Southmoreland School District
Curriculum Framework

Course	Advanced Biology
Unit	Unit 1 Introduction to Biology

Standards

Pennsylvania Academic Standards for Science:
- 3.1.10.A: Explain the characteristics of life.
- 3.1.10.B: Describe concepts of biotic and abiotic factors.
- 3.3.10.A: Explain how organisms maintain homeostasis.

Essential Questions	Skills/Competencies
• What defines life? • How do living things interact with their environment? • How do scientists investigate the natural world?	• Differentiate between living and nonliving things. • Describe levels of biological organization. • Apply scientific method and experimental design.

Key Vocabulary	Related Misconceptions
• Biology • Living Organisms • Scientific Method • Homeostasis • Cell Theory	• All cells are the same. • The cell membrane is a solid barrier. • Photosynthesis occurs only in plant cells. • Cellular respiration only occurs in animal cells. • Enzymes are consumed or used up during reactions. • DNA replication only occurs during cell division.

Southmoreland School District
Curriculum Framework

Course	Advanced Biology
Unit	Unit 2: Biochemistry

Standards

- 3.1.10.A9: Describe the life-supporting properties of water.
- 3.2.10.A: Explain structure and function of biological macromolecules.
- 3.2.10.B: Describe enzymatic reactions

Essential Questions	Skills/Competencies
• How does the chemistry of life support biological processes? • Why is water essential to living systems? • How do macromolecules support cellular structure and function?	• How does the chemistry of life support biological processes? • Why is water essential to living systems? • How do macromolecules support cellular structure and function?

Key Vocabulary	Related Misconceptions
• Atom, molecule, polarity, cohesion, adhesion, macromolecule, polymer, monomer, enzyme, substrate, pH, amino acid, nucleotide	• All enzymes work at the same rate under all conditions. • Carbohydrates are always unhealthy. • Water is not a nutrient.

Southmoreland School District
Curriculum Framework

Course	Advanced Biology
Unit	Unit 3: Cells & Cell Processes

Standards

- 3.1.10.A: Describe cell structure and function.
- 3.1.10.B: Explain transport mechanisms.
- 3.1.10.C: Describe energy transformations (photosynthesis and respiration).

Essential Questions	**Skills/Competencies**
• What structures do all cells share? • How do cells maintain internal balance? • How do cells transform energy to support life?	• Compare prokaryotic and eukaryotic cells. • Illustrate osmosis, diffusion, and active transport. • Model photosynthesis and cellular respiration.
Key Vocabulary	**Related Misconceptions**
• Cell membrane, nucleus, mitochondria, chloroplast, ribosome, diffusion, osmosis, active transport, ATP, photosynthesis, respiration	• Plant and animal cells perform photosynthesis. • Diffusion requires energy. • Mitochondria are only in animals.

Southmoreland School District
Curriculum Framework

Course	Advanced Biology
Unit	Unit 4: Heredity

Standards

3.1.10.D: Explain patterns of inheritance.
3.1.10.E: Use Punnett squares to predict genetic outcomes.

Essential Questions	**Skills/Competencies**
• How are traits inherited from one generation to the next? • How do genes influence observable traits?	• Interpret Mendelian inheritance patterns. • Use Punnett squares to calculate probabilities. • Explain meiosis and its role in variation.
Key Vocabulary	**Related Misconceptions**
• Gene, allele, dominant, recessive, genotype, phenotype, meiosis, homozygous, heterozygous, probability	• Dominant traits are always more common. • Traits blend rather than segregate.

Southmoreland School District
Curriculum Framework

Course	Advanced Biology
Unit	Unit 5: Molecular Genetics & Technology

Standards

3.1.10.C: Describe DNA structure and replication.
3.1.10.D: Explain gene expression.
3.2.10.B: Apply biotechnology concepts.

Essential Questions	**Skills/Competencies**
• How does DNA serve as the blueprint for life? • How do cells use genetic information? • How is modern biotechnology applied in society?	• Model DNA replication. • Describe transcription and translation. • Understand applications of genetic engineering.
Key Vocabulary	**Related Misconceptions**
• DNA, RNA, replication, transcription, translation, codon, mutation, genetic engineering, CRISPR, cloning	• Mutations are always harmful. • DNA is only found in the nucleus. • Genes can be "turned on" permanently. .

Southmoreland School District
Curriculum Framework

Course	Advanced Biology
Unit	Unit 6 : Evolution

Standards

3.1.10.F: Explain natural selection and evolutionary processes.
3.3.10.A: Describe species adaptations.

Essential Questions	**Skills/Competencies**
• How do species change over time? • What evidence supports the theory of evolution?	• Analyze fossil and molecular evidence. • Explain mechanisms of natural selection. • Interpret phylogenetic trees.
Key Vocabulary	**Related Misconceptions**
• Evolution, natural selection, adaptation, variation, fitness, common ancestry, speciation	• Individuals evolve, not populations. • Evolution has a predetermined direction.

Southmoreland School District
Curriculum Framework

Course	Advanced Biology
Unit	Unit 7: Ecology

Standards

3.1.10.B: Analyze interdependence among organisms.
3.3.10.C: Describe cycles of matter and energy flow.
.

Essential Questions	**Skills/Competencies**
• How do organisms interact with each other and their environment? • How does energy move through ecosystems?	• Interpret food webs and energy pyramids. • Explain carbon, nitrogen, and water cycles. • Analyze human impact on ecosystems.
Key Vocabulary	**Related Misconceptions**
• Ecosystem, population, community, producer, consumer, decomposer, food web, trophic level, biodiversity	• Energy cycles through ecosystems. • Humans are not part of ecosystems.