

**Mississippi  
BIOLOGY (Traditional)  
2017-2018 Pacing Guide**

<b>Unit</b>	<b>Objective</b>	<b>Major Topics/Concepts</b>
<b>Introduction to Biological Inquiry</b>	1a 1b 1c 1d 1e 1f 1g	Safety rules and symbols Lab equipment Scientific method Experimental design (controlled experiment) Independent vs. dependent variables Graphing Microscope parts and functions  <i>This content should be embedded and reinforced through actual experimentation throughout the course, but all inquiry topics should be introduced by the 1<sup>st</sup> benchmark. These objectives will be assessed in the context of the units covered on every benchmark.</i>
<b>Chemistry</b>	2a 2b 2c 2d 2e	Atoms Chemical bonds Properties of water Organic compounds Chemical reactions pH scale Acids and bases Enzymes
<b>Cell Structure and Function</b>	4a	Prokaryotic vs. eukaryotic cells Organelle structure and function Cell membrane and transport of materials Mobility (e.g., cilia, flagella, pseudopodia)
<b>1<sup>st</sup> Cumulative Benchmark (covering all content to this point)</b>		
<b>Photosynthesis and Cellular Respiration</b>	2f 2g	ATP structure and function Photosynthesis reactants and products and their roles Requirements and products for light-dependent and light-independent reactions Respiration reactants and products and their roles Products and energy differences between anaerobic and aerobic respiration
<b>Cell Division and Growth</b>	4b	Distinguish between types of cell reproduction Cell cycle events Mitosis (contrast plant and animal cell division) Binary fission (e.g., budding, vegetative propagation) Significance of meiosis in sexual reproduction Significance of crossing over Compare/contrast mitosis and meiosis Cancer

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<b>Genetics</b>	5b	Mendel's laws Probability Monohybrid crosses Punnett squares for complete and incomplete dominance, codominance, sex-linked and multiple alleles Outcome percentages for genotypes and phenotypes for all crosses
<b>DNA and RNA</b>	5a	Central dogma of molecular biology Genes and gene regulation DNA structure DNA replication RNA structure Transcription Translation Types of RNA mRNA codon chart
<b>2<sup>nd</sup> Cumulative Benchmark (covering all content to this point)</b>		
<b>Mutations, Genetic Engineering, and the Human Genome</b>	5c 5d	Characteristics and implications of chromosomal and gene mutations Significance of nondisjunction, deletion, substitutions, translocation, and frameshift mutations in animals Examine inheritance patterns using genetic engineering technology (e.g., pedigrees, karyotypes, gel electrophoresis) Occurrence and significance of genetic disorders such as sickle cell anemia, Tay-Sachs disorder, cystic fibrosis, hemophilia, Down Syndrome, color blindness
<b>Biological Evolution</b>	6b 6c 6d 6e	Critique data used by scientists to develop understanding of evolutionary processes and patterns (e.g., Redi, Needham, Spallanzani, Pasteur) Differentiate among chemical evolution, organic evolution, and evolutionary steps to aerobic heterotrophs and photosynthetic autotrophs Summarize contributions of Darwin, Malthus, Wallace, Lamarck, and Lyell to the development of the theory of evolution Role of natural selection Mechanisms of speciation (e.g., mutations, adaptations, geographic isolation) Applications of speciation (e.g., pesticide and antibiotic resistance)
<b>Classification</b>	4c 6a	Classification based on evolutionary relationships (cladograms) Characteristics of six kingdoms Taxonomy Binomial nomenclature Body symmetry Sexual vs. asexual reproductive methods

Unit	Objective	Major Topics/Concepts
		Organizational levels of organisms (e.g., cells, tissues, organs, systems, types of tissues)
<b>Plants</b>	4d	Plant structures and cellular functions related to survival (roots, stems, leaves, flowers) Vascular vs. nonvascular Specialized tissues (xylem, phloem) Reproduction Hormones
<b>Ecology</b>	3a 3b 3c	Plant and animal species, climate, and adaptations of organisms in the major biomes Biotic vs. abiotic factors in ecosystems Energy flow (e.g., energy pyramids, producers, herbivores, carnivores, decomposers) Beneficial bacteria Cooperation Predation Parasitism Commensalism Symbiosis Mutualism Significance of natural events and human activities on major ecosystems (e.g., succession, population growth, technology, resource use, biodiversity, sustainable use)
<b>Final Comprehensive Benchmark (covering all content)</b>		