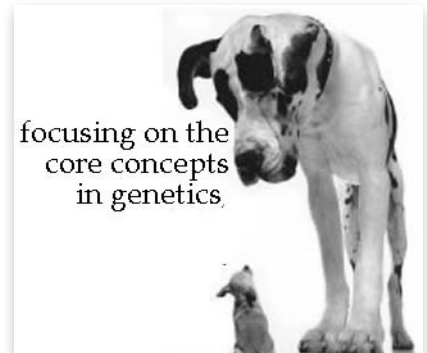


biofundamentals: genetics

The goal of the course is to help students' achieve an understanding of how genes behave, both within an organism and within a lineage. Such an understanding involves understanding how variations in genes (alleles) arise through mutation and recombination, how allelic variation influences an organism's traits (its phenotype), and how a particular organism comes to inherit the specific alleles in contains.

Students should be able to understand the impacts of various modes of reproduction (sexual versus asexual) on genetic variation within a population. Using new genomic analysis tools, students should be able to interpret the impact of evolutionary processes (positive and negative selection, genomic reorganization) on the alleles present within an individual and a population, as well as the process of reproductive isolation, a key aspect of how new species arise from ancestral species, associated with the process of meiosis.



Based on an understanding the nature of monogenic (recessive, dominant, maternal, sex-linked, enhancer, and suppressor) traits, students should be able to analyze family trees to generate and test predictions and plausible mechanisms for the appearance of various traits, including pathological traits and disease susceptibilities, within specific and related individuals. In a scientific setting, students will be introduced to methods (genetic crosses and outcomes analyses) that can be used to identify processes such as synthetic lethality and that provide evidence for genetic linkage and the influence of evolutionary pressures.

The overall goal is a molecular and cellular level understanding, appreciation, and working ability to consider the relationships between gene structure, gene expression and the function(s) of gene products, the interactions between genes associated with the expressivity and penetrance of monogenic traits, together with an understanding of how a particular gene can contribute to a range of traits and how many genes cooperate to produce any particular trait.