Why is Biophysics Important Right Now?

Society is facing physical and biological problems of global proportions. How will we continue to get sufficient energy? How can we feed the world’s population? How do we remediate global warming? How do we preserve biological diversity? How do we secure clean and plentiful water? These crises require scientific insight and innovation. Biophysics provides that insight and technologies for meeting these challenges, based on the principles of physics and the mechanisms of biology.

Biophysics discovers how to modify microorganisms for biofuel (replacing gasoline and diesel fuel) and bioelectricity (replacing petroleum products and coal for producing electricity).

Biophysics discovers the biological cycles of heat, light, water, carbon, nitrogen, oxygen, heat, and organisms throughout our planet.

Biophysics harnesses microorganisms to clean our water and to produce lifesaving drugs.

Biophysics pushes back barriers that once seemed insurmountable.
Biophysics, a Bridge Between Biology & Physics

Biology studies life in its variety and complexity. It describes how organisms go about getting food, communicating, sensing the environment, and reproducing. On the other hand, physics looks for mathematical laws of nature and makes detailed predictions about the forces that drive idealized systems. Spanning the distance between the complexity of life and the simplicity of physical laws is the challenge of biophysics. Looking for the patterns in life and analyzing them with math and physics is a powerful way to gain insights. Biophysics looks for principles that describe patterns. If the principles are powerful, they make detailed predictions that can be tested.

Biophysics at the U

The University of Utah has a long tradition of biophysics research in a variety of departments and graduate programs on campus. Two key themes of the Utah experience are diversity and collaboration, which are evident across research groups and entire departments. The biophysics efforts within the department are complemented by strong collaborative efforts throughout campus, including Physics & Astronomy, Biology, Chemistry, Mathematics, Biochemistry, and Bioengineering, as well as numerous institutes and facilities, representing a vibrant and growing community.

The University of Utah offers numerous courses learning facilities, and opportunities to participate in cutting-edge research in Biophysics and related areas. Interested students can apply to the Biological Chemistry Program or to a participating department as outlined on the University’s Biophysics website: www.biophysics.utah.edu.

Department Research Groups

The Nano-optics group is advancing the boundaries of bio-imaging. This research aims to optimize nanoscale-imaging performance in aqueous environments and to ultimately image biomolecular network structures with single molecule sensitivity.

The Virus Budding group is studying the process by which a new enveloped virus is created on the membrane of its host cell. An enveloped virus similar to influenza or HIV needs to incorporate its genome and many different proteins to be infectious. How all these components are packaged into a new virus; and how the fission from cellular membrane works; are still open questions.

The Molecular Motors group studies the properties of molecular motors, such as kinesins and dyneins. These proteins are responsible for a wide variety of cargo transport in cells, from single molecules to the largest intracellular assemblies. The group’s focus is on how these motors work together, their regulation, and how their functioning is disrupted or altered in various diseases.

To learn more about the Biophysics program, visit: www.biophysics.utah.edu