

Pequannock Township School District Curriculum Syllabus

Course Name and level / Grade level and Subject: Academic Biology
Grade 9

Course Description:

This lab-based, inquiry-instructed course is aligned to the Next Generation Science Standards and the Common Core State Standards. This course deals with major concepts and theories of biology.

Students develop an understanding of matter in terms of composition and changes in composition, and become able to solve scientific problems logically, use and right chemical formulae, as well as, write and balance chemical equations.

Course Standards:

The following is a list of NJSLS that describe what students are expected to know and be able to do as a result of successfully completing this course. The following NJSLS are the basis of the assessment of student achievement. The learner will demonstrate mastery of:

Unit 1	LS1-6 LS1-7
Unit 2	LS1-1 LS1-2 LS1-3 LS1-4
Unit 3	LS1-5 LS1-7
Unit 4	LS1-1 LS3-1 LS3-2 LS3-2 LS 4-1
Unit 4	

	LS4-2 LS4-3 LS4-4 LS4-5 LS4-6
	LS2-1 LS2-2 LS3-3 LS4-5 LS4-6

Scope and Sequence

Unit 1 (30 Days)

In this unit, students will review and learn the chemical principles, terms, and processes needed for a thorough understanding of biology.

Biology and chemistry are two subjects that are tied closely together. A student cannot fully grasp all of the processes in an organism without a basic understanding of how reactions work and the structure of the atom. This unit serves to solidify students' foundation understanding of chemistry.

Unit 2 (15 Days)

The performance expectations in the topic Structure and Function help students formulate an answer to the question: "How do the structures of organisms enable life's functions?"

Students are able to investigate explanations for the structure and function of cells as the basic units of life, the hierarchical systems of organisms, and the role of specialized cells for maintenance and growth. Students demonstrate an understanding of how systems of cells function together to support the life processes. Students demonstrate their understanding through critical reading, using models, and conducting investigations. The crosscutting concepts of structure and function, matter and energy, and systems and system models in organisms are called out as organizing concepts. Cell theory, along with evolution and genetics, form the foundation of modern biology. At the center of this, of course, is the cell. Without knowing each part of the cell and its role, students will not be able to link cells to functions of tissues and organs. Also, recognizing the importance of water balance is an underlying issue for later chapters, including ecology and body systems.

Unit 3 (21 Days) In this unit of study, students construct explanations for the role of energy in the cycling of matter in organisms and ecosystems. They apply mathematical concepts to develop evidence to support explanations of the interactions of photosynthesis and cellular respiration, and they will develop models to communicate these explanations. Students also understand organisms' interactions with each other and their physical environment and how organisms obtain resources. Students utilize the crosscutting concepts of matter and energy and systems, and system models to make sense of ecosystem dynamics. Students construct explanations for the role of energy in the cycling of matter in organisms and ecosystems. They apply mathematical concepts to develop evidence to support explanations as they demonstrate their understanding of the disciplinary core ideas. Understanding both photosynthesis and respiration is the foundation for understanding of all of the processes that cells perform. This understanding is key for students to begin to see the interconnectedness of all living things.

Unit 4 (31 Days) Students take an in depth look into Genetics, DNA, Transcription/Translation, as well as Genetic Disorders, Technology, and Engineering. Students analyze data and develop models to make sense of the relationship between DNA and chromosomes in the process of cellular division, which passes traits from one generation to the next. Students determine why individuals of the same species vary in how they look, function, and behave. Many of the questions that students ask relate to their appearance and how it relates to the appearance of their family. Having a solid genetic understanding allows students to see the traits that are carried down and lost and perform basic predictions. Modern development of DNA and genetics are the basis for emerging technologies and treatments. Understanding gene therapy, genetically modified foods, mutations, and DNA technology is key to existing as an informed citizen.

Unit 5 (10 Days) After uniting information from a variety of sources, Darwin formulated his Theory of Evolution. This theory states that organisms change over time to be best suited to their environment. Evolution explains how all living things on Earth changed from single-celled states to the complex organisms around us. Students also develop an understanding of the factors causing natural selection of species over time. They also demonstrate and understandings of how multiple lines of evidence contribute to the strength of scientific theories of natural selection. Evolution forms the foundation of modern biology. After the study of mutations creating different traits, the natural progression is to see the effect of differences. Evolution acts on these differences and creates the diversity that students see around them. The ideas in this unit underpin the understanding of units to come, especially the animal and plant units.

Unit 6 (29 Days) This unit discusses the interaction between plants, animals, and the environment around them. This includes nutrient cycling and energy use among ecosystems, as well as the role of organisms in these patterns. Specific symbioses between organisms will be examined, also the evolutionary paths that lead to interactions. The highest level of biological organization is ecology. Understanding this topic means that students have a solid understanding of all topics previous. Also, news in recent years has involved more ecological

trends and ideas. Events like the Gulf Oil Spill, Global Warming, and recent flooding in the Northeast show the human impact on the environment. Students need to be able to discuss ecological topics to be part of modern society.

Assessments

Evaluation of student achievement in this course will be based on the following:

Concept checks, quizzes, tests, labs, critical thinking and analysis questions, research projects

Curriculum Resources

Anchor Programs/Teacher Materials
NGSS materials, Miller Levine Biology Text

Home and School Connection

The following are suggestions and/or resources that will help parents support their children:

Discovery Education, McGraw Hill animations, Khan academy, Bozeman science

