

BIOL1020 Core Concepts

Introduction to evolution as a common theme in biology: Common ancestor concept,
Taxonomy intro, Evolutionary processes intro
Cells: definition, structure, types, cytoskeleton
DNA and RNA: structure and composition, double helical structure
implications/parallel/anti-parallel
DNA replication
Macromolecules: polymerization, carbohydrates, lipids, proteins
Structure and function of macromolecules
Cellular energy: ATP, Energy and matter, Chemical reaction, Enzymes
Photosynthesis and Cellular respiration
Cell Cycle: Description and regulation (cancer)
Molecular anatomy of a gene: Prokaryote vs Eukaryote
DNA packaging
From genes to traits concept - Bacterial gene structure and regulation (operon
structure and regulation, basal transcription factors, levels of bacterial gene control
Eukaryotic Gene regulation: molecular anatomy, The Central Dogma of Mol Biol
(Transcription, Translation, mRNA Processing)
Prokaryote/eukaryote
Viruses (General intro, Replication cycle, Anti-Central Dogma
Biotechnology intro (Cloning, PCR, Gel electrophoresis, Probability, Experimental
design)
Sources of genetic variation: Mutation, Horizontal gene, transfer
Meiosis
Asexual reproduction
Mendelian genetics (Mendel I): Segregation, Dominance, Test cross, Punnett squares
Mendelian Genetics (Mendel II): Independent assortment, genetic interactions
(introduction to epistasis)
Pleiotropy, Polygenic traits (intro)
Gene Linkage and recombination mapping (basic – two point cross)
Mapping complex traits (QTL intro)
Adaptation and natural selection
Hardy-Weinberg; changes in allele frequencies (mutation, drift, selection), gene flow
Genomics, genome structure and evolution, comparative genomics