04_Molecular Genetics

Content Area: **Science**
Course(s):
Time Period: **Full Year**
Length: **1-2 weeks**
Status: **Published**

General Overview, Course Description or Course Philosophy

Biology focuses on the diversity, complexity, and interdependence of life on Earth. Students will develop an understanding of how organisms evolve, reproduce, and adapt to their environments. This will include an exploration of how to relate the structure and function of molecules to their role in cell biology and metabolism. Further understanding of evolution and reproduction will be explored through the science of genetics. Knowledge of biodiversity and adaptation will be illustrated through the science of ecology.

OBJECTIVES, ESSENTIAL QUESTIONS, ENDURING UNDERSTANDINGS

- All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins, which carry out most of the work of cells.
- Each chromosome consists of a single very long DNA molecule, and each gene on the chromosome is a particular segment of that DNA. The instructions for forming species' characteristics are carried in DNA. All cells in an organism have the same genetic content, but the genes used (expressed) by the cell may be regulated in different ways. Not all DNA codes for a protein; some segments of DNA are involved in regulatory or structural functions, and some have no as-yet known function.
- Ask questions that arise from examining models or a theory to clarify relationships.

CONTENT AREA STANDARDS

SCI.HS-LS3-1	Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.
SCI.HS-LS1-1	Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.

RELATED STANDARDS (Technology, 21st Century Life & Careers, ELA Companion Standards are Required)

MA.K-12.4	Model with mathematics.
LA.W.9-10.5	Develop and strengthen writing as needed by planning, revising, editing, rewriting, trying a new approach, or consulting a style manual (such as MLA or APA Style), focusing on addressing what is most significant for a specific purpose and audience.

LA.W.9-10.8	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 (MLA or APA Style Manuals).
LA.W.9-10.9	Draw evidence from literary or nonfiction informational texts to support analysis, reflection, and research.
TECH.9.4.12.IML.3	Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions (e.g., S-ID.B.6a., 8.1.12.DA.5, 7.1.IH.IPRET.8).

STUDENT LEARNING TARGETS

Declarative Knowledge

Students will understand that:

- Regions of DNA called genes determine the structure of proteins, which carry out the essential functions of life through systems of specialized cell

Procedural Knowledge

Students will be able to:

- Construct an explanation that includes the idea that regions of DNA called genes determine the structure of proteins, which carry out the essential functions of life through systems of specialized cells.
- Identify and describe the evidence to construct their explanation, including that:
    - All cells contain DNA.
    - DNA contains regions that are called genes.
    - The sequence of genes contains instructions that code for proteins

EVIDENCE OF LEARNING

Formative Assessments

- Checks for understanding during lesson.
- Do Now activities.
- Student-centered questioning and discussion that is facilitated by instructor.

- Exit Tickets.

Summative Assessments

- Exams/Unit Exams.
- Quizzes.
- Laboratory Activities.

RESOURCES (Instructional, Supplemental, Intervention Materials)

Miller & Levine Biology Textbook

- Unit 4 - Genetics
    - Case Study: *Living things don't carry ID cards...or do they?*
    - Interactivity: *Explore DNA Structure.*
    - Interactivity: *Base Pairing.*
    - Interactivity: *Transcription.*
    - Analyzing Data: *Crack the code*
    - Chapter 13 - DNA

POGIL Biology

Gizmos

- DNA Structure and Replication

Brainpop

NSTA

Data Nuggets

INTERDISCIPLINARY CONNECTIONS

ELA/Literacy

Mathematics

Technology

ACCOMMODATIONS & MODIFICATIONS FOR SUBGROUPS

See link to Accommodations & Modifications document in course folder.