

# **New Mexico Public Education Department**



**PRELIMINARY Assessment Blueprint**

## **Science: Biology**

**End-of-Course (EoC) Exam**

**Version 003**

## Purpose Statement—Science: Biology

*The Biology End-of-Course assessment is designed to measure student proficiency of the New Mexico Science Standards pertaining to Biology. This course-level assessment is provided to all students who have completed Biology-First Year (STARS code 1711) or related courses. Intended as a final exam for the course, this is a summative assessment covering a wide range of content, skills, and applications. Scores are reported to the teacher, school, district, and state levels for the purposes of student grades, curriculum review, student graduation requirements, and the optional use for teacher effectiveness.*

## Preliminary Blueprint

*The preliminary blueprint identifies the content standards and benchmarks assessed on the EoC. The Assessment and Accountability Division of the Public Education Department (PED) will publish a final blueprint after conducting content review meetings in fall 2013. **The final blueprint, which will be published in late fall of 2013, will include specification tables identifying the item types by standard, the number of points associated with each item type, and Depth-of-Knowledge (DOK) levels of the items.***

# Blueprint Table—Science: Biology EoC

Based on NM Grades 9–12 Science Standards

Standard/ Content ID	Content Statement
Strand I: Scientific Thinking and Practice Standard I 9–12 Benchmark I: 1, 2, 3, 4	<p>Use accepted scientific methods to collect, analyze, and interpret data and observations and to design and conduct scientific investigations and communicate results.</p> <ol style="list-style-type: none"><li>1. Describe the essential components of an investigation, including appropriate methodologies, proper equipment, and safety precautions.</li><li>2. Design and conduct scientific investigations that include:<ul style="list-style-type: none"><li>• testable hypotheses</li><li>• controls and variables</li><li>• methods to collect, analyze, and interpret data</li><li>• results that address hypotheses being investigated</li><li>• predictions based on results</li><li>• re-evaluation of hypotheses and additional experimentation as necessary</li></ul>error analysis.</li><li>3. Use appropriate technologies to collect, analyze, and communicate scientific data (e.g., computers, calculators, balances, microscopes).</li><li>4. Convey results of investigations using scientific concepts, methodologies, and expressions, including:<ul style="list-style-type: none"><li>• scientific language and symbols</li><li>• diagrams, charts, and other data displays</li><li>• mathematical expressions and processes (e.g., mean, median, slope, proportionality)</li><li>• clear, logical, and concise communication</li><li>• reasoned arguments.</li></ul></li></ol>

Standard/ Content ID	Content Statement
Strand I: Scientific Thinking and Practice Standard I 9–12 Benchmark II: 2	Understand that scientific processes produce scientific knowledge that is continually evaluated, validated, revised, or rejected. 2. Use scientific reasoning and valid logic to recognize: <ul style="list-style-type: none"> <li>• faulty logic</li> <li>• cause and effect</li> <li>• the difference between observation and unsubstantiated inferences and conclusions</li> <li>• potential bias.</li> </ul>
Strand I: Scientific Thinking and Practice 9–12 Benchmark III: 1, 4	Use mathematical concepts, principles, and expressions to analyze data, develop models, understand patterns and relationships, evaluate findings, and draw conclusions. 1. Create multiple displays of data to analyze and explain the relationships in scientific investigations. 4. Identify and apply measurement techniques and consider possible effects of measurement errors.
Strand II: The Content of Science Standard I: Physical Science 9–12 Benchmark I: 1, 2	Understand the properties, underlying structure, and reactions of matter. <b>Properties of Matter</b> 1. Classify matter in a variety of ways (e.g., element, compound, mixture; solid, liquid, gas; acidic, basic, neutral). 2. Identify, measure, and use a variety of physical and chemical properties (e.g., electrical conductivity, density, viscosity, chemical reactivity, pH, melting point).
Strand II: The Content of Science Standard I: Physical Science 9–12 Benchmark I: 7	Understand the properties, underlying structure, and reactions of matter. <b>Structure of Matter</b> 7. Explain how electrons determine the properties of substances by: <ul style="list-style-type: none"> <li>• interactions between atoms through transferring or sharing valence electrons</li> <li>• ionic and covalent bonds</li> <li>• the ability of carbon to form a diverse array of organic structures.</li> </ul>

Standard/ Content ID	Content Statement
Strand II: The Content of Science Standard II: Life Science 9–12 Benchmark I: 2, 3, 4	<p>Understand how the survival of species depends on biodiversity and on complex interactions, including the cycling of matter and the flow of energy.</p> <p><b>Ecosystems</b></p> <ol style="list-style-type: none"> <li>2. Describe how organisms cooperate and compete in ecosystems (e.g., producers, decomposers, herbivores, carnivores, omnivores, predator-prey, symbiosis, mutualism).</li> <li>3. Understand and describe how available resources limit the amount of life an ecosystem can support (e.g., energy, water, oxygen, nutrients).</li> <li>4. Critically analyze how humans modify and change ecosystems (e.g., harvesting, pollution, population growth, technology).</li> </ol>
Strand II: The Content of Science Standard II: Life Science 9–12 Benchmark I: 5, 6, 7	<p>Understand how the survival of species depends on biodiversity and on complex interactions, including the cycling of matter and the flow of energy.</p> <p><b>Energy Flow in the Environment</b></p> <ol style="list-style-type: none"> <li>5. Explain how matter and energy flow through biological systems (e.g., organisms, communities, ecosystems), and how the total amount of matter and energy is conserved but some energy is always released as heat to the environment.</li> <li>6. Describe how energy flows from the sun through plants to herbivores to carnivores and decomposers.</li> <li>7. Understand and explain the principles of photosynthesis (i.e., chloroplasts in plants convert light energy, carbon dioxide, and water into chemical energy).</li> </ol>
Strand II: The Content of Science Standard II: Life Science 9–12 Benchmark I: 9	<p>Understand how the survival of species depends on biodiversity and on complex interactions, including the cycling of matter and the flow of energy.</p> <p><b>Biodiversity</b></p> <ol style="list-style-type: none"> <li>9. Understand variation within and among species, including:             <ul style="list-style-type: none"> <li>• mutations and genetic drift</li> <li>• factors affecting the survival of an organism</li> <li>• natural selection.</li> </ul> </li> </ol>

Standard/ Content ID	Content Statement
<p>Strand II: The Content of Science Standard II: Life Science 9–12 Benchmark II: 1, 2, 3, 5, 6, 7</p>	<p>Understand the genetic basis for inheritance and the basic concepts of biological evolution.</p> <p><b>Genetics</b></p> <ol style="list-style-type: none"> <li>1. Know how DNA carries all genetic information in the units of heredity called genes, including: <ul style="list-style-type: none"> <li>• the structure of DNA (e.g., subunits A, G, C, T)</li> <li>• information-preserving replication of DNA</li> <li>• alteration of genes by inserting, deleting, or substituting parts of DNA.</li> </ul> </li> <li>2. Use appropriate vocabulary to describe inheritable traits (i.e., genotype, phenotype).</li> <li>3. Explain the concepts of segregation, independent assortment, and dominant/recessive alleles.</li> <li>5. Know how genetic variability results from the recombination and mutation of genes, including: <ul style="list-style-type: none"> <li>• sorting and recombination of genes in sexual reproduction result in a change in DNA that is passed on to offspring</li> <li>• radiation or chemical substances can cause mutations in cells, resulting in a permanent change in DNA.</li> </ul> </li> <li>6. Understand the principles of sexual and asexual reproduction, including meiosis and mitosis.</li> <li>7. Know that most cells in the human body contain 23 pairs of chromosomes including one pair that determines sex, and that human females have two X chromosomes and human males have an X and a Y chromosome.</li> </ol>

Standard/ Content ID	Content Statement
Strand II: The Content of Science Standard II: Life Science 9–12 Benchmark II: 10, 12, 13	Understand the genetic basis for inheritance and the basic concepts of biological evolution. <b>Biological Evolution</b> 10. Understand the data, observations, and logic supporting the conclusion that species today evolved from earlier, distinctly different species, originating from the ancestral one-celled organisms. 12. Explain how natural selection favors individuals who are better able to survive, reproduce, and leave offspring. 13. Analyze how evolution by natural selection and other mechanisms explains many phenomena including the fossil record of ancient life forms and similarities (both physical and molecular) among different species.
Strand II: The Content of Science Standard II: Life Science 9–12 Benchmark III: 2, 3, 4, 6	Understand the characteristics, structures, and functions of cells. <b>Structure and Function</b> 2. Know that specialized structures inside cells in most organisms carry out different functions, including: <ul style="list-style-type: none"> <li>• parts of a cell and their functions (e.g., nucleus, chromosomes, plasma, and mitochondria)</li> <li>• storage of genetic material in DNA</li> <li>• similarities and differences between plant and animal cells</li> <li>• prokaryotic and eukaryotic cells.</li> </ul> 3. Describe the mechanisms for cellular processes (e.g., energy production and storage, transport of molecules, waste disposal, synthesis of new molecules). 4. Know how the cell membrane controls which ions and molecules enter and leave the cell based on membrane permeability and transport (i.e., osmosis, diffusion, active transport, passive transport). 6. Know that DNA directs protein building (e.g., role of RNA).
Strand II: The Content of Science Standard II: Life Science 9–12 Benchmark III: 7	Understand the characteristics, structures, and functions of cells. <b>Biochemical Mechanisms</b> 7. Describe how most cell functions involve chemical reactions, including: <ul style="list-style-type: none"> <li>• promotion or inhibition of biochemical reactions by enzymes</li> <li>• processes of respiration (e.g., energy production, ATP)</li> <li>• communication from cell to cell by secretion of a variety of chemicals (e.g., hormones).</li> </ul>

