HIGH SCHOOL

SCIENCE

SCOPE AND SEQUENCE

BIOLOGY

ENVIRONMENTAL SYSTEMS

CHEMISTRY

PHYSICS

Biology

First Six Weeks :: The student is expected to...

- demonstrate safe practices during field and laboratory investigations.[1.A]
- plan and implement investigative procedures including asking questions, formulating testable hypotheses, and selecting equipment and technology.[2.A]
- collect data and make measurements with precision.[2.B]
- organize, analyze, evaluate, make inferences, and predict trends from data.[2.C]
- communicate valid conclusions.[2.D]
- analyze, review, and critique scientific explanations, including hypotheses and theories, as to their strengths and weaknesses using scientific evidence and information.[3.A]
- evaluate promotional claims that relate to biological issues such as product labeling and advertisements.[3.B]
- evaluate the impact of research on scientific thought, society, and the environment.[3.C]
- describe the connection between biology and future careers.[3.D]
- evaluate models according to their adequacy in representing biological objects or events.[3.E]
- research and describe the history of biology and contributions of scientists.[3.F]

Second Six Weeks :: The student is expected to...

- make wise choices in the use and conservation of resources and the disposal or recycling of materials.[1.B]
- analyze the flow of matter and energy through different trophic levels and between organisms and the physical environment.[9.D]
- summarize the role of microorganisms in maintaining and disrupting equilibrium including diseases in plants and animals and decay in an ecosystem.[11.D]
- analyze the flow of energy through various cycles including the carbon, oxygen, nitrogen, and water cycles. [12.A]
- interpret interactions among organisms exhibiting predation, parasitism, commensalism, and mutualism.[12.B]
- compare variations, tolerances, and adaptations of plants and animals in different biomes.[12.C]
- investigate and explain the interactions in an ecosystem including food chains, food webs, and food pyramids. [12.E]
- evaluate the significance of structural and physiological adaptations of plants to their environments.[13.A]
- survey and identify methods of reproduction, growth, and development of various types of plants.[13.B]

Third Six Weeks :: The student is expected to...

- investigate and identify cellular processes including homeostasis, permeability, energy production, transportation of molecules, disposal of wastes, function of cellular parts, and synthesis of new molecules.[4.B]
- identify cell differentiation in the development of organisms.[5.B]
- sequence the levels of organization in multicellular organisms to relate the parts to each other and to the whole. [5.C]
- describe components of deoxyribonucleic acid (DNA), and illustrate how information for specifying the traits of an organism is carried in the DNA.[6.A]
- explain replication, transcription, and translation using models of DNA and ribonucleic acid (RNA).[6.B]
- identify and illustrate how changes in DNA cause mutations and evaluate the significance of these changes. [6.C]
- compare the structures and functions of different types of biomolecules such as carbohydrates, lipids, proteins, and nucleic acids.[9.A]
- compare the energy flow in photosynthesis to the energy flow in cellular respiration.[9.B]
- investigate and identify the effects of enzymes on food molecules.[9.C]
- identify and illustrate that long-term survival of species is dependent on a resource base that may be limited. [12.D]

Biology

Fourth Six Weeks :: The student is expected to...

- identify the parts of prokaryotic and eukaryotic cells.[4.A]
- compare genetic variations observed in plants and animals.[6.D]
- compare the processes of mitosis and meiosis and their significance to sexual and asexual reproduction.[6.E]
- identify and analyze karyotypes.[6.F]
- analyze and identify characteristics of plant systems and subsystems.[10.C]

Fifth Six Weeks :: The student is expected to...

- compare cells from different parts of plants and animals including roots, stems, leaves, epithelia, muscles, and bones to show specialization of structure and function.[5.A]
- identify evidence of change in species using fossils, DNA sequences, anatomical similarities, physiological similarities, and embryology.[7.A]
- illustrate the results of natural selection in speciation, diversity, phylogeny, adaptation, behavior, and extinction. [7.B]
- collect and classify organisms at several taxonomic levels such as species, phylum, and kingdom using dichotomous keys.[8.A]
- analyze relationships among organisms and develop a model of a hierarchical classification system based on similarities and differences using taxonomic nomenclature.[8.B]
- identify characteristics of kingdoms including monerans, protists, fungi, plants, and animals.[8.C]

Sixth Six Weeks :: The student is expected to...

- compare the structures and functions of viruses to cells and describe the role of viruses in causing diseases and conditions such as acquired immune deficiency syndrome, common colds, smallpox, influenza, and warts.[4.C]
- identify and describe the role of bacteria in maintaining health such as in digestion and in causing diseases such as in streptococcus infections and diphtheria.[4.D]
- interpret the functions of systems in organisms including circulatory, digestive, nervous, endocrine, reproductive, integumentary, skeletal, respiratory, muscular, excretory, and immune.[10.A]
- compare the interrelationships of organ systems to each other and to the body as a whole.[10.B]
- identify and describe the relationships between internal feedback mechanisms in the maintenance of homeostasis.[11.A]
- investigate and identify how organisms, including humans, respond to external stimuli.[11.B]
- analyze the importance of nutrition, environmental conditions, and physical exercise on health.[11.C]

Environmental Systems

First Six Weeks :: The student is expected to...

- identify indigenous plants and animals, assess their role within an ecosystem, and compare them to plants and animals in other ecosystems and biomes.[4.A]
- predict how the introduction, removal, or reintroduction of an organism may alter the food chain and affect existing populations.[4.D]
- predict changes that may occur in an ecosystem if biodiversity is increased or reduced.[4.E]
- summarize forms and sources of energy.[6.A]
- explain the flow of energy in an ecosystem.[6.B]
- investigate and explain the effects of energy transformations within an ecosystem.[6.C]
- investigate and identify energy interactions in an ecosystem.[6.D]
- relate carrying capacity to population dynamics.[7.A]
- calculate exponential growth of populations.[7.B]
- analyze and make predictions about the impact on populations of geographic locales, natural events, diseases, and birth and death rates.[7.D]

Second Six Weeks :: The student is expected to...

- evaluate the impact of human activity such as methods of pest control, hydroponics, organic gardening, or farming on ecosystems.[4.C]
- summarize methods of land use and management.[5.A]
- document the use and conservation of both renewable and non-renewable resources.[5.C]
- identify renewable and non-renewable resources that must come from outside an ecosystem such as food, water, lumber, and energy.[5.D]
- evaluate the impact of human activity and technology on land fertility and aquatic viability.[5.F]
- evaluate the depletion of non-renewable resources and propose alternatives.[7.C]

Third Six Weeks :: The student is expected to...

- make observations and compile data about fluctuations in abiotic cycles and evaluate the effects of abiotic factors on local ecosystems and biomes.[4.B]
- identify source, use, quality, and conservation of water.[5.B]
- analyze and evaluate the economic significance and interdependence of components of the environmental system.[5.E]

Fourth Six Weeks :: The student is expected to...

- analyze and describe the effects on environments of events such as fires, hurricanes, deforestation, mining, population growth, and municipal development.[8.A]
- explain how regional changes in the environment may have a global effect.[8.B]
- describe how communities have restored an ecosystem.[8.C]
- examine and describe a habitat restoration or protection program.[8.D]

Fifth Six Weeks :: The student is expected to...

- demonstrate safe practices during field and laboratory investigations.[1.A]
- make wise choices in the use and conservation of resources and the disposal or recycling of materials.[1.B]
- plan and implement investigative procedures including asking questions, formulating testable hypotheses, and selecting equipment and technology.[2.A]
- collect data and make measurements with precision.[2.B]
- organize, analyze, evaluate, make inferences, and predict trends from data.[2.C]
- communicate valid conclusions.[2.D]

Sixth Six Weeks :: The student is expected to...

- analyze, review, and critique scientific explanations, including hypotheses and theories, as to their strengths and weaknesses using scientific evidence and information.[3.A]
- make responsible choices in selecting everyday products and services using scientific information.[3.B]
- evaluate the impact of research on scientific thought, society, and the environment.[3.C]
- describe the connection between environmental science and future careers.[3.D]
- research and describe the history of environmental science and contributions of scientists.[3.E]

Chemistry

First Six Weeks :: The student is expected to...

- demonstrate safe practices during field and laboratory investigations.[1.A]
- make wise choices in the use and conservation of resources and the disposal or recycling of materials.[1.B]
- plan and implement investigative procedures including asking questions, formulating testable hypotheses, and selecting equipment and technology.[2.A]
- collect data and make measurements with precision.[2.B]
- communicate valid conclusions.[2.E]
- analyze, review, and critique scientific explanations, including hypotheses and theories, as to their strengths and weaknesses using scientific evidence and information.[3.A]
- make responsible choices in selecting everyday products and services using scientific information.[3.B]
- differentiate between physical and chemical properties of matter.[4.A]

Second Six Weeks :: The student is expected to...

- investigate and identify properties of mixtures and pure substances.[4.C]
- describe the physical and chemical characteristics of an element using the periodic table and make inferences about its chemical behavior.[4.D]
- describe the existence and properties of subatomic particles.[6.A]
- analyze stable and unstable isotopes of an element to determine the relationship between the isotope's stability and its application.[6.B]
- summarize the historical development of the periodic table to understand the concept of periodicity.[6.C]
- identify characteristics of atoms involved in chemical bonding.[8.A]
- investigate and compare the physical and chemical properties of ionic and covalent compounds.[8.B]
- describe the influence of intermolecular forces on the physical and chemical properties of covalent compounds.[8.D]

Third Six Weeks :: The student is expected to...

- express and manipulate chemical quantities using scientific conventions and mathematical procedures such as dimensional analysis, scientific notation, and significant figures.[2.C]
- organize, analyze, evaluate, make inferences, and predict trends from data.[2.D]
- compare the arrangement of atoms in molecules, ionic crystals, polymers, and metallic substances.[8.C]
- demonstrate and document the effects of a corrosion process and evaluate the importance of electroplating metals.[10.B]
- identify common elements and compounds using scientific nomenclature.[11.A]
- demonstrate the use of symbols, formulas, and equations in describing interactions of matter such as chemical and nuclear reactions.[11.B]

Fourth Six Weeks :: The student is expected to...

- analyze examples of solids, liquids, and gases to determine their compressibility, structure, motion of particles, shape, and volume.[4.B]
- identify changes in matter, determine the nature of the change, and examine the forms of energy involved.[5.A]
- identify and measure energy transformations and exchanges involved in chemical reactions.[5.B]
- describe interrelationships among temperature, particle number, pressure, and volume of gases contained within a closed system.[7.A]
- illustrate the data obtained from investigations with gases in a closed system and determine if the data are consistent with the Universal Gas Law.[7.B]
- demonstrate and explain effects of temperature and the nature of solid solutes on the solubility of solids.[12.A]
- develop general rules for solubility through investigations with aqueous solutions.[12.B]
- evaluate the significance of water as a solvent in living organisms and in the environment.[12.C]
- compare unsaturated, saturated, and supersaturated solutions.[13.A]

- interpret relationships among ionic and covalent compounds, electrical conductivity, and colligative properties of water.[13.B]
- measure and compare the rates of reaction of a solid reactant in solutions of varying concentration.[13.C]

Chemistry

- verify the law of conservation of energy by evaluating the energy exchange that occurs as a consequence of a chemical reaction.[15.A]
- relate the rate of a chemical reaction to temperature, concentration, surface area, and presence of a catalyst. [15.B]

Fifth Six Weeks :: The student is expected to...

- evaluate the impact of research on scientific thought, society, and the environment.[3.C]
- describe the connection between chemistry and future careers.[3.D]
- research and describe the history of chemistry and contributions of scientists.[3.E]
- measure the effects of the gain or loss of heat energy on the properties of solids, liquids, and gases.[5.C]
- explain and balance chemical and nuclear equations using number of atoms, masses, and charge.[11.C]
- analyze and measure common household products using a variety of indicators to classify the products as acids or bases.[14.A]
- demonstrate the electrical conductivity of acids and bases.[14.B]
- identify the characteristics of a neutralization reaction.[14.C]
- describe effects of acids and bases on an ecological system.[14.D]

Sixth Six Weeks :: The student is expected to...

- compare fission and fusion reactions in terms of the masses of the reactants and products and the amount of energy released in the nuclear reactions.[9.A]
- investigate radioactive elements to determine half-life.[9.B]
- evaluate the commercial use of nuclear energy and medical uses of radioisotopes.[9.C]
- evaluate environmental issues associated with the storage, containment, and disposal of nuclear wastes.[9.D]
- identify oxidation-reduction processes.[10.A]
- demonstrate and document the effects of a corrosion process and evaluate the importance of electroplating metals.[10.B]

Physics

First Six Weeks :: The student is expected to...

- demonstrate safe practices during field and laboratory investigations.[1.A]
- make wise choices in the use and conservation of resources and the disposal or recycling of materials.[1.B]
- plan and implement experimental procedures including asking questions, formulating testable hypotheses, and selecting equipment and technology.[2.A]
- make quantitative observations and measurements with precision.[2.B]
- organize, analyze, evaluate, make inferences, and predict trends from data.[2.C]
- communicate valid conclusions.[2.D]
- graph data to observe and identify relationships between variables.[2.E]
- read the scale on scientific instruments with precision.[2.F]
- express laws symbolically and employ mathematical procedures including vector addition and right-triangle geometry to solve physical problems.[3.B]
- generate and interpret graphs describing motion including the use of real-time technology.[4.A]
- analyze examples of uniform and accelerated motion including linear, projectile, and circular.[4.B]
- demonstrate the effects of forces on the motion of objects.[4.C]
- develop and interpret a free-body diagram for force analysis.[4.D]
- identify and describe motion relative to different frames of reference.[4.E]

Second Six Weeks :: The student is expected to...

- interpret evidence for the work-energy theorem.[5.A]
- observe and describe examples of kinetic and potential energy and their transformations.[5.B]
- calculate the mechanical energy and momentum in a physical system such as billiards, cars, and trains.[5.C]
- demonstrate the conservation of energy and momentum.[5.D]
- identify the influence of mass and distance on gravitational forces.[6.A]

Third Six Weeks :: The student is expected to...

- analyze and explain everyday examples that illustrate the laws of thermodynamics.[7.A]
- evaluate different methods of heat energy transfer that result in an increasing amount of disorder.[7.B]

Fourth Six Weeks :: The student is expected to...

- examine and describe a variety of waves propagated in various types of media and describe wave characteristics such as velocity, frequency, amplitude, and behaviors such as reflection, refraction, and interference.[8.A]
- identify the characteristics and behaviors of sound and electromagnetic waves.[8.B]
- interpret the role of wave characteristics and behaviors found in medicinal and industrial applications.[8.C]
- describe the photoelectric effect.[9.A]
- explain the line spectra from different gas-discharge tubes.[9.B]

Fifth Six Weeks :: The student is expected to...

- identify and analyze the influences of charge and distance on electric forces.[6.C]
- demonstrate the relationship between electricity and magnetism.[6.D]
- design and analyze electric circuits.[6.E]
- identify examples of electrical and magnetic forces in everyday life.[6.F]

Sixth Six Weeks :: The student is expected to...

- analyze, review, and critique scientific explanations, including hypotheses and theories, as to their strengths and weaknesses using scientific evidence and information.[3.A]
- evaluate the impact of research on scientific thought, society, and the environment.[3.C]
- describe the connection between physics and future careers.[3.D]
- research and describe the history of physics and contributions of scientists.[3.E]
- research and describe the historical development of the concepts of gravitational, electrical, and magnetic force. [6.B]