Fayette R-III

FHS- Curriculum Guide for Biology

Fayette R-III Mission: To educate all students to be ethical, successful citizens.

The Biology Learning Goals are based on the Missouri Learning Standards. The Missouri Learning Standards define the knowledge and skills students need to succeed in college, other postsecondary training and careers. This document is designed to make clear what each child should know and be able to do at the end of the course in Biology.

Course Description: Biology is devoted to the study of living things and their processes. Throughout the year this course provides an opportunity for students to develop scientific process skills, laboratory techniques, and an understanding of the fundamental principles of living organisms. Students will explore biological science as a process, cell structure and function, genetic heredity, evolution and classification, and the diversity of living organisms and their ecological roles. Units of this course include:

1. The Nature of Science and Biological Principles - themes, processes, chemistry, and biochemistry.
2. Cell Structure, Energy, and Division - structures and functions, transport systems, photosynthesis and cellular respiration, nucleic acids, and protein synthesis, chromosomes, mitosis and meiosis.
3. Structure and Function of DNA and Genetics - fundamentals, inheritance patterns, human genetics, gene expression and applied genetics.
4. Natural Selection and Evolution- principles of natural selection
5. Ecology - biosphere and biomes, ecosystem structure and relationships, populations, and future concerns.
6. Biotechnology, Scientific Research, and Ethics in Science- advancement and careers in science

Course Rationale: The Science Department of the Fayette School District believes that science is a diverse subject that encompasses many fields of investigation and interests. The primary goals of Fayette science courses are to equip students with an understanding of scientific concepts and principles, to develop students' critical thinking and problem solving skills in a variety of contexts, and to foster students' clear communication of their knowledge with others. We recognize that it is important to teach students methods of using current technology and outside resources to research information and help them make informed decisions for the purpose of better participation in the world around them. To accomplish these goals, students will participate in a variety of instructional activities and will develop information gathering, reading, writing, comprehension, and problem-solving skills both as individuals and as group members.

Biology Student Learning Goals	**Standard Alignment**
1. Students will plan and conduct investigations using specific and qualitative criteria.	9-12LS1 - 3
2. Students will explain how various factors affect carrying capacity and biodiversity of an ecosystem.	9-12-LS2-1
3. Students will communicate the pattern of the cycling of matter and the flow of energy among trophic levels in an ecosystem.	9-12-LS2-3
4. Students will design, evaluate, and/or refine solutions that positively impact the environment and biodiversity with an understanding that changing conditions may result in new ecosystem dynamics.	9-12-LS2-5, LS2-6, ESS3-1, ESS3-4
5. Students will use models to illustrate organization and interaction of systems that provide specific functions within multicellular organisms.	9-12-LS1-2

6. Students will develop and use models to communicate the role of mitosis, cellular division, and differentiation in producing and maintaining complex organisms.	9-12-LS1-4
7. Students will construct a model of the structure of DNA and explain how it determines the structure of proteins which carry out the essential functions of life.	9-12-LS1-1
8. Students will compare and contrast asexual and sexual reproduction with regard to genetic information and variation in offspring.	9-12-LS3-1, LS3-2
9. Students will use a model to describe why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism.	9-12-LS3-3
10. Students will be able to use data to explain that inheritable genetic variations may result from new genetic combinations in meiosis, mutations occurring during replication, and/or mutations caused by environmental factors.	9-12-LS3-4
11. Students will apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.	9-12-LS3-5
12. Students will construct an explanation based on evidence that the process of evolution primarily results from four factors: (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment.	9-12-LS4-3
13. Students will construct an explanation based on evidence for how natural selection leads to adaptation of populations with organisms having advantageous traits tending to increase in proportion.	9-12-LS4-4, LS4-5
14. Students will explain the cause and effect relationship between changes to the environment and the effect on distribution, emergence, or disappearance of species.	9-12-LS4-6
15. Students will use a model to demonstrate how photosynthesis transforms light energy into stored chemical energy and how cellular respiration transfers energy.	9-12-LS1-7, LS1-8
16. Students will construct an explanation based on evidence that organic macromolecules are primarily composed of six elements (carbon, hydrogen, oxygen, nitrogen, sulfur, and phosphorus) to form large carbon-based molecules such as proteins, carbohydrates, nucleic acids, and lipids.	9-12-LS1-8
17. Students will use evidence to explain that the processes of photosynthesis, chemosynthesis, and aerobic and anaerobic respiration are responsible for the cycling of matter and flow of energy through ecosystems and that environmental conditions restrict which reactions can occur.	9-12-LS2 -2
18. Students will use a model to illustrate the roles of photosynthesis, cellular respiration, decomposition, and combustion in the cycling of carbon through the biosphere, atmosphere, hydrosphere, and geosphere.	9-12-LS2 -4
19. Students will analyze the roles of science and society as they interact to determine the direction of scientific and technological progress.	

Resources:
Biology Textbook- Holt McDougal, Vernier LabQuest and appropriate sensors.
Assessments:
Teacher developed formative and summative assessments, Missouri Biology EOC

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