Marking Period	Unit Title	Recommended Instructional Days
2	**Heredity: DNA and Genetics**	**40 Days**

NJSLS - Science: *TItle*	NJSLS - Science: *Performance Expectations*	
HS-LS1 From Molecules to Organisms: Structure and Processes **HS-LS3** Heredity: Inheritance and Variation of Traits	**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. **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. **HS-LS3-2** Make and defend a claim based on evidence that inheritance genetic variations may result from: (1) new genetic combinations through meiosis. (2) viable errors occurring during replication, and/or (3) mutations caused by environment factors. **HS-LS3-3** Apply concepts of statistics and probability to explain	**Recommended Activities, Investigations, Interdisciplinary Connections, and/or Student Experiences to Explore NJSLS-S within Unit**

	the variation and distribution of expressed traits in a population.	
FOUNDATION Disciplinary: ***Core Idea***	**FOUNDATION Disciplinary:** ***Statement***	
LS1.A: Structure and Function **LS3.A:** Inheritance of Traits	-Systems of specialized cells within organisms help them perform the essential functions of life. (HS-LS1-1) -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. (HS-LS1-1 and HS-LS3- 1.) -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. (HS-LS3-1)	**Essential Question/s:** ● What is the structure of DNA, and how does it function in genetic inheritance? ● How and why do scientists manipulate DNA in living cells? ● How do scientists use biological information to study how genetics pass from one generation to another? **Activity Description**: ● **Savvas Realize Interactivity- Using Punnett Squares** This digital activity provides an opportunity for students to practice using Punnett Squares by performing a genetics investigation using pea pod characteristics. ● **Savvas Realize Analyzing Data- Human Blood Types** Students will decide whether a person with a specific phenotype is a family member based on their blood type. Students will construct an argument to support their reasoning. ● **Savvas Realize Modeling Lab- A Model of Meiosis** Students construct a model of a cell and its chromosomes and use it to demonstrate and explain the process of meiosis. ● **Savvas Realize Interactive Video- Analyzing DNA Structure** This digital activity provides an opportunity for students to explore the structure of a DNA molecule and how Chargaff's rules are applied to its bases. ● **Savvas Realize Skills Lab- Where is RNA made? And Where Does it Go?** This digital activity provides an opportunity for students to be exposed to the scientific experiments that led to the understanding that ribosomes create proteins and that DNA provides the blueprint for such molecules.

LS3.B: Variation of Traits	-In sexual reproduction, chromosomes can sometimes swap sections during the process of meiosis (cell division), thereby creating new genetic combinations and thus more genetic variation. Although DNA replication is tightly regulated and remarkably accurate, errors do occur and result in mutations, which are also a source of genetic variation. Environmental factors can also cause mutations in genes, and viable mutations are inherited. (HS-LS3-2) -Environmental factors also affect expression of traits, and hence affect the probability of occurrences of traits in a population. Thus the variation and distribution of traits observed depends on both genetic and environmental factors. (HS-LS3-2),(HS-LS3-3)	● **Savvas Realize Interactivity- Mutations** This digital activity provides an opportunity for students to investigate changes in genetic code that can result in the expression of different traits. ● **Savvas Realize Simulation- Colorblindness** This digital activity provides an opportunity for students to simulate how color blindness is inherited in humans. ● **Spotlight on scientists and their accomplishments: Mark E. Dean** Students will research and discuss the contributions of Mark E. Dean, computer scientists and engineer from IBM. Students will discuss how new technology and inventions have shaped the future of areas such as genetics and biotechnology. **Interdisciplinary Connections: Content: ;NJSLS#:** *Connections to NJSLS – English Language Arts* ● **RST.11-12.1** Accurately cite strong and thorough evidence from the text to support analysis of science and technical texts, attending to precise details for explanations or descriptions. (HS-LS3-1), (HS-LS3-2) ● **RST.11-12.9** Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. (HS-LS3-1) ● **WHST.9-12.1** Write arguments focused on discipline-specific content. (HS-LS3-2) *Connections to NJSLS – Mathematics* ● **MP.2** Reason abstractly and quantitatively. (HS-LS3-2), (HS-LS3-3)
FOUNDATION **Science and Engineering Practices:** ***Core Idea***	**FOUNDATION** **Science and Engineering Practices:** ***Statement***	
Constructing Explanations and Designing Solutions Constructing explanations and designing solutions in 9–12 builds on K–8 experiences and progresses to	-Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories,	

explanations and designs that are supported by multiple and independent student- generated sources of evidence consistent with scientific ideas, principles, and theories.	simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. (HS-LS1-1)	
Asking Questions and Defining Problems Asking questions and defining problems in 9-12 builds on K-8 experiences and progresses to formulating, refining, and evaluating empirically testable questions and design problems using models and simulations.	-Ask questions that arise from examining models or a theory to clarify relationships. (HS-LS3-1)	
Engaging in Argument from Evidence Engaging in argument from evidence in 9–12 builds on K–8 experiences and progresses to using appropriate and sufficient evidence and scientific reasoning to defend and critique claims and explanations about the natural and designed world(s). Arguments may also come from current scientific or historical episodes in science.	-Make and defend a claim based on evidence about the natural world that reflects scientific knowledge, and student-generated evidence. (HS-LS3-2)	
Analyzing and Interpreting Data	-Apply concepts of statistics and probability (including determining	

Analyzing data in 9-12 builds on K-8 experiences and progresses to introducing more detailed statistical analysis, the comparison of data sets for consistency, and the use of models to generate and analyze data.	function fits to data, slope, intercept, and correlation coefficient for linear fits) to scientific and engineering questions and problems, using digital tools when feasible. (HS-LS3-3)	
FOUNDATION Crosscutting Concepts: ***Core Idea***	**FOUNDATION Crosscutting Concepts:** ***Statement***	
Structure and Function	-Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem. (HS-LS1-1)	
Cause and Effect	-Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects. (HS-LS3-1),(HS-LS3-2)	
Scale, Proportion, and Quantity	-Algebraic thinking is used to examine scientific data and predict the effect of a change in one variable on another (e.g., linear growth vs. exponential growth). (HS- LS3-3)	

Connections to Nature of Science: Science is a Human Endeavor	-Technological advances have influenced the progress of science and science has influenced advances in technology. (HS-LS3-3) -Science and engineering are influenced by society and society is influenced by science and engineering. (HS-LS3-3)	
Social and Emotional Learning: ***Competencies***	**Social and Emotional Learning:** ***Sub-Competencies***	
Self Awareness	-Recognize one's feelings and thoughts -Recognize the impact of one's feelings and thoughts on one's own behavior -Recognize one's personal traits, strengths, and limitations -Recognize the importance of self-confidence in handling daily tasks and challenges	
Self Management	-Understand and practice strategies for managing one's own emotions, thoughts, and behaviors -Recognize the skills needed to establish and achieve personal and educational goal -Identify and apply ways to persevere or overcome barriers through alternative methods to achieve one's goals	

Social Awareness	-Recognize and identify the thoughts, feelings, and perspectives of others -Demonstrate an awareness of the differences among individuals, groups, and others' cultural backgrounds -Demonstrate an understanding of the need for mutual respect when viewpoints differ -Demonstrate an awareness of the expectations for social interactions in a variety of settings	
Responsible Decision-making	-Develop, implement, and model effective problem-solving and critical thinking skills -Identify the consequences associated with one's actions in order to make constructive choices -Evaluate personal, ethical, safety, and civic impact of decisions	
Relationship Skills	-Establish and maintain healthy relationships -Utilize positive communication and social skills to interact effectively with others -Identify ways to resist inappropriate social pressure -Demonstrate the ability to prevent and resolve interpersonal conflicts in constructive ways	

	-Identify who, when, where, or how to seek help for oneself or others when needed	

Assessments (Formative) ***To show evidence of meeting the standard/s, students will successfully engage within:***	**Assessments (Summative)** ***To show evidence of meeting the standard/s, students will successfully complete:***
Formative Assessments: ● Savvas Realize Interactivity Assignments ● Reading and Study Guide Workbook ● Class Discussions and Questioning ● eText Notebook Responses	**Benchmarks:** ● District Assessments ● Unit Portfolios if applicable **Summative Assessments:** ● Chapter Tests ● Claim Evidence Reasoning Tasks ● Case Study Wrap Ups ● Lab Reports/Skills Worksheets

Differentiated Student Access to Content:
Teaching and Learning *Resources/Materials*

Core Resources	**Alternate Core Resources** ***IEP/504/At-Risk/ESL***	**ELL Core Resources**	**Gifted & Talented Core Resources**
● Authentic Reading Materials ● Classroom Supplies ● Teacher Computer ● Internet Connectivity ● Smart Board ● Online Learning Platform ● Data Analysis Software such as Google sheets ● Lab Equipment	● Alternate reading materials ● Home copy of text ● Copy of Teacher notes ● USe of models ● Authentic Reading Materials ● Classroom Supplies ● Teacher Computer ● Internet Connectivity ● Smart Board ● Online Learning Platform ● Data Analysis Software such as Google sheets ● Lab Equipment	● Translator ● English translator dictionary ● Alternate reading materials ● Copy of Teacher notes ● Use of models ● Authentic Reading Materials ● Classroom Supplies ● Teacher Computer ● Internet Connectivity ● Smart Board ● Online Learning Platform ● Data Analysis Software such as Google sheets	● Increased inquiry based labs ● Independent Research ● Authentic Reading Materials ● Classroom Supplies ● Teacher Computer ● Internet Connectivity ● Smart Board ● Online Learning Platform ● Data Analysis Software such as Google sheets ● Lab Equipment

		• Lab Equipment	

Supplemental Resources

Technology:
- Supplemental Videos
- Student Chromebooks
- Digital Platforms including Schoology and Savvas Realize

Other:
- Safety equipment
- Classroom models

Differentiated Student Access to Content:
Recommended *Strategies & Techniques*

Core Resources	**Alternate Core Resources** ***IEP/504/At-Risk/ESL***	**ELL Core Resources**	**Gifted & Talented Core**
• Guided experiments • Inquiry experiments • Class discussions • CER activities • Phenomenon • Positive reinforcement • Rubrics	• Extended time/retakes on assessments • Modified Assessment • Written, visual and oral directions • multisensory during instruction • Alternate instruction such as visual, kinetic, and auditory. • Preferential seating if needed • Review activities • Study guides • Break assignments into shorter tasks • Guided experiments • Inquiry experiments	• Read aloud test • Modified Assessments • Written, visual and oral directions • multisensory during instruction • Alternate instruction such as visual, kinetic, and auditory. • Preferential seating if needed • Review activities • Study guides • Break assignments into shorter tasks • Guided experiments • Inquiry experiments • Class discussions • CER activities • Phenomenon	• Further depth of content • Example of realistic scenarios • Research opportunities • Design own experiments • Enhanced set of introductory activities • Extension activities • Guided experiments • Inquiry experiments • Class discussions • CER activities • Phenomenon • Positive reinforcement • Rubrics

	• Class discussions • CER activities • Phenomenon • Positive reinforcement • Rubrics	• Positive reinforcement • Rubrics	

<table>
<tr><td rowspan="4">NJSLS CAREER READINESS, LIFE LITERACIES & KEY SKILLS</td><td colspan="2">Disciplinary Concept:
• Critical Thinking and Problem Solving
• Information and Media Literacy</td></tr>
<tr><td>Core Ideas:</td><td>• Collaboration with individuals with diverse experiences can aid in the problem-solving process, particularly for global issues where diverse solutions are needed.
• Accurate information may help in making valuable and ethical choices.</td></tr>
<tr><td>Performance Expectation/s:</td><td>• 9.4.12.CT.3: Enlist input from a variety of stakeholders (e.g., community members, experts in the field) to design a service learning activity that addresses a local or global issue (e.g., environmental justice).
• 9.4.12.IML.7: Develop an argument to support a claim regarding a current workplace or societal/ethical issue such as climate change (e.g., NJSLSA.W1, 7.1.AL.PRSNT.4).</td></tr>
<tr><td colspan="2">Career Readiness, Life Literacies, & Key Skills Practices</td></tr>
<tr><td></td><td colspan="2">Critical Thinking and Problem-solving
Critical thinking involves the ability to use various types of reasoning as appropriate to the situation. Essential to critical thinking is systems thinking, which analyzes how parts of a whole interact together to produce outcomes. Critical thinking also includes making judgements and decisions by analyzing evidence, claims, points of view then communicating the interpretation of both the information and conclusions based on the best analysis. In tandem with critical thinking, problem solving involves the ability to generate and execute a solution to a problem. Problem solving occurs through one's use of initiative and flexibility to use trial and error to solve a problem until a successful solution is found.

Information and Media Literacy
Information and Media Literacy empowers learners to access, retrieve and produce well managed resources. This access promotes and fosters inquiry learning as well as a deep understanding of target knowledge, skills or concepts. Information and</td></tr>
</table>

	Media Literacy is the vehicle for learners to pursue and create relevant information using the opportunities of high-quality materials. Information and media literacy also includes a basic understanding of ethical use of information.

New Jersey Legislative Statutes and Administrative Code (place an "X" before each law/statute if/when present within the curriculum map)									
	Amistad Law: *N.J.S.A. 18A 52:16A-88*		Holocaust Law: *N.J.S.A. 18A:35-28*	X	LGBT and Disabilities Law: *N.J.S.A. 18A:35-4.35*	X	Diversity & Inclusion: *N.J.S.A. 18A:35-4.36a*		Standards in Action: *Climate Change*