Study Guide: Highlights and Themes from Midterm #1 Lecture Series

Lecture Series 1 – Evolutionary Framework

Overview of Biology
Evolutionary Milestones
Biological Diversity
Fundamental Concepts
    Emergent Properties
    Hierarchical Organization
Endosymbiosis and Complexity
Habitable Zones in our Solar System

Lecture Series 2 – Biologically Important Macromolecules

Condensation/Dehydration or Hydrolysis Reactions
Macromolecules vs. Polymers
    Lipids
    Carbos
    Proteins
    Nucleic Acids
Bonds/Linkages for each!
Proteins
    Structures and Functions
    Folding
    Interactions

Lecture Series 3 – The Organization of the Cell

Cell Theory
Surface Area to Volume Ratios
Compare and Contrast Prokaryotes with Eukaryotes
Compare and Contrast Plant Cells with Animal Cells

Organelles
    Structures and Functions
Endomembrane System
    e.g., From Signal Sequence to Oligosaccharide in a Glycoprotein
Cytoskeleton
    Whose Who and What Do They do?
    Motor Proteins and How They Work
Extracellular Structures of Plants and Animals

Lecture Series 4 – Cellular Membranes

Membrane Composition and Structure
Animal Cell Adhesion
Passive Processes of Membrane Transport
    Osmosis, Which Way Does It Flow?
Active Transport of Membrane Transport
    Primary vs Secondary
Endocytosis and Exocytosis
    Receptor-Mediated Endocytosis

Lecture Series 5 – Cell Cycle & Cell Division

Systems of Cell Division
    Bacterial Cell Division
Interphase and the Control of Cell Division
    The Eukaryotic Cell Cycle
    Cell Cycle Control
        Internal and External
Eukaryotic Chromosomes
    Organization of Chromosomes
        Levels of Packing
        Histones
        Cohesins and Condensins

Mitosis = Cloning
- All the steps
- Cytokinesis in Animal vs Plant Cells
- Evolutionary Development Issues

Meiosis = Diversity
- All the steps – twice!
- Alternation of Generations

Genetic Variation Provided by Sex:
- *Independent Assortment of Chromosomes*
- *Crossing Over Events of Non-Sister Chromatids*
- *Random Fertilization*

Meiotic Errors
- Nondisjunction
- Aneuploidy

Programmed Cell Death
- Apoptosis