School District of Marshfield
Course Syllabus

Course Name: Biology Honors
Length of Course: 1 Year
Credits: 1

Course Description:
It is important for a biology student use details learned in class as a tool for comprehending biology's impact in a global society. Students will examine biological concepts including the scientific process, biochemistry, cellular structure, cellular metabolism, genetics, evolution, plants, and ecology. Even though the Honors Biology curriculum covers a broad range in topics, it is important to link the diverse concepts we will be studying. Students should be aware that there are unifying themes among the diverse biological concepts.

Learning Targets:
- Understand concepts in the three overarching topics: Molecules and Cells, Heredity and Evolution, Organisms and Populations.
- Develop a conceptual framework for modern biology emphasizing evidence for an understanding of science as a process rather than the accumulation of facts.
- Develop a conceptual framework for modern biology emphasizing recognition of evolution as the foundation of modern biological models and thought.
- Integrate the general topics of biology through the eight major themes of biology: Science as a Process, Evolution, Energy Transfer, Continuity and Change, Relationship of Structure to Function, Regulation, Interdependence in Nature, and Science, Technology and Society
- Apply biological knowledge and critical thinking to environmental and social concerns.

First Quarter – 9 weeks
1. Scientific Process (1.5 weeks)
2. Chemistry (3.5 weeks)
   A. Basic Chemistry
   B. Chemistry of Water
   C. Biochemistry
3. Cellular Structure and Function (2 weeks)
   A. Microscopy
   B. Prokaryotic vs. Eukaryotic Cells
   C. Plant vs. Animal Cells
   D. Eukaryotic Organelles
4. Energy and Enzymes (2 weeks)
   A. Energy
   B. Laws of Thermodynamics
   C. ATP Structure and Function
   D. Enzyme Function and Regulation

Second Quarter – 9 weeks
5. Cell Membrane Structure and Function (2 weeks)
   A. Plasma Membrane Structure
   B. Plasma Membrane Protein Functions
   C. Cell Transport
6. Cellular Respiration (2 weeks)
   A. Cellular Respiration vs. Fermentation
   B. Input and Output of Glycolysis, Citric Acid Cycle, ETC + ATP Synthase
   C. Ethanol and Lactic Acid Fermentation
7. Photosynthesis (2 weeks)
   A. Producers vs. Consumers
   B. Plant Pigments
   C. Input and Output of Light Reactions and Calvin Cycle
   D. C3, C4, and CAM Plants
8. Cell Division (3 weeks)
   A. Purpose of Cell Division Associated With Mitosis and Meiosis
   B. Cell Cycle With Mitosis
   C. Characteristics of Cancer
   D. Cell Division With Meiosis
   E. Genetic Recombination
   F. Chromosomal Mutations

Third Quarter – 9 weeks
9. Mendelian Genetics (2.5 weeks)
    A. Mendel's Principles of Genetics
    B. Complete, Incomplete, and Codominance
    C. Multiple Alleles, Pleiotropy, and Polygenic Inheritance
    D. Pedigree Analysis
10. Molecular Biology and Genetics (2 weeks)
    A. DNA and RNA Structure
    B. DNA Replication, Transcription, and Translation
    C. Point Mutations
11. Genetics of Viruses and Bacteria (1 weeks)
    A. Lytic Cycle and Lysogenic Cycle
    B. Emerging Viruses
    C. Transformation, Transduction, and Conjugation
    D. Operon Hypothesis
12. DNA Technology (1.5 weeks)
    A. Restriction Enzymes, Polymerase Chain Reactions, and Gel Electrophoresis
    B. Cloning, Stem Cells, DNA Fingerprinting, GMO's, Gene Therapy
13. Evolution (2 weeks)
    A. Evidence of Evolution
    B. Microevolution and Hardy – Weinberg Equilibrium
    C. Macroevolution and Speciation
    D. Systematics and Phylogeny

Fourth Quarter – 9 weeks
14. Plants (3 weeks)
    A. Structure, Reproduction, and Development
    B. Nutrition and Transport
    C. Plant Growth: Hormones, Photoperiods, Tropisms
15. Ecology (6 weeks)
    A. Biomes
    B. Population Ecology
    C. Community Ecology
    D. Ecosystem Ecology
    E. Behavior Ecology
    F. Ecology and Society

Required Core Resources: Biology: Concepts and Connections 4th Edition (Campbell, Reece, Mitchell)