

BB 4900-A18. CURRENT TOPICS IN CANCER VACCINES

This capstone course will use student presentations and discussions to investigate current research articles in the field of cancer vaccines. These vaccines use a patient's own immune system to kill the tumor cells, and are quite diverse, including: dendritic cell (DC) vaccines, tumor-infiltrating lymphocytes (TILs), and chimeric antigen receptor (CAR) vaccines. Although early cancer vaccine attempts did not work well, the past few years have shown some spectacular successes, including complete cancer remissions in patients with metastatic tumors resistant to all current treatments and with very poor prognosis. But the vaccines often have side-effects and do not work well in all patients. Students should have a strong foundational knowledge of cell and molecular biology, as would be obtained from BB 2550 and BB 2950.

BB 4900-B18. CELL MOTILITY AND NANO-MACHINES

Cell motility is important for all cells, from bacteria to neurons. The motile mechanisms of cells are diverse, but in many cases, the cellular components responsible have been conserved in evolution. Some of the key molecules for motility are 80-90% identical between animal, fungi and plants! Despite this similarity, these molecular machines are responsible for generating differences in cell shape and motility such as those between fungal hyphae, leaf cells, and neurons. How are these molecular machines organized to allow the incredible diversity of forms and behaviors of cells? How is energy converted and forces generated by machines only a few nanometers in size? What cellular assemblies and structures are responsible for muscle contraction, phagocytosis of bacteria, or metastatic behavior? In this class we will explore the recent and classic literature in this field and we will also explore the constantly expanding collection of exciting videos of cells in motion. Suggested background: BB 2550 (Cell Biology).

BB 4900-C19. ASK YOUR DOCTOR: PROBIOTICS AND BIOLOGICS

We are awash in advertising for drugs called "biologics" and recommendations for "probiotics" that will impact everything from our digestive and immune systems to our moods. Working from the primary literature, we will examine some of these claims, begin to understand the science behind them, and the potential risks and benefits of both prescription and over-the-counter products.

This course is appropriate for junior and senior life science students with a strong biology background, particularly those who have an interest in medical microbiology, immunology, physiology or other aspects of human health.

BB4900-D19. SYNTHETIC BIOLOGY

Do we yet have the technology to engineer life? Can we control gene expression to create organisms that function in useful ways? Do we understand the tenets of genetic regulation as well as we think we do? These important questions and more are investigated by the emerging field of Synthetic Biology. In this course, students will explore this exciting new realm of biology through in-depth analysis and discussion of primary literature. Topics to be covered include the design and construction of synthetic gene circuits, synthesis of new genes and genomes, logic gate regulation of gene expression, and the latest applications of synthetic biology to advances in medicine, information processing, and the environment. Students should have a strong foundational knowledge of cell biology, molecular biology, and genetics, as would be obtained from BB2550, BB2920, and BB2950.