MEDFORD HIGH SCHOOL
COURSE SYLLABUS

Department:	Science

Course Title:	Biology

Level and/or Grade:	Standard; Grades 10-11

Prerequisite:	Passing grade in Introductory Physics 9.

Course Description:

This course emphasizes inquiry and lab-based experiences to explore the fundamental principles of living things. Students study life by examining systems from the molecular level through cell biology and genetics, to the tissue and organ level in vertebrate anatomy and physiology, and at the level of organisms and populations through ecology. Students encounter standards in the areas of *The Chemistry of Life, Cell Biology, Genetics, Anatomy and Physiology, Evolution and Biodiversity, and Ecology*. In classes where dissection is used as an instructional activity, students will be presented with alternatives as described in the district's Dissection Policy.

Note: *In the 2-year version of the course, standards under Chemistry of Life, Ecology, and Cell Biology are presented in Year 1 (Biology A) and standards under Genetics, Evolution & Biodiversity and Anatomy & Physiology are presented in Year 2 (Biology B).*

Learning Standards: *Through inquiry, experimentation, labs, use of tools, discussion, presentation, and composition, students will be able to….*

The Chemistry of Life:

- Recognize the six most common elements in organic molecules: C, H, N, O, P, S.
- Describe the composition and functions of carbohydrates, lipids, proteins, and nucleic acids.
- Explain the role of enzymes in biochemical reactions.

Cell Biology:

- Relate cell parts/organelles to their functions; describe how cells function in a narrow range of physical conditions such as temperature and pH, to perform life functions that help maintain homeostasis.
- Explain the role of cell membranes as a highly selective barrier.
- Differentiate between prokaryotic cells and eukaryotic cells; distinguish between plant and animal cells.
- Use cellular evidence and modes of nutrition to describe various kingdoms.
- Explain the interrelated nature of photosynthesis and cellular respiration.
- Identify the reactants and products in the general reaction of photosynthesis.
- Provide evidence that the organic compounds produced by plants are the primary source of energy and nutrients for most living things.
- Describe and compare the processes of mitosis and meiosis, and their role in the cell cycle.
- Compare and contrast a virus and a cell in terms of genetic material and reproduction.
- Recognize that while viruses lack cell structure, they have the genetic material to invade living cells.

Genetics:

- Describe the structure and function of DNA; describe the processes of replication, transcription, and translation and how they relate to each other in molecular biology; explain mutations in DNA sequence.
- Differentiate between dominant, recessive, co-dominant, polygenic, and sex-linked traits.
- State Mendel's laws of segregation and independent assortment.
- Use a Punnett Square to determine the genotype and phenotype of monohybrid crosses.

Anatomy & Physiology:

- Explain how the major organ systems in humans have functional units with specific anatomy that perform a function of that organ system.
- Be familiar with parts of the digestive, circulatory, respiratory, nervous, muscular, sexual reproductive systems: generalize their functions.
- Describe how the functions of individual systems within humans are integrated to maintain homeostatic balance in the body.

Evolution and Biodiversity:

- Explain how the fossil record, comparative anatomy, and other evidence support the theory of evolution.
- Describe how the taxonomic system classifies living things into domains and kingdoms based on morphological, behavioral, and molecular similarities.
- Illustrate how genetic variation is preserved or eliminated from a population through Darwinian natural selection resulting in biodiversity.

Ecology:

- Identify factors in an ecosystem that influence fluctuations in population sizes.
- Analyze changes in an ecosystem resulting from natural causes, changes in climate, human activity, or introduction of non-native species.
- Use a food web to identify and distinguish producers, consumers, and decomposers.
- Explain how symbiotic behavior produces interactions within ecosystems and how biotic and abiotic factors cycle in an ecosystem (water, carbon, oxygen, nitrogen).

Course Alignment with High School Expectations for Student Learning:

Students will…

1. Analyze, interpret, evaluate and use logical reasoning to solve problems using a variety of resources and strategies.
    - Make observations, raise questions, and formulate hypotheses.
    - Read, interpret, and examine the credibility and validity of scientific claims in different sources of information.
    - Design and conduct scientific investigations (ID purpose, select appropriate tools and conditions; identify variables; write clear procedures; measure accurately; collect data in organized ways; follow safety guidelines. Analyze and interpret results of scientific investigations.
2. Communicate effectively to a variety of audiences.
    - Communicate orally and in writing, and apply the results of scientific investigations.
    - Explain diagrams and charts and prepare lab reports,
    - Use language and vocabulary appropriately, speak clearly, and use appropriate technology.
3. Create works using a variety of communication forms.
    - Present arguments through writing; solve problems through projects, homework, tests, and lab experiences; use technology; make oral presentations.
4. Develop skills and knowledge to reach personal and career goals.
    - Develop ‘habits of mind’: work beyond center of competence; gain attitude of persistence; seek feedback; develop confidence.
    - Become familiar with careers related to science.
5. Work cooperatively to achieve objectives.
    - Work in pairs, small groups, and part of the whole class to solve problems.
    - Analyze and evaluate the mathematical thinking and strategies of others.

Assessment:

- See grading policy attached.