

YOUNGSTOWN CITY SCHOOLS CURRICULUM MAP: GRADE 10- BIOLOGY

Unit Title: UNIT #1: CELLULAR GENETICS

Timeframe: Quarter 1 weeks 5

Cluster of Standards

Literacy Standards

I. HEREDITY

A. Cellular Genetics

1. Genomes are the DNA that are part of the genes.
 - a. life is specified by genomes (each organism has a genome that contains all the biological information needed to build and maintain a living example of that organism)
 - b. biological information in genome is encoded in DNA and carried in genes; genes are segments of DNA and code for protein
 - c. the sequence of DNA bases in a chromosome determines sequence of amino acids in a protein
2. Meiosis is reviewed from 8th grade.
Variations occur in reproduction.
 - a. recombination occurs in sexual reproduction
 - b. sorting occurs at meiosis

B. Structure and Function of DNA in cells

1. Sequence of DNA bases determines the sequence of amino acids used to build a specific protein.
2. Body cells can be very different from one another.
 - a. they are descended from a single cell and have identical genetic instructions
 - b. different genes are active in different types of cells (differentiation results from gene regulation)
 - c. DNA is influenced by the cell's environment and past history

D. Mutations

1. Inserting, deleting, substituting segments of DNA alters genes
 - a. altered gene may be passed on to every cell that develops from it
 - b. resulting features may help, harm or have little or no effect on offspring's success in its environment
2. Gene mutations - - when they occur in gametes - - can be passed to offspring
3. Gene mutations result in specific features.

RST.1 Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.

WHST.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

YOUNGSTOWN CITY SCHOOLS CURRICULUM MAP: GRADE 10- BIOLOGY

Unit Title: UNIT #2: GENETIC MECHANISMS

Timeframe Quarter 1: 4 weeks

Cluster of Standards	Literacy Standards
<p>I. HEREDITY</p> <p>C. Genetic Mechanisms and inheritance</p> <ol style="list-style-type: none"> 1. Basic principles of genetics (review of 8th grade work) include Mendel's laws, heterozygous and homozygous, phenotype and genotype, dominant and recessive, Punnett Squares. 2. The components of genetic mechanisms and inheritance include - - <ol style="list-style-type: none"> a. incomplete dominance b. sex-linked traits c. dihybrid cross and goodness of fit test (Chi-square) through real-world examples; dihybrid crosses used to explore linkage groups d. pleiotropy – genes that affect more than one trait e. epistasis – traits affected by more than one gene f. polygenetic traits – using simple real-world examples g. genes that modify or regulate the expression of another gene h. cloning <p>E. Modern Genetics</p> <ol style="list-style-type: none"> 1. In genetics, cloning refers to the process of making an identical copy of the DNA of an organism. 2. Genetic engineering is the direct human manipulation of an organism's genome using modern DNA technology. 3. Technological developments lead to the current knowledge of heredity. <ol style="list-style-type: none"> a. the model for DNA structure has advanced the study of genetics Watson and Crick developed the final model, but others had done the original studies 	<p>WHST.1 Write arguments focused on <i>discipline-specific content</i>.</p> <ol style="list-style-type: none"> a. Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among the claim(s), counterclaims, reasons, and evidence. b. Develop claim(s) and counterclaims fairly, supplying data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form and in a manner that anticipates the audience's knowledge level and concerns. c. Use words, phrases, and clauses to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. e. Provide a concluding statement or section that follows from or supports the argument presented.

YOUNGSTOWN CITY SCHOOLS CURRICULUM MAP: GRADE 10- BIOLOGY

Unit Title: UNIT #3: EVOLUTION MECHANISMS

Timeframe: Quarter 2: 5 weeks

Cluster of Standards	Literacy Standards
<p>II. EVOLUTION</p> <p>A. Mechanisms</p> <ol style="list-style-type: none"> 1. Natural selection is the process by which traits become more and less common in a population. <ol style="list-style-type: none"> a. it is due to consistent environmental effects upon the survival or reproduction of the individual with the trait (survival of the fittest) b. it works on the phenotype - - different phenotypes result from new combinations of existing genes or from mutations of genes in reproductive cells c. [combine grade 8 knowledge with] it explains the internal structure and function of chromosomes d. heritable characteristics influence how likely an organism is to survive and reproduce in a particular environment; when an environment changes, the survival value of inherited characteristics may change; this may or may not cause a change in species that inhabit the environment 2. Mutations are described in the Content Elaboration for Heredity D. <ol style="list-style-type: none"> a. mutations are changes in a genomic sequence; i.e., the DNA sequence of a cell's genome or the DNA or RNA sequence of a virus b. they are defined as sudden and spontaneous changes in the cell c. mutations are caused by radiation, viruses, transposons and mutagenic chemicals, as well as errors that occur during meiosis or DNA replication 3. Genetic drift involves mutation over time. <ol style="list-style-type: none"> a. mutation and genetic drift are evident in real-world examples (e.g., African cheetahs exist in small populations; and smaller populations have less variation and, therefore, a lower ability to respond favorably to changing conditions) b. descent with modification occurs in a population over time 4. Gene flow involves both <i>immigration</i> and <i>emigration</i>. <ol style="list-style-type: none"> a. examples in the real-world include: <ol style="list-style-type: none"> (1) in the 1960s and 1970s, U.S. soldiers had children in Southeast Asia with Vietnamese women; this altered the gene pool frequencies of the Vietnamese population. (2) if all red-haired people were to leave Scotland, the next generation there would likely have very few people with this trait; the Scottish population would have evolved - - as would the populations into which the red haired people migrated (3) segments of DNA may be transferred from one species to another by viruses as they invade the cells of animals or plants (rare, but documented in some species of insects, fish, reptiles, mammals, and especially microorganisms; not conclusively demonstrated for humans) b. explanations for gene flow are revised based on gene flow between species rather than within them 5. Sexual selection is a type of natural selection that affects the traits that influence an individual's ability to attain or choose a mate, instead of the traits that influence an individual's ability to survive. <ol style="list-style-type: none"> a. different phenotypes result from new combinations of existing genes or mutations in reproductive cells b. explanations for sexual selection can be formulated and revised (e.g., many elaborate morphological features, such as long 	<p>RST.2 Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.</p> <p>RST. 4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to <i>grades 9–10 texts and topics</i>.</p>

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Unit Title: UNIT #3: EVOLUTION MECHANISMS

Timeframe: Quarter 2: 5 weeks

Cluster of Standards	Literacy Standards
<p>plumes in birds, courtship displays, and bright colors)</p> <ol style="list-style-type: none">6. The history of life on Earth is documented in the evolution of various species.<ol style="list-style-type: none">a. present-day species descended from earlier, common ancestral speciesb. evolution is the descent with modification of different lineages from common ancestorsc. recent molecular-sequence data as evidence for evolution generally, but not always, support earlier hypotheses regarding lineages of organisms based upon morphological comparisonsd. modern ideas about evolution provide a natural explanation for the diversity of life on Earth as represented in the fossil record, in the similarities of existing species, and in modern molecular evidence7. Modern theories are the synthesis of genetics and evolution, based on the historical perspectives of evolutionary theory.	

YOUNGSTOWN CITY SCHOOLS CURRICULUM MAP: GRADE 10- BIOLOGY

Unit Title: UNIT #4: DIVERSITY OF LIFE

Timeframe: Quarter2: 4 weeks

Cluster of Standards

Literacy Standards

II. EVOLUTION

B. Diversity of Life

1. Speciation and biological classification are based on molecular evidence.
 - a. modern ideas about evolution provide a natural explanation for the diversity of life on Earth as represented in the fossil record, in the similarities of existing species and in modern molecular evidence
 - b. biological evolution explains the natural origins for the diversity of life
 - c. present species descended from common ancestor

2. Variation of organisms within a species is due to population genetics and gene frequency.
 - a. selection of individuals with a particular trait shifts to to changing proportions of a trait in populations
 - b. Hardy-Weinberg's laws are used to explain gene frequency patterns in a population
 - c. populations evolve over time
 - d. evolution is the consequence of the interactions of - -
 - (1) the potential for a population to increase its numbers
 - (2) the genetic variability of offspring due to mutation and recombination of genes
 - (3) a finite supply of the resources required for life
 - (4) the differential survival and reproduction of individuals with the specific phenotype
 - e. technology allows access to real-time/authentic data to study population changes and growth in specific locations

RST.9 Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.

RST.10 By the end of grade 10, read and comprehend science/technical texts in the grades 9–10 text complexity band independently and proficiently.

WHST.8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.

WHST.9 Draw evidence from informational texts to support analysis, reflection, and research.

YOUNGSTOWN CITY SCHOOLS CURRICULUM MAP: GRADE 10-BIOLOGY

Unit Title: UNIT #5: CLASSIFICATION SYSTEMS		Timeframe: Quarter 3 weeks 2-3
Cluster of Standards	Literacy Standards	
<p>III. DIVERSITY AND INTERDEPENDENCE OF LIFE</p> <p>A. Classification systems</p> <ol style="list-style-type: none"> 1. These frameworks were created by scientists to describe the vast diversity of organisms and yet indicate the degree of relatedness between organisms. 2. The great diversity of organisms and ecological niches they occupy result from more than 3.5 billion years of evolution. 3. Recent molecular-sequence data generally support earlier hypotheses regarding lineages of organisms based upon morphological comparisons. 4. Both morphological comparisons and molecular evidence must be used to describe biodiversity (cladograms can be used to address this); study of the diversity and similarity of organisms (molecular level). 	<p>RST.1 Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details and explanations or descriptions.</p> <p>RST.4 Determine the meaning of words, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grade 9-10 texts.</p>	

YOUNGSTOWN CITY SCHOOLS CURRICULUM MAP: GRADE 10- BIOLOGY

Unit Title: UNIT #6: ECOSYSTEMS	Timeframe: Quarter 3 weeks 4
Cluster of Standards	Literacy Standards
<p>III. DIVERSITY AND INTERDEPENDENCE OF LIFE</p> <p>B. Ecosystems</p> <ol style="list-style-type: none"> 1. Homeostasis is the condition of balance created by various relationships in an environment. <ol style="list-style-type: none"> a. some ecosystems have persisted over hundreds or thousands of years b. misconceptions exist about population growth capacity, interspecies and intra-species competition for resources, and what occurs when a species immigrates to or emigrates from ecosystems c. physical/chemical constraints have an effect on all biological relationships and systems d. mathematical graphing and algebraic knowledge are used to explain carrying capacity and homeostasis within biomes 2. The mechanisms of homeostasis can be expressed with mathematical models; these include - - <ol style="list-style-type: none"> a. the use real-time data to investigate population changes that occur locally and regionally b. the exponential growth model and the logistic growth model c. the logistic growth model of $dN/dt = rN (K-N/K)$ [the only new variable added to the exponential model is K for carrying capacity] d. mathematical graphing and algebraic knowledge must be used to explain concepts of carrying capacity and homeostasis within biomes <p>Note 1: Exponential growth equation in simplest form, change in population size N per unit time t is a product of r (the per capita reproductive rate) and N (population size).</p> <p>Note 2: Carrying capacity is defined as the population equilibrium sized when births and deaths are equal; hence $dN/dt = zero$</p> <p>Note 3: Constructing food webs/food chains to show interactions between organisms within ecosystems is not appropriate for this grade. Students may use these diagrams to help explain real-world relationships or events within an ecosystem, but not to identify simple trophic levels, consumers, producers, predator-prey and symbiotic relations.</p> 3. Deviation from the Hardy–Weinberg equilibrium denotes the evolution of a species. <ol style="list-style-type: none"> a. ecosystems tend to have cyclic fluctuations around a state of rough equilibrium b. ecosystems always change as geological and biological conditions vary c. organisms transform energy (flow of energy) and matter (cycles of matter) as they survive and reproduce. The cycling of matter and flow of energy occurs at all levels of biological organization, from molecules to ecosystems d. the concept of energy flow is unidirectional in ecosystems 	<p>RST.5 Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., <i>force, friction, reaction force, energy</i>). [Algae Blooms, other invasive species articles] (IIB1)</p>

YOUNGSTOWN CITY SCHOOLS CURRICULUM MAP: GRADE 10- BIOLOGY

Unit Title: UNIT #7: CELL STRUCTURE AND FUNCTION	Timeframe: Quarter 3-4 weeks 4
Cluster of Standards	Literacy Standards
<p>IV. CELLS</p> <p>A. Cell structure and function</p> <p>[Note: This topic focuses on the cell as a system itself (single-celled organism); as a part of larger systems (multicellular organism), and sometimes as part of a multicellular organism. But they are always as part of an ecosystem.]</p> <ol style="list-style-type: none"> 1. The living conditions is dependent on the structure, function and interrelatedness of cell a living cell is composed of a small number of elements - - mainly carbon, hydrogen, nitrogen, oxygen, phosphorous and sulfur <ol style="list-style-type: none"> a. because of its small size and four available bonding electrons, carbon can join to other carbon atoms in chains and rings to form large and complex molecules (macromolecules; organic building blocks / amino acids) b. the essential functions of cells involve chemical reactions that involve water and carbohydrates, proteins, lipids and nucleic acids c. cell functions are regulated; complex interactions among the different kinds of molecules in the cell cause distinct cycles of activities - - such as growth and division d. most cells function within a narrow range of temperature and pH; at very low temperatures, reactions are slow; high temperatures and/or extremes of pH can irreversibly change the structure of most protein molecules; even small changes in pH can alter how molecules interact. e. examples of homeostasis at the cellular level to maintain equilibrium are diffusion, osmosis, and active transport f. cellular organelles include cytoskeleton, Golgi complex, and endoplasmic reticulum g. every cell is covered by a membrane that controls what can enter and leave the cell h. within the cell are specialized parts for the transport of materials, energy transformation, protein building, wasted disposal, information feedback and movement i. most cells in multicellular organisms perform some specific functions that others do not 2. Scientists believe that prokaryotic cells (in the form of bacteria) were the first life forms on earth <ol style="list-style-type: none"> a. from about 4 billion years ago to about 2 billion years ago, only simple, single-celled microorganisms (prokaryotic cells) are found in the fossil record b. once cells with nuclei developed about a billion years ago, increasingly complex multicellular (eukaryotic) cells c. in all but quite primitive cells, a complex network of proteins provides organization and shape 	<p>RST.2 Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.</p> <p>WHST.10 Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. [compare/contrast prokaryote vs eukaryote]</p>

YOUNGSTOWN CITY SCHOOLS CURRICULUM MAP: GRADE 10- BIOLOGY

Unit Title: UNIT #8: CELLULAR PROCESSES	Timeframe: Quarter: 4 weeks 4
Cluster of Standards	Literacy Standards
<p>IV. CELLS</p> <p>B. Cellular processes</p> <ol style="list-style-type: none"> 1. Characteristics of life are regulated by cellular processes <ol style="list-style-type: none"> a. the cell is a system that conducts a variety of functions associated with life b. a special group of proteins, enzymes, enables chemical reactions to occur within living systems c. the sequence of DNA bases on a chromosome determines the sequence of amino acids in a protein. <ol style="list-style-type: none"> (1) proteins catalyze most chemical reactions in cells (2) protein molecules are long, usually folded chains made from combinations of the 20 typical amino acid sub-units found in the cell (3) the function of each protein molecule depends on its specific sequence of amino acids and the shape the chain takes as a result of that sequence <p style="margin-left: 40px;">Note 1: The idea that protein molecules, assembled by cells, conduct the work that goes on inside and outside the cells in an organism can be learned without going into the biochemical details. It is sufficient for students to know that the molecules involved are different configurations of a few amino acids and that the different shapes of the molecules influence what they do.</p> <p style="margin-left: 40px;">Note 2: The concept of the cell and its parts as a functioning system is more important than memorizing parts of the cell</p> 2. Cellular processes include photosynthesis, chemosynthesis, cellular respiration, cell division, differentiation, cell division and differentiation	<p>RST.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.</p> <p>RST.7 Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. [photosynthesis and/or cell respiration equations]</p> <p>RST.9 Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.</p> <p>WHST.5 Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. [present to younger group; pick a cell process]</p>