CURRICULUM MAP FOR BIOLOGY II Shamokin Area High School

| **UNIT** 4**: The Biosphere** | | | | | | |
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| **Learning Objectives** |  | **Text**  **Section** | **Eligible Content** | **Eligible Content Descriptors** | **Assessments** |
| **Chapter 3: The Biosphere**  3.1.1 Describe the study of ecology  3.1.2 List and describe the levels of ecological organization  3.1.3 Describe how biotic and abiotic factors influence the environment  3.2.1 Define *primary producers*  3.2.2 Describe how consumers obtain energy and nutrients  3.3.1 Describe how energy flows through ecosystems  3.3.2 Identify the three types of ecological pyramids  3.4.1 Describe how matter cycles among the living and non-living parts of an ecosystem  3.4.2 Describe how water cycles through the biosphere  3.4.3 Describe the main nutrient cycles  3.4.4 Describe how nutrient availability affects the productivity of ecosystems  **Chapter 4: Ecosystems and Communities**  4.1.1 Differentiate between weather and climate  4.1.2 Identify the factors that influence climate  4.2.1 Define niche  4.2.2 Describe the role competition plays in shaping communities  4.2.3 Describe the role predation plays in shaping communities  4.2.4 Describe the three types of symbiotic relationships in nature  4.3.1 Describe how ecosystems recover from a disturbance  4.3.2 Compare primary and secondary succession  4.4.1 Describe and compare the characteristics of the major biomes  4.5.1 Discuss the factors that affect aquatic ecosystems  **Chapter 5: Populations**  5.1.1 List the characteristics used to describe a population  5.1.2 Identify factors that affect population growth  5.1.3 Describe exponential growth  5.2.1 Identify factors that determine carrying capacity  5.2.2 Identify the limiting factors that depend on population density  5.2.3 Identify the limiting factors that do not depend on population density  **Chapter 6: Humans in the Biosphere**  6.1.1 Describe human activities that can affect the biosphere  6.1.2 Describe the relationship between resource use and sustainable development  6.2.1 Describe how human activities affect soil and land  6.2.2 Describe how human activities affect water resources  6.2.3 Describe how human activities affect air resources  6.3.1 Define biodiversity and explain its value  6.3.2 Identify current threats to biodiversity  6.3.3 Describe how biodiversity can be preserved |  | 3.1  3.2  3.3  3.4  4.1  4.2  4.3  4.4  4.5  5.1  5.2  6.1  6.2  6.3 | BIO.B.4.1.1  BIO.B.4.1.2  BIO.B.4.2.1  BIO.B.4.2.2  BIO.B.4.2.1  BIO.B.4.2.4  BIO.B.4.2.3  BIO.B.4.2.4  BIO.B.4.1.2  BIO.B.4.2.4  BIO.B.4.2.2  BIO.B.4.2.4  BIO.B.4.1.1  BIO.B. 4.1.2  BIO.B.4.2.5  BIO.B.4.2.5  BIO.B.4.2.4  BIO.B.4.2.4  BIO.B.4.2.4 | BIO.B.4.1.1: Describe the ecological levels of organization (i.e., organism, population, community, ecosystem, biome, biosphere).  BIO.B.4.1.2: Describe characteristic biotic and abiotic components of aquatic and terrestrial ecosystems.  BIO.B.4.2.1: Describe how energy flows through an ecosystem (e.g., food chains, food webs, energy pyramids).  BIO.B.4.2.2: Describe biotic interactions in an ecosystem (e.g., competition, predation, symbiosis).  BIO.B.4.2.3: Describe how matter recycles through an ecosystem (i.e., water cycle, carbon cycle, oxygen cycle, nitrogen cycle).  BIO.B.4.2.4: Describe how ecosystems change in response to natural and human disturbances (e.g., climate changes, introduction of non-native species, pollution, fires).  BIO.B.4.2.5: Describe the effects of limiting factors on population dynamics and potential species extinction  BIO.B.4.1.1: Describe the ecological levels of organization (i.e., organism, population, community, ecosystem, biome, biosphere).  BIO.B.4.1.2: Describe characteristic biotic and abiotic components of aquatic and terrestrial ecosystems.  BIO.B.4.2.1: Describe how energy flows through an ecosystem (e.g., food chains, food webs, energy pyramids).  BIO.B.4.2.2: Describe biotic interactions in an ecosystem (e.g., competition, predation, symbiosis).  BIO.B.4.2.3: Describe how matter recycles through an ecosystem (i.e., water cycle, carbon cycle, oxygen cycle, nitrogen cycle).  BIO.B.4.2.4: Describe how ecosystems change in response to natural and human disturbances (e.g., climate changes, introduction of non-native species, pollution, fires).  BIO.B.4.2.5: Describe the effects of limiting factors on population dynamics and potential species extinction | Assignments  Quizzes  Labs  Tests  Assignments  Quizzes  Labs  Tests |

| **UNIT** 5**: Inheritance, Heredity and Genetics** | | | | | | |
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| **Learning Objectives** |  | **Text**  **Section** | **Eligible Content** | **Eligible Content Descriptors** | **Assessments** |
| **Chapter 10: Cell Growth and Division**  10.1.1 Explain the problems that growth causes for cells  10.1.2 Compare sexual and asexual reproduction  10.2.1 Describe the role of chromosomes in cell division  10.2.2 Name the main events of the cell cycle  10.2.3 Describe what happens during the four phases of mitosis  10.2.4 Describe the process of cytokinesis  **Chapter 11**  11.1.1 Describe Mendel’s studies and conclusions about inheritance  11.1.2 Explain the principle of segregation  11.2.1Explain how geneticists use the principle of probability to make Punnett squares  11.2.2 Explain the principle of independent assortment  11.2.3 Explain how Mendel’s principles apply to all organisms  11.3.1 Describe other patterns of inheritance (co-dominance, incomplete dominance, multiple alleles, polygenic and sex-linked inheritance)  11.3.2 Explain the relationship between genes and the environment  11.4.1 Contrast the number of chromosomes in body cells and in gametes  11.4.2 Summarize the events of meiosis  11.4.3 Contrast mitosis and meiosis  11.4.4 Describe how alleles from different genes can be inherited together  **Chapter 12**  12.1.1 Identify the role of DNA in heredity  12.2.1 Identify the chemical components of DNA  12.2.2 Discuss the experiments leading to the identification of DNA as the molecule that carries the genetic code  12.2.3 Describe the steps leading to the development of the double-helix model of DNA  12.3.1 Summarize the events of DNA replication  **Chapter 13**  13.1.1 Contrast RNA and DNA  13.1.2 Explain the process of transcription  13.2.1 Identify the genetic code and explain how it is read  13.2.2 Summarize the process of translation  13.2.3 Describe the central dogma of molecular biology  13.3.1 Define mutations and describe the different types of mutations  13.3.2 Describe the effects mutations can have on genes  **Chapter 14**  14.1.1 Identify the types of human chromosomes in a karyotype  14.1.2 Describe the patterns of inheritance in human traits  14.1.3 Explain how pedigrees are used to study human traits  14.2.1 Explain how small changes in DNA cause genetic disorders  14.2.2 Summarize the problems caused by non-disjunction  14.3.1 Describe how DNA is analyzed through gel electrophoresis  **Chapter 15**  15.1.1 Explain the purpose of selective breeding  15.1.2 Explain how people increase genetic variation  15.2.1 Explain how scientist manipulate DNA  15.2.2 Describe the importance of recombinant DNA  15.2.3 Define transgenic and describe the usefulness of some transgenic organisms to humans  15.3.1 Describe the benefits of genetic engineering as they relate to agriculture and industry  15.3.2 Explain how recombinant DNA technology can improve human health  15.3.3 Summarize the process of DNA fingerprinting and explain its uses  15.4.1 Describe some of the issues that relate to biotechnology  15.4.2 Identify some of the pros and cons of genetically modified foods  15.4.3 Describe some of the ethical issues relating to biotechnology |  | 10.1  10.2  11.1  11.2  11.3  11.4  12.1  12.2  12.3  13.1  13.2  13.3  14.1  14.2  14.3  15.1  15.2  15.3  15.4 | BIO.B.1.1.1  BIO.B.1.1.1  BIO.B.1.2.1  BIO.B.1.2.2  BIO.B.1.2.2  BIO.B.2.1.1  BIO.B.1.2.2  BIO.B.2.1.1  BIO.B.2.1.1  BIO.B.1.1.1  BIO.B.1.1.2  BIO.B.1.2.2  BIO.B.2.1.2  BIO.B.1.2.2  BIO.B.1.2.1  BIO.B.1.2.1  BIO.B.2.2.1  BIO.B.2.2.1  BIO.B.2.2.2  BIO.B.2.1.2  BIO.B.2.3.1  BIO.B.3.1.3  BIO.B.1.2.2  BIO.B.2.1.1  BIO.B.2.1.2  BIO.B.3.1.3  BIO.B.2.4.1  BIO.B.1.2.2  BIO.B.2.4.1  BIO.B.1.2.1  BIO.B.1.2.2  BIO.B.2.4.1  BIO.B.2.4.1  BIO.B.2.4.1 | BIO.B.1.1.1: Describe the events that occur during the cell cycle: interphase, nuclear division (i.e., mitosis or meiosis), and cytokinesis  BIO.B.1.1.2: Compare and contrast the processes and outcomes of mitotic and meiotic nuclear divisions  BIO.B.1.2.1: Describe how the process of DNA replication results in the transmission and/or conservation of genetic information  BIO.B.1.2.2: Explain the functional relationships among DNA, genes, alleles, and chromosomes and their roles in inheritance  BIO.B.2.1.1: Describe and/or predict observed patterns of inheritance (i.e., dominant, recessive, co-dominance, incomplete dominance, sex-linked, polygenic, and multiple alleles).  BIO.B.2.1.2: Describe processes that can alter the composition of number of chromosomes (i.e., crossing-over, non-disjunction, duplication, translocation, deletion, insertion, inversion)  BIO.B.1.2.1: Describe how the process of DNA replication results in the transmission and/or conservation of genetic information  BIO.B.1.2.2: Explain the functional relationships among DNA, genes, alleles, and chromosomes and their roles in inheritance  BIO.B.2.2.1: Describe how the process of transcription and translation are similar in all organisms.  BIO.B.2.2.2: Describe the role of ribosomes, endoplasmic reticulum, Golgi apparatus, and the nucleus in the production of specific types of proteins.  BIO.B.2.3.1: Describe how genetic mutations alter the DNA sequence and may or may not affect phenotype (e.g., silent, nonsense, frameshift).  BIO.B.2.4.1: Explain how genetic engineering has impacted the fields of medicine, forensics and agriculture (e.g., selective breeding, gene splicing, cloning, GMOs, gene therapy).  BIO.B.3.1.3: Explain how genetic mutations may result in genotypic and phenotypic variations within a population.  BIO.B.1.2.1: Describe how the process of DNA replication results in the transmission and/or conservation of genetic information  BIO.B.1.2.2: Explain the functional relationships among DNA, genes, alleles, and chromosomes and their roles in inheritance  BIO.B.2.1.1: Describe and/or predict observed patterns of inheritance (i.e., dominant, recessive, co-dominance, incomplete dominance, sex-linked, polygenic, and multiple alleles).  BIO.B.2.1.2: Describe processes that can alter the composition of number of chromosomes (i.e., crossing-over, non-disjunction, duplication, translocation, deletion, insertion, inversion)  BIO.B.2.4.1: Explain how genetic engineering has impacted the fields of medicine, forensics and agriculture (e.g., selective breeding, gene splicing, cloning, GMOs, gene therapy).  BIO.B.3.1.3: Explain how genetic mutations may result in genotypic and phenotypic variations within a population. | Assignments  Quizzes  Labs  Tests  Assignments  Quizzes  Labs  Tests  Assignments  Quizzes  Labs  Tests |

| **UNIT** 6**: Evolution** | | | | | | |
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| **Learning Objectives** |  | **Text**  **Section** | **Eligible Content** | **Eligible Content Descriptors** | **Assessments** |
| **Chapter 16**  16.1.1 State Charles Darwin’s contribution to science  16.1.2 Describe the three patterns of biodiversity noted by Darwin  16.2.1 Identify the conclusions drawn by Lyell and Hutton about Earth’s history  16.2.2 Describe Lamarck’s hypothesis of evolution  16.2.3 Describe Malthus’s view of population growth  16.2.4 Explain the role of inherited variation in artificial selection  16.3.1 Describe the conditions under which natural selection occurs  16.3.2 Explain the principle of common descent  16.4.1 Explain how geologic distribution of species relates to their evolutionary history  16.4.2 Explain how fossils and the fossil record document the descent of modern species from ancient ancestors  16.4.3 Describe what homologous structures and embryology suggest about the process of evolutionary change  16.4.4 Explain how molecular evidence can be used to trace the process of evolution  **Chapter 17**  17.1.1 Define evolution in genetic terms  17.1.2 Identify the main sources of genetic variation in a population  17.1.3 State what determines the number of phenotypes for a trait  17.2.1Explain how natural selection affects the frequency of traits  17.2.2 Describe genetic drift  17.2.3 Explain how different factors affect genetic equilibrium  17.3.1 Identify the types of isolation that can lead to the formation of new species  **Chapter 18**  18.2.1 Explain the goal of evolutionary classification  18.2.2 Describe how to make and interpret a cladogram  18.2.3 Explain the use of DNA sequences in classification  **Chapter 19**  19.1.1 Explain what information fossils can reveal about ancient life  19.1.2 Differentiate between relative dating and radiometric dating  19.1.3 Identify the division of the geologic time scale  19.1.4 Describe how environmental processes and living things have shaped life on Earth  19.2.1 Identify the processes that influence the survival or extinction of a species or clade  19.2.2 Contrast gradualism and punctuated equilibrium  19.2.3 Describe two important patterns in macroevolution  19.2.4 Explain the evolutionary characteristics of co-evolving organisms  19.3.1 Identify some of the hypotheses about early Earth and the origin of life  19.3.2 Explain the endosymbiotic theory  19.3.3 Explain the significance of sexual reproduction in evolution |  | 16.1  16.2  16.3  16.4  17.1  17.2  17.3  18.2  19.1  19.2  19.3 | BIO.B.3.3.1  BIO.B.1.2.2  BIO.B.3.2.1  BIO.B.3.3.1  BIO.B.1.2.2  BIO.B.3.2.1  BIO.B.3.2.1  BIO.B.1.2.2  BIO.B.2.1.2  BIO.B.3.1.1  BIO.B.3.1.3  BIO.B.3.2.1  BIO.B.1.2.2  BIO.B.2.1.1  BIO.B.3.1.1  BIO.B.3.1.2  BIO.B.3.2.1  BIO.B.3.2.1  BIO.B.3.2.1  BIO.B.3.2.1 | BIO.B.1.2.2: Explain the functional relationships among DNA, genes, alleles, and chromosomes and their roles in inheritance  BIO.B.2.1.1: Describe and/or predict observed patterns of inheritance (i.e., dominant, recessive, co-dominance, incomplete dominance, sex-linked, polygenic, and multiple alleles).  BIO.B.2.1.2: Describe processes that can alter the composition of number of chromosomes (i.e., crossing-over, non-disjunction, duplication, translocation, deletion, insertion, inversion)  BIO.B.3.1.1: Explain how natural selection can impact allele frequencies of a population  BIO.B.3.1.2: Describe the factors that can contribute to the development of new species (e.g., isolating mechanisms, genetic drift, founder effect and migration)  BIO.B.3.1.3: Explain how genetic mutations may result in genotypic and phenotypic variations within a population.  BIO.B.3.2.1 Interpret evidence supporting the theory of evolution (i.e., fossil, anatomical, physiological, embryological, biochemical and universal genetic code  BIO.B.3.3.1 Distinguish among the scientific terms: hypothesis, inference, law, theory, principle, fact, observation  BIO.A.1.2.2: Describe and interpret relationships between structure and function at various levels of biological organization  BIO.B.3.2.1 Interpret evidence supporting the theory of evolution (i.e., fossil, anatomical, physiological, embryological, biochemical and universal genetic code).  BIO.B.3.3.1 Distinguish among the scientific terms: hypothesis, inference, law, theory, principle, fact and observation | Assignments  Quizzes  Labs  Tests  Assignments  Quizzes  Labs  Tests |