*Chemistry and Biochemistry*) Single molecule spectroscopy, fluorophore design and utilization in materials and biology, laser spectroscopy and dynamics, nanoparticle synthesis and photophysics, biolabeling, superresolution and high-sensitivity optical microscopy.

Mostafa A. El-Sayed: (*Chemistry and Biochemistry*) Nanoscience: synthesis and study of the properties of nanomaterial of different shapes, nanotechnology: potential use of nanoparticles in: a) nanomedicine: diagnostics and selective photothermal therapy of cancer, b) nanocatalysis: shape dependence in cage effects.

Christoph J. Fahrni: (*Chemistry and Biochemistry*) Development and application of cation-selective fluorescent probes for biophotonics. Study of metal-ion distribution and subcellular localization in live cells by x-ray fluorescence microscopy.

JC Gumbart: (*Physics*) Molecular dynamics simulations of membrane-protein insertion and function at both the inner and outer bacterial membranes, bacterial cell wall dynamics and growth, nascent-peptide-ribosome interactions.

Rigoberto Hernandez: (*Chemistry and Biochemistry*) Analytic and computational approaches in nonequilibrium statistical mechanics to understand the structure and dynamics within and between proteins.

Nicholas V. Hud: (*Chemistry and Biochemistry*) Elucidation of the fundamental chemical and physical principles that govern nucleic acid assembly at multiple scales, from cation-mediated RNA folding in the ribosome to the organization of DNA in viruses and bacterial cells.

Harold Kim: (*Physics, Biology*) Quantitative understanding of transcription-factor activated gene expression in eukaryotic cells with emphasis on the role of nucleosome position/energetics and three-dimensional organization of the genome in gene regulation. Fluorescence microscopy of live cells and single molecules.

Raquel L. Lieberman: (*Chemistry and Biochemistry*) Protein crystallography, enzymology, biophysics, chemical biology and in silico modeling to elucidate the structure, function and mechanism of enzymes that perform hydrolysis reactions in an unusual chemical environment within or at the surface of the lipid bilayer of a cell.

Nael McCarty: (*Emory School of Medicine, Biology, Chemistry and Biochemistry*) Biophysical approaches to understand the structure, function, and regulation of plasma membrane ion channels and receptors.

Christine Payne: (*Chemistry and Biochemistry*) Development and use of fluorescence microscopy to image intracellular dynamics. Specific systems of interest include the transport of extracellular cargo and nanoparticle-cell interactions.

Amit Reddi: (*Chemistry and Biochemistry*) Biophysical and biochemical characterization of cellular transition metal trafficking, metalloproteins and metalloproteomes, placing an emphasis on systems relevant to cancer, neurodegenerative disorders, and infectious diseases.

Ingeborg Schmidt-Krey: (*Biology, Chemistry and Biochemistry*) Structure of eukaryotic membrane proteins and membrane protein complexes by electron crystallography.

C. David Sherrill: (*Chemistry and Biochemistry, Computational Science and Engineering*) Quantum mechanical models of electronic structure used to obtain reliable binding energies and substituent effects for non-covalent interactions in nucleic acids and between protein side-chains.

Jeffrey Skolnick: (*Biology, Chemistry and Biochemistry, Computational Science and Engineering*) Computational biology.

Todd Sulchek: (*Mechanical Engineering, Bioengineering*) Bioengineering and microelectromechanical systems: atomic force microscopy, pathogen adhesion and endocytosis, cell biomechanics, single molecule biophysics, drug delivery and targeting, biosensors.

Roger Wartell: (*Biology, Physics*) Mechanism of protein facilitated sRNA regulation of mRNA expression; assembly and stability of RNA structures.

Loren D. Williams: (*Chemistry and Biochemistry*) Experimental and informatic approaches to determining and characterizing nucleic acid structures, and the forces that govern the structures.

Cheng Zhu: (*Biomedical Engineering, Bioengineering*) Biomechanics of cell adhesion and signaling molecules of the immune system and the vascular systems.

