The Physics of Life
(Physics 171)

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Course Description

Expanded Description

The Physics of Life, aimed at non-science majors, will introduce and survey the broad field of biophysics. We will examine the ways in which physical laws and principles guide and constrain life, and the physical properties of microscopic and macroscopic biological materials.

We will explore questions such as "What are you made of?," the multifaceted answers to which continue to fascinate scientists. It is easy to make a list of your “parts” – cells, bones, muscles, etc. – but this is neither interesting nor illuminating. What is it about your flesh that makes you squishy? Would you be better off with a skeleton of wood rather than bone? If you shrank a whale to the size of a bacterium, could it swim the same way? These questions, like many at the forefront of contemporary science and medicine, bring together concepts from a variety of disciplines, mixing together biology, chemistry, and physics.

We will explore topics in biophysics and biomaterials. We will examine subjects such as the mechanical properties of DNA, and why these properties are crucial to life; structural similarities between cell membranes and soap films; and the simple biomechanical reasons that elephants can’t jump. There are no scientific prerequisites, and mathematics in the course will be at the level of elementary algebra. Beyond exploring exciting areas of contemporary science, our goals will be to improve critical reasoning abilities, especially with respect to quantitative data, and to better understand the process of science, i.e. how we know what we know.