

**MOORESTOWN TOWNSHIP PUBLIC SCHOOLS
MOORESTOWN, NEW JERSEY**

*Moorestown High School
Science Department*

*College Prep Biology
Grade 9*

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[Course Description and Fundamental Concepts](#)

The members of the science department at Moorestown High feel that science is an essential component in the total education process. Science education is the link between science, technology and society. The ultimate goal of the science program and this course at Moorestown High School is to develop scientifically and technologically literate citizens as well as to prepare students for scientific and/or technological careers.

Biology is a laboratory course, which enables the student to verify the concepts presented and discussed in the classroom. The student studies and examines a variety of problems shared by all living things, (molecular biology, biochemistry and cellular organization and features of metabolism, responsiveness, reproduction, evolution and ecology). In the lab, the student uses materials and equipment of the biologist in his/her attempt to learn more about life. Students who take this course in ninth grade should have acquired an above-average mastery of basic scientific concepts, scientific processes, and laboratory skills in their middle school science program.

[New Jersey Student Learning Standards \(NJSLS\)](#)

Subject/Content Standards

Include grade appropriate subject/content standards that will be addressed

Standard #	Standard Description
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-LS1-2	Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.
HS-LS1-3	Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.
HS-LS1-4	Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms. [
HS-LS1-5	Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.
HS-LS1-6	Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules.
HS-LS1-7	Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed resulting in a net transfer of energy.
HS-LS2-1	Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales. [
HS-LS2-2	Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.
HS-LS2-3	Construct and revise an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions. [
HS-LS2-4	Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.
HS-LS2-5	Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere.

HS-LS2-6	Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.
HS-LS2-7	Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.*
HS-LS2-8	Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce.
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 inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors.
HS-LS3-3	Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.
HS-LS4-1	Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence.
HS-LS4-2	Construct an explanation based on evidence that the process of evolution primarily results from four factors: (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment.
HS-LS4-3	Apply concepts of statistics and probability to support explanations that organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait.
HS-LS4-4	Construct an explanation based on evidence for how natural selection leads to adaptation of populations.
HS-LS4-5	Evaluate the evidence supporting claims that changes in environmental conditions may result in: (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species.
HS-LS4-6	Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.

[English Companion Standards](#)

List grade-level appropriate companion standards for *History, Social Studies, Science and Technical Subjects* (CTE/Arts) 6-12. English Companion Standards are required in these subject/content areas.

Unit Addressed	Standard #	Standard Description
Unit 1,2,3,4,5,6,7,8,9, 10,11,12	NJSLSA.R1	Read closely to determine what the text says explicitly and to make logical inferences and relevant connections from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.
Unit 1,2,3,4,5,6,7,8,9, 10,11,12	NJSLSA.R2	Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.
Unit 3,5,6,7,9,11,12	NJSLSA.R7	Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.
Unit 1,2,3,4,5,6,7,8,9, 10,11,12	NJSLSA.R8	Delineate and evaluate the argument and specific claims in a text, including the validity of the reasoning as well as the relevance and sufficiency of the evidence.
Unit 1,2,3,4,5,6,7,8,9, 10,11,12	NJSLSA.R10	Read and comprehend complex literary and informational texts independently and proficiently with scaffolding as needed.
Unit 1,2,3,4,5,6,7,8,9, 10,11,12	RI.9-10.1	Accurately cite strong and thorough textual evidence, (e.g., via discussion, written response, etc.) and make relevant connections, to support analysis of what the text says explicitly as well as inferentially, including determining where the text leaves matters uncertain.
Unit 1,2,3,4,5,6,7,8,9, 10,11,12	RI.9-10.8	Describe and evaluate the argument and specific claims in a text, assessing whether the reasoning is valid and the evidence is relevant and sufficient; identify false statements and reasoning.
Unit 1,2,3,4,5,6,7,8,9, 10,11,12	RI.9-10.10	By the end of grade 9, read and comprehend literary nonfiction at grade level text-complexity above with scaffolding as needed.

21st-Century Skills and Technology Integration ([Standard 8](#))

List appropriate units below for which strands (A through F) will be addressed

Standard 8.1 (K-12)		Educational Technology: <i>All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.</i>
Unit Addressed	Strand Letter	Standard Description
Unit 1,2,3,4,5,6,7,8,9, 10,11,12	Strand A	Technology Operations and Concepts: <i>Students demonstrate a sound understanding of technology concepts, systems, and operations.</i>
Unit 3, 4, 5,7,8	Strand B	Creativity and Innovation: <i>Students demonstrate creative thinking, construct knowledge and develop innovative products and process using technology.</i>
Unit 1,2,3,4,5,6,7,8,9, 10,11,12	Strand C	Communication and Collaboration: <i>Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others.</i>
Unit 1,2,3,4,5,6,7,8,9, 10,11,12	Strand D	Digital Citizenship: <i>Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.</i>
Unit 1, 3, 4,7, 9,10,11,12	Strand E	Research and Information Fluency: <i>Students apply digital tools to gather, evaluate, and use information.</i>
Unit 1,2,3,4,5,6,7,8,9, 10,11,12	Strand F	Critical thinking, problem-solving, and decision making: <i>Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.</i>
Standard 8.2 (K-5)		Technology Education, Engineering, Design, and Computational Thinking - Programming: <i>All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.</i>
	Strand A	The Nature of Technology: Creativity and Innovation: <i>Technology systems impact every aspect of the world in which we live.</i>

	Strand B	Technology and Society: <i>Knowledge and understanding of human, cultural and societal values are fundamental when designing technological systems and products in the global society.</i>
	Strand C	Design: <i>The design process is a systematic approach to solving problems.</i>
	Strand D	Abilities for a Technological World: <i>The designed world is the product of a design process that provides the means to convert resources into products and systems.</i>
	Strand E	Computational Thinking: Programming: <i>Computational thinking builds and enhances problem-solving, allowing students to move beyond using knowledge to creating knowledge.</i>

Career Ready Practices ([Standard 9](#))

List appropriate units below for which CRPs will be addressed

Unit Addressed	Standard #	Standard Description
Unit 1,2,3,4,5,6,7,8,9, 10,11,12	CRP1	<i>Act as a responsible and contributing citizen and employee.</i>
Unit 1,2,3,4,5,6,7,8,9, 10,11,12	CRP2	<i>Apply appropriate academic and technical skills.</i>
	CRP3	<i>Attend to personal health and financial well-being.</i>
Unit 1,2,3,4,5,6,7,8,9, 10,11,12	CRP4	<i>Communicate clearly and effectively and with reason.</i>
Unit 1,2,3,4,5,6,7,8,9, 10,11,12	CRP5	<i>Consider the environmental, social and economic impacts of decisions.</i>
Unit 1,2,3,4,5,6,7,8,9, 10,11,12	CRP6	<i>Demonstrate creativity and innovation.</i>
Unit	CRP7	<i>Employ valid and reliable research strategies.</i>

1,2,3,4,5,6,7,8,9, 10,11,12		
Unit 1,2,3,4,5,6,7,8,9, 10,11,12	CRP8	<i>Utilize critical thinking to make sense of problems and persevere in solving them.</i>
	CRP9	<i>Model integrity, ethical leadership, and effective management.</i>
	CRP10	<i>Plan education and career paths aligned to personal goals.</i>
Unit 1,2,3,4,5,6,7,8,9, 10,11,12	CRP11	<i>Use technology to enhance productivity.</i>
Unit 1,2,3,4,5,6,7,8,9, 10,11,12	CRP12	<i>Work productively in teams while using cultural global competence</i>

Interdisciplinary Connections

List any other content standards addressed as well as appropriate units

Visual & Performing Arts Integration ([Standard 1](#))

List appropriate units below for which standards (1.1 through 1.4) may be addressed

Unit Addressed	Standard #	Standard Description
Unit 1,2,3,4,5,6,7,8,9, 10,11,12	Standard 1.1	The Creative Process: <i>All students will demonstrate an understanding of the elements and principles that govern the creation of works of art in dance, music, theatre, and/or visual art.</i>
	Standard 1.2	History of the Arts and Culture: <i>All students will understand the role, development, and influence of the arts throughout history and across cultures.</i>
Unit 1,2,3,4,5,6,7,8,9, 10,11,12	Standard 1.3	Performing/Presenting/Producing: <i>All students will synthesize those skills, media, methods, and technologies appropriate to creating, performing, and/or presenting works of art in dance, music, theatre, and/or visual art.</i>
	Standard 1.4	Aesthetic Responses & Critique Methodologies: <i>All students will demonstrate and apply an understanding of arts philosophies, judgment, and analysis to works of art in dance, music, theatre, and/or visual art.</i>

Other Interdisciplinary Content Standards

List appropriate units below for any other content/standards that may be addressed

Unit Addressed	Content / Standard #	Standard Description
5,7,8,9,11,12	MP.2	Reason abstractly and quantitatively. (HS-LS3-2),(HS-LS3-3)
3,9,11,12	MP.4	Model with mathematics. (HS-LS1-4)
11,12	HSN-Q.A.1	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. (HS-LS2-1),(HS-LS2-2),(HS-LS2-4),(HS-LS2-7)
11,12	HSN-Q.A.2	Define appropriate quantities for the purpose of descriptive modeling. (HS-LS2-1),(HS-LS2-2),(HS-LS2-4),(HS-LS2-7)
11,12	HSN-Q.A.3	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. (HS-LS2-1),(HS-LS2-2),(HS-LS2-4),(HS-LS2-7)
11	HSS-ID.A.1	Represent data with plots on the real number line. (HS-LS2-6)
11	HSS-IC.A.1	Understand statistics as a process for making inferences about population parameters based on a random sample from that population. (HS-LS2-6) HSS-IC.B.6 Evaluate reports based on data. (HS-LS2-6)

Pacing Guide (All Dates are approximate based on the school calendar)

Unit/ Topic	Month (w/Approx number of Teaching Days)
1. Organization and Multicellularity 2. Biochemistry and Elements of Life	September (~19 days)
3. Cell Differentiation and Mitosis 4. Homeostasis, Feedback, and Transport	October (~19 days)
5. Inheritable Genetic Variation	November (~16 days)
5. Genetic Variation 6. Protein synthesis	December (~15 days)
6. Protein Synthesis <p style="text-align: center;">-Review and Midterm</p>	January (~18 days)
7. Human Genetics 8. Population Genetics	February (~18 days)
9. Evolution	March (~15-20 days)
10. Photosynthesis and Respiration 11. Ecology	April (~15-20 days)
11. Ecology 12. Natural science and Human Impacts	May (~18 days)
12. Natural science -Project based ecology topics -Review of semester topics -Final exam	June (~15 days)

[Units](#)

Contact the Content Supervisor for unit details.