

Biology 11

2011 -2012 Offerings

11F at 9L, *DNA to Diversity*. We have chosen “DNA to Diversity” as a theme because we want to highlight how modern biology integrates all levels from the molecule to the diversity of life. As an organizing principle, we focus on the development of complex multicellular organisms. We will explore how cellular processes are driven by key developmental control genes, how cells communicate, and how these molecular and cellular mechanisms shape diverse forms of life. We will investigate how ecological forces drive natural selection, and how this and other evolutionary processes have sorted and sifted DNA mutations, producing DNA blueprints that direct development. Over the course of the term, students should gain a perspective on how genetic and environmental changes have produced the astonishing variety of species and life forms that now exist on earth, and how biologists are piecing that puzzle together. Jack, Peart.

11F 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. McClung, McPeck.

12W 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. McPeck.

12S at 10, *Emerging Infectious Diseases: How Microbes Rule the World*. Emerging infectious diseases, which have shaped the course of humanity and caused untold suffering and death, will continue to challenge society as long as humans and microbes co-exist. This course will explore why infectious diseases emerge and re-emerge. The viruses, bacteria and eukaryotes that cause these diseases continually evolve in response to their hosts. Dynamic interactions between rapidly evolving infectious agents and changes in the environment and in host behavior provide such agents with favorable new ecological niches. In addition, dramatic increases in the worldwide movement of people and goods drive the globalization of disease. Guerinot, B. Taylor.