

Biology 11. The Science of Life

Offerings for 09-10

In 09F at 10

Life Through Compound Eyes. Insects rule the earth. They are conspicuous occupants of every terrestrial environment in the world. They influence the properties of ecosystems and the biology of all species within ecosystems. There are more species of insects than all other plant and animal groups combined. Furthermore, insects have proven to be ideal organisms for biological study within virtually every subdiscipline of biology. In this course, we will draw from the treasure of pioneering research that has been conducted with insects to study the most general and important biological theories from all levels of biological organization: biochemical, molecular, cellular, developmental, organismal, population, communities, and ecosystems -- and naturally we will do so from the perspective of the evolutionary processes that shape life on earth. Along the way we will also see how the insect body plan and its underlying genome have permitted the breathtaking diversification of insects, and we will note some of the myriad ways in which insects affect the lives of humans in terms of disease, agriculture, and the environment. *Berger, Ayres.*

In 09F at 10A

Cooperation and Conflict in Biological Systems. Cooperation and conflict arise at all levels of biology—with molecules, cells, organisms and communities. Throughout the term, we will explore several examples of cooperation and conflict in biological systems and examine the cost and benefits of these two opposing forces. We will investigate theories about how cooperation and/or conflict have shaped how life began, the concept of “selfish” DNA, why cells have the structures they have as well as multi-protein complexes driving essential cellular processes. In addition, we will discuss the generation of multicellular organisms, cooperation of different cell types within the organism and examples of cellular competition that arise in specific diseased states such as cancer. We also will consider behavioral interactions among different types of organisms, and the organization of human societies. Ultimately, our goal is to guide students to critically evaluate the different ways that cooperation and conflict shape biological systems and to begin to understand the mechanisms underlying these two forces. *Bickel, Calsbeek.*

In 10W at 10A

Biology in the News. Biology is relevant to almost all aspects of everyday life. Some are obvious. Everyone recognizes that medicine and agriculture clearly have their roots in biology. However, others are not so obvious to the average person. Even insurance actuarials, economic policies and nuclear proliferation have their roots in biology. Each day we will consider the biological underpinnings and implications of a local, national or international news story taken from a broad range of topics. *Dietrich, McPeck.*

In 10S at 10A

LUCA: the Last Universal Common Ancestor. Over the course of the last 4.5 billion years, life has faced a number of challenges, and in response has evolved a number of remarkable innovations to meet those challenges. Incorporating data and perspectives from molecular and cellular biology, macroevolutionary theory, and paleobiology, we will reconstruct the biology of the Last Universal Common Ancestor of all living organisms. Her name is LUCA and unraveling her biology will require us to work within the framework of what it means to be a living cell. We will move forward in time from the origin of life, and backward in time from the remarkable diversity of life present today. We will see that much of LUCA’s biology has left “molecular fossils” in our very own DNA, and we will learn how to read this remarkable fossil record. *Peterson, Sloboda.*