



GREAT NECK PUBLIC SCHOOLS

"Where Discovery Leads to Greatness"

#DiscoverGreatness

Phipps Administration Building
Office of Instruction
345 Lakeville Road
Great Neck, New York 11020

516.441.4009
516.441.4010
Fax 516.441.4992

Course Profile

Department	Science Department		
Course Name	Regents Biology: The Living Environment		
Course Length	1 Year		
High School Credits	1 Science Credit		
Description	This is a New York State Regents science course that includes a mandatory laboratory component. Students must successfully complete 1200 minutes of laboratory experience with satisfactory written reports for each laboratory investigation. In this course students will investigate and apply scientific concepts, principles, and theories pertaining to the living environment. Topics include Safety, Experimental Design, Graphing, Life Functions, Biochemistry & Enzymes, Cells, Microscope, Transport, Photosynthesis, Cellular Respiration, Human Body System, Genetics, Evolution, Classification, Ecology & Human Impact.		
Target/eligible students	This is a required science course taught in the 9th grade at South HS and in 11th grade at NHS.		
State Learning Standards Link(s)	NYS Science Learning Standards		
Primary texts and materials	Primary texts and materials include but are not limited to the following HHMI Biointeractive ; Amoeba Sisters ; Ted-ED ; Bozeman Science ; Crashcourse ; CK12 Bio Flexbook		
Scope/Sequence	NYS Science Learning Standards		
Unit 1: Safety, Experimental. Design, Graphing, Technology	HS-LS2-4 HS-LS1-6 HS-LS2-3 HS-LS3-2 HS-LS3- 1 HS-LS3-3 HS-LS1-8	● Use mathematical representations of phenomena or design solutions to support claims. ● Apply concepts of statistics and probability (including determining function fits to data, slope, intercept, and correlation coefficient for linear fits) to scientific and engineering questions and problems, using digital tools when feasible. ● Make and defend a claim based on evidence about the natural world that reflects scientific knowledge, and student generated evidence. ● Construct and revise an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, 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. ● Communicate scientific information (e.g., about phenomena and/or the process of development and the design and performance of a proposed process or system) in multiple formats (including orally, graphically, textually, and mathematically).	p65 -69

		● Evaluate the evidence behind currently accepted explanations or solutions to determine the merits of arguments. ● Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects. ● 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). ● Technological advances have influenced the progress of science and science has influenced advances in technology. ● Science and engineering are influenced by society and society is influenced by science and engineering. ● A scientific theory is a substantiated explanation of some aspect of the natural world, based on a body of facts that have been repeatedly confirmed through observation and experiment and the science community validates each theory before it is accepted. If new evidence is discovered that the theory does not accommodate, the theory is generally modified in light of this new evidence.	
Unit 2: Biochemistry & Enzymes	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 such as nitrogen, sulfur, and phosphorus to form amino acids and other carbon-based molecules. ● Sugar molecules contain carbon, hydrogen, and oxygen. Their hydrocarbon backbones combine with other elements to make amino acids and other carbon-based molecules that can be assembled into larger molecules, such as proteins or DNA. ● 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. ● Different patterns may be observed at each of the scales at which a system is studied and can provide evidence for causality in explanations of phenomena.	Page 65

Unit 3: Life Functions, Cells, Microscope & Transport	HS-LS2-5 HS-LS3-1 HS-LS1-1 HS-LS1-2 HS-LS1-3	● Develop a model based on evidence to illustrate the relationships between systems or components of a system. ● 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. ● All cells in an organism have the same genetic content, but the genes used (expressed) by the cell may be regulated in different ways. ● Different patterns may be observed at each of the scales at which a system is studied and can provide evidence for causality in explanations of phenomena. ● Systems of specialized cells within organisms help them perform the essential functions of life. ● Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level. ● Feedback mechanisms maintain a living system's internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change within some range. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the living system. ● 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.	Page 64
Unit 4: Photosynthesis and Cellular Respiration	HS-LS1-5	● Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.	p65

	HS-LS1-7 HS-LS1-6 HS-LS2-3	● Use a model to illustrate that aerobic 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. ● The process of photosynthesis converts light energy to stored chemical energy by converting carbon dioxide plus water into sugars plus released oxygen. ● Cellular respiration is a chemical process in which the bonds of food molecules and oxygen molecules are broken and new compounds are formed. In this process ATP is produced, which is used to carry out life processes. ● Photosynthesis and cellular respiration (including anaerobic processes) provide most of the energy for life processes. ● As matter and energy flow through different organizational levels of living systems, chemical elements are recombined in different ways to form different products. As a result of these chemical reactions, energy is transferred from one system of interacting molecules to another.	
Unit 5: Human Body Systems	HS-LS1-8 HS-LS1-1 HS-LS1-2 HS-LS1-3	● Use models to illustrate how human reproduction and development maintains continuity of life ● 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. ● Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms ● Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis	p64
Unit 6: Modern Genetics	HS-LS1-4 HS-LS3-1 HS-LS3-2 HS-LS3-3	● Use a model to illustrate cellular division (mitosis) and differentiation ● Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring ● 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, (3) mutations caused by environmental factors and/or (4) genetic engineering. ● Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population	p69
Unit 7: Evolution	HS-LS4-1 HS-LS4-2 HS-LS4-3 HS-LS4-4 HS-LS4-5	● Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence ● 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	p 71

		● 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 ● Construct an explanation based on evidence for how natural selection leads to adaptation of populations ● 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	
Unit 8: Ecology	HS-LS2-3 HS-LS2-4 HS-LS2-5 HS-LS2-1 HS-LS2-2 HS-LS2-6 HS-LS2-7 HS-LS2-8	● Construct and revise an explanation based on evidence for the cycling of matter and flow of energy in ecosystems ● Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem. ● Develop a model to illustrate the role of various processes in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere ● Use mathematical and/or computational representations to support explanations of biotic and abiotic factors that affect carrying capacity of ecosystems at different scales ● 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 ● Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity ● Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce	Pages 65 and 67
Additional Notes:			