

**Berlin Brothersvalley School District
Berlin Brothersvalley High School
Year at a Glance Curriculum**

**Science Department
Biology
9th Grade**

Course Description:

Biology 9 is an introductory course designed to provide a broad education in the fundamentals of biology (cell biology, bioenergetics, chemical basis for life, theory of evolution). This course, in combination with genetics and ecology, prepares students for choosing more advanced courses in the biological sciences, (anatomy/physiology, biology II, chemistry). A variety of instruction, including labs, will be used to cover and reinforce key topics. This course is constantly evolving based on real-world events. Biological topics in the news (medical treatments, agricultural techniques) are incorporated in the course to show the student biology's direct connection to their everyday lives. Please see below for a concise outline of the course.

Units of Study	Competencies	Approximate Time Frame	Standards
Into to Biology & Scientific Method	Students will be able to classify organisms based on their characteristics, make predictions and testable hypotheses about a future event based on current evidence or past experience, design a scientific experiment, graph and analyze data, and use tools of a scientist safely.	3 weeks	3.1.9-12.B 3.1.9-12.C
Ecology & Human Impact	Students will be able to construct and analyze an energy pyramid as it relates to different trophic levels, identify the parts of the carbon and nitrogen cycles, construct and analyze an exponential, logistic, and age structure graph, interpret climate change graphs, explain the impact of humans on natural resources, interpret predator/prey graphs, identify and describe symbiotic relationships (mutualism and parasitism), identify the parts of the carbon and nitrogen cycles, and construct and analyze an exponential, logistic, and age structure graph.	4 weeks	3.1.9-12.H 3.1.9-12.L 3.1.9-12.I 3.1.9-12.M 3.1.9-12.N 3.1.9-12.O 3.1.9-12.V 3.1.9-12.X 3.3.9-12.O
Water and Atoms & Biochemistry/Cells/Transport	Students will be able to identify the 4 essential elements that make up organisms (C, H, O, N,) determine how elements form bonds, identify the quinque properties of water, construct graphic organizers/models that identify the similarities and differences of organic macromolecules, identify everyday substances that contain organic	6 weeks	3.2.9-12.A 3.2.9-12.C 3.1.9-12.A 3.1.9-12.F 3.1.9-12.J

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	molecules, design an inquiry activity demonstrating the effect of temperature or pH on enzyme function, distinguish the difference between prokaryotic, eukaryotic, plant, and animal cells, compare specialized cells, distinguish between passive and active transport and examples of each, predict changes in osmotic pressure when cells are placed in various solutions, and design an inquiry activity demonstrating the effect of osmosis and diffusion on cells.		
Photosynthesis & Cellular Respiration	Students will be able to explain how photosynthesis and cellular respiration (sugar and oxygen are produced by carbon dioxide and water by the process of photosynthesis and that those outputs of photosynthesis are the inputs of cellular respiration), explain how cellular respiration, glucose and oxygen react to form ATP and cellular energy, explain how bacteria convert nitrogen into a form that plants can use, and show how matter transfers and how energy flows between organisms and their environment.	2 weeks	3.1.9-12.E 3.1.9-12.G 3.1.9-12.K
DNA/Mitosis & Meiosis	Students will be able to use the base pair rule for DNA replication and protein synthesis, interpret the codon chart to determine amino acid sequence, properly organize the steps to protein synthesis, compare mitosis to meiosis through diagrams or graphic organizers including type of reproduction, replication of DNA, separation of cellular material, changes in chromosome number, number of cell divisions, and number of cells produced, and compare and contrast DNA and RNA nucleotides.	5 weeks	3.1.9-12.D 3.1.9-12.P
Biotechnology	Students will be able to outline the steps of gel-electrophoresis, interpret or "read" a gel, diagram/model the process of bacterial transformation, and explore the ethical implications of biotechnology-stem cell research, gene therapy, genetically modified organisms (GMO), regenerative medicine, and gene mapping.	2 weeks	3.5.9-12.E

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Genetics	Students will be able to contrast independent assortment and segregation of alleles, construct and interpret monohybrid Punnett squares, determine parental genotypes based on offspring ratios, construct and analyze pedigrees to determine inheritance patterns, construct and analyze karyotypes to detect gender or chromosomal abnormalities, and design an inquiry activity in which students determine their genotypes based on their phenotypes.	5 weeks	3.1.9-12.Q 3.1.9-12.R
Theory of Natural Selection/Evolution & Application and Assessment of Scientific Concepts	Students will be able to create a concept map/flow chart/graphic organizer that depicts the development of cells, outline the steps necessary for natural selection, construct and use a dichotomous key to classify organisms, and use a phylogenetic tree to show the relationships between organisms, and summarizing the kingdom characteristics.	9 weeks	3.1.9-12.S 3.1.9-12.T 3.1.9-12.U 3.1.9-12.W 3.3.9-12.N 3.4.9-12.F

*Please visit pdesas.org for a complete list of standards taught in this course and for more information regarding PA State Standards for this course.

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