Hunterdon Preparatory School
Earth Science Curriculum

Earth Science is a natural science concerned with the origin, structure, and physical phenomena of the earth and its place in space. Students who attend the Hunterdon Preparatory School arrive with a varied knowledge base and specific sets of skills in science, and their yearly curriculum is dictated by their abilities based on these skill sets. The Earth Science curriculum seeks to teach students that Earth operates as a set of complex, dynamic, and interconnected systems, and is a part of the all-encompassing system of the universe. Major emphasis is placed on fostering an overall sense of curiosity and inquiry in students concerning the physical world around them. Students are taught critical and creative thinking skills, problem solving skills, and the importance of collaboration with peers in order to formulate sound conclusions. The use of technology and computers is integrated into all facets of Earth Science instruction, as well as a continual examination of the numerous career opportunities to be found in different fields of science.

The Earth Science curriculum seeks to instill in students the importance of studying the earth in terms of its population, its environmental challenges, and the limited resources available to sustain life on the planet for years to come. Students are taught to develop and apply their scientific literacy by studying the interrelationship of humans to Earth's interior, land, sea, air, and space. They are taught to think globally in terms of management of the planet, but that they need to act locally in terms of overseeing the use of natural resources and making changes in the world. Empowering students with scientific knowledge and skills to make informed decisions as citizens of our common home is a vital undertaking of this course. The applied, and often visual, nature of Earth Science helps learners see the connections and relevance of science to their lives and their communities.

Earth Science is composed of four major branches: geology, oceanology, climatology and meteorology, and astronomy. These four branches are divided into the marking periods during the school year, but their interconnectedness and interdependence are stressed throughout. In studying geology, students investigate the earth’s structure and how changes occur to the terrain of the earth’s surface. The unit also focuses on the formation of rocks and minerals, plate tectonics, and geologic time and evolution. The climatology and meteorology unit centers on the earth’s atmosphere, the effects of climate change, and desertification, as well as on exploring the concept of weather patterns and their effect on the planet in terms of crops, erosion, and human interactions. For the unit on oceanography, students learn the importance of the oceans of the

world and the ecosystems discovered there. Ocean currents, tidal energy, ocean pollution, and ocean mining are all important topics studied. The astronomy unit covers space, the solar system, stars and galaxies, and space exploration.

All through the Earth Science course, students are taught the importance of being able to express and interpret information and ideas in an organized fashion. As scientists must be able to carefully describe their methods and results to a variety of audiences, including other scientists, students are taught to develop their powers of observation and description, and to be able to communicate their findings into clear understandable language. Students are given opportunities during each unit of study to express themselves verbally either in a group setting or during individual presentations. Throughout the year, students also participate in classroom experiments, collaborative group work, individual research projects, field trips, computer software science programs, and the viewing of instructional science videos.

COURSE OBJECTIVES

- Students will cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.
- Students will determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept and provide an accurate summary of the text.
- Students will be able to follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
- Students will determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical text.
- Students will analyze the structure of the relationships among concepts in a text, including relationships among key terms.
- Students will analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.

- Students will be able to translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
- Students will assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.
- Students will compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.

Hunterdon Preparatory School
Life Science Curriculum

The study of Life Science comprises the fields of science that involve the scientific study of living organisms – such as microorganisms, plants, animals, and human beings, as well as related considerations such as health medicine and food science. The term Life Science is generally understood to cover a broader field than Biology, including interdisciplinary areas that lie between biology and medicine. At the Hunterdon Preparatory School, students arrive with a varied knowledge base and specific sets of skills in science, and their yearly curriculum is dictated by their abilities based on these skill sets. Major emphasis is placed on fostering an overall sense of curiosity and inquiry in students concerning the natural world around them. Students are taught critical and creative thinking skills, problem solving skills, and the importance of collaboration with peers in order to formulate sound conclusions. The use of technology and computers is integrated into all facets of Life Science instruction, as well as a continual examination of the numerous career opportunities to be found in the different fields of science.

The Life Science curriculum seeks to teach students to employ the scientific inquiry process in evaluating information that is observed in the natural world, and to be able to infer and predict possible outcomes for the future. The course begins with a close examination of cell theory and life at the cellular level in both plants and animals. Students explore life, starting with the simple and microscopic, and work their way up to the most complex life forms. A major unit of study involves evolution, genetics, and heredity and how traits are passed on in both the plant and animal kingdoms. This unit leads into the next area of study which is the diversity of life and how scientists classify all living creatures into different kingdoms, phylums, classes, orders, and families.

The curriculum next proceeds to a more comprehensive unit on plants in terms of their characteristics, their reproduction, photosynthesis, and respiration. Students likewise study the medicinal benefits of certain plants in their treatment of human diseases, and what effect biotechnology is having in the natural world. The next area of study continues with the exploration of life by an all-encompassing examination of the animal kingdom. Students inspect animal characteristics, behavior, adaptations, and body systems, from sea creatures to insects, and from birds to mammals. Animal classification, diversity, reproduction, communication, and ecosystems are all thoroughly investigated.

Throughout the course, students discover the impact that animals and humans have on the environments that they inhabit. Students study the concept of ecology, the complex relationships of all living organisms operating within the biosphere, changing ecosystems and biomes, and the negative effects of overpopulation, pollution, pesticides, and the overuse of non-renewable resources.

The last unit of study focuses on the human body and human health. Students learn about the various systems that are a part of the human body, the different cycles of growth and reproduction, and the importance of nutrition and exercise to the health of the individual. A unit focuses on the impact of drugs and diseases on the human body and the human immune system, as well as the complexities of today's food industry from which individuals obtain their nourishment.

Student progress and performance in Life Science is determined by participation in classroom experiments, collaborative group work in science "research teams", individual research projects, field trips, computer software science programs, and the viewing of instructional science videos.

COURSE OBJECTIVES

- Students will cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.
- Students will determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept and provide an accurate summary of the text.
- Students will be able to follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
- Students will determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical text.
- Students will analyze the structure of the relationships among concepts in a text, including relationships among key terms.

- Students will analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.
- Students will be able to translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
- Students will assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.
- Students will compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.

Hunterdon Preparatory School
Biology Curriculum

Biology is a natural science concerned with the study of life and living organisms, including their structure, function, growth, evolution, and taxonomy. While the roots of the study of biology can be traced back to ancient Greeks such as Hippocrates and Aristotle, modern biology is a relatively recent development. With the advances in microscopy, microbiology, genetics, and medicine, an introduction to biology is a vital part of every student's education. An understanding of modern biology allows students to react intelligently to changes taking place in the world. At the Hunterdon Preparatory School students arrive with a varied knowledge base and specific sets of skills in science, and their yearly curriculum is dictated by their abilities based on these skill sets. Major emphasis is placed on fostering an overall sense of curiosity and inquiry in students concerning the natural world around them. Students are taught critical and creative thinking skills, problem solving skills, and the importance of collaboration with peers in order to formulate sound conclusions. The use of technology and computers is integrated into all facets of Biology instruction, as well as a continual examination of the numerous career opportunities to be found in the different fields of science.

The Biology curriculum seeks to impress upon students the complexities and interconnectedness of all forms of life on our planet and the universal laws that govern all interactions. The curriculum teaches students to use their powers of observation, to gather, analyze, and evaluate evidence, and to reach conclusions and make predictions about phenomena in nature. Scientific predictions can then be useful in solving problems, addressing issues in society, and assisting policy makers with making educated decisions in directing the future of the planet. The course begins with a basic overview of the "chemistry of life" and how different chemical reactions operate to sustain life. The following unit instructs students on the ecology of life or the study of the interactions of organisms and between organisms and their environment. Students learn the levels of organization within the biosphere and specific biomes, and the impact of different populations and humans on ecosystems.

One of the major units of study involves life at the cellular level as students examine cell theory, cell structure, cellular diversity, cellular respiration and division, and chemical reactions at the cellular level. Students next learn about genetics and heredity, and how chromosomes, DNA, RNA, and genes operate at the cellular level to influence character traits. Students study the history of genetics and the evolving controversial field of genetic engineering. This unit of study is then followed by the theory of evolution and the puzzle of the diversity of life. Students explore the concepts of "survival of the fittest", natural selection, genetic variation, and

speciation. The history of life is traced through the various geologic time periods in conjunction with the evolution of multicellular life forms. This unit leads into the next area of study which is how scientists classify all living creatures into different kingdoms, phylum, classes, orders, and families.

The curriculum next proceeds to a more comprehensive unit on plants in terms of their characteristics, their reproduction, photosynthesis, and respiration. Students likewise study the importance of vegetative reproduction and propagation in terms of agricultural production and the history of the feeding of human populations. The next area of study continues with the exploration of life by an all-encompassing examination of the animal kingdom. Students inspect animal characteristics, animal behavior, adaptations in animals, and animal body systems, from sea creatures and insect invertebrates, to birds and mammals. Animal classification, diversity, reproduction, communication, and ecosystems are all thoroughly investigated.

The last unit of study focuses on the human body and human health. Students learn about all of the various systems that are a part of the human body, the different cycles of growth and reproduction, and the importance of nutrition and exercise to the health of the individual. Detailed units explore the function of each of the human body's eleven organ systems and the complexities of each system working interdependently with one another.

Student progress and performance in Biology class is determined by a number of progress indicators. Readings from the Biology textbook, the Biology Workbook and Study Guide, teacher prepared materials, and laboratory assessments are all used as student progress indicators.

COURSE OBJECTIVES

- Students will cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.
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Hunterdon Preparatory School
Chemistry Curriculum

Chemistry is a physical science and is the study of the composition, structure, properties, and changes of matter. Chemistry, with its historical roots in the study of Alchemy, is a branch of knowledge that grew from human curiosity about our world and the universe beyond. The study of Chemistry helps make sense of the world we live in, from soap breaking down greases to biofuel alternatives. At the Hunterdon Preparatory School, students arrive with a varied knowledge base and specific sets of skills in science, and their yearly curriculum is dictated by their abilities based on these skill sets. Students in the Chemistry course are taught critical and creative thinking skills, problem solving skills, and the importance of collaboration with peers in order to formulate sound conclusions. The subject matter and principles included in the curriculum outline are basic to understanding our environment. The HPS Chemistry course presents a modern view of chemistry suitable for students with a wide range of skills and abilities. Special attention is given to the scientific method, the historical development of scientific thinking, and the technological advances made through chemical research development. The use of technology and computers is integrated into all facets of Chemistry instruction, as well as a continual examination of the numerous career opportunities to be found in the different fields of science.

The Chemistry curriculum seeks to impress upon students that chemistry is a "central" science as it unites physics, mathematics, biology, medicine, the earth, and environmental science. By understanding the nature of chemicals and chemical processes, we gain insight into the physical and biological phenomena that surround us. The curriculum begins by covering the scientific method and the basic properties of matter including elements, compounds, and chemical reactions. Students next learn about atomic structure, the Periodic Table, and the behavior of electrons in order to understand observable changes at the atomic level. The following unit describes Ionic, Metallic, and Covalent Bonding as students learn how mixtures and compounds are formed. Students also learn chemical names and formulas and how chemical quantities are measured, as well as studying chemical reactions and balancing chemical equations.

The curriculum then proceeds to introduce the changing states of matter and their physical properties including solutions. Students learn about the nature of acids and bases, and they study thermochemistry or the study of energy changes that occur during chemical reactions. Students examine units concerning the concepts of oxidation, chemical reaction rates, and electrochemistry. The course concludes with units on hydrocarbon compounds, the chemistry of life, and nuclear chemistry.

Students are given opportunities during each unit of study to express themselves verbally or through written assessments either in a group setting or during individual presentations. Throughout the year, student progress and performance in Chemistry class is determined by a number of progress indicators. Students participate in classroom experiments, collaborative group work, individual research projects, field trips, computer software science programs, and the viewing of instructional science videos.

COURSE OBJECTIVES

- Students will cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.
- Students will determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept and provide an accurate summary of the text.
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Hunterdon Preparatory School
Global Issues Curriculum

This course explores the issues facing our global community. From environmental issues like climate change to political and economic issues like war and trade policies, the course has students apply critical thinking skills to factual information and develop their own viewpoints while exploring and developing potential solutions to problems facing the world today. Students are exposed to varied sources of information such as news media, documentaries, and first-hand accounts of events. The students discuss informational text and are expected to use critical thinking skills to recognize bias and misleading or false facts. The course aims at preparing students to be informed active members of their communities and forces for positive change.

Global Issues at the Hunterdon Preparatory School introduces sustainability and resources as the first unit as classes begin in September. Teacher and students look to history to understand population trends and the need to reduce consumption. Essential human needs are discussed from the perspective that our planet may someday run out of water. Energy demands and the impact of fossil fuels give students the opportunity to research alternative energy sources as they participate in collaborative small groups and present their findings to the class, thus practicing their public speaking skills on a more sophisticated level.

The next unit in Global Issues covers biodiversity, forest habitats, air quality and the cleanliness of our oceans. This includes the impact of human beings on the ozone layer, acid rain, the Greenhouse Effect and global warming. Solutions to our pollution problems such as the Kyoto Protocol help students grasp the critical role that governments play in the efforts to reduce and reverse the damage that has been done by prior generations in the hope that future generations can live in a cleaner environment. The health of our oceans and the stresses faced by our by fragile ecosystems like the world's coral reefs are affected by commercial, military, recreational and agricultural sources. Global Issues widens the students perspectives as they study our over exploited fisheries, nutrient pollution and the degradation of coastal habitats. They learn that being well informed about environmental issues and making a few small personal changes to help conserve resources can make a difference in the protection of our shared planet.

World health is the next unit of study. Advances in medicine that have increased the longevity of people who live in the United States have not been made available to people who live in poorer countries. Students learn the factors that contribute to worldwide disease and illness. Medical treatment in these countries is strained as scientists and health care providers encounter new diseases and the reemergence of old ones. The pandemic known as AIDS is discussed at

length and the role of the World Health Organization allows students to discover the truth about infant mortality rates, immunizations and vaccinations and the connection between education, literacy rates and the problems faced by members of third world countries.

The course culminates in a unit that promotes building sustainability, environmental stewardship, sound economic development and the well-being of all people for a peaceful existence everywhere. Effective and ineffective governance is compared through contemporary informational text and documentaries that presents the challenges and potential for globalization to be a growthful endeavor that makes life better for everyone.

COURSE OBJECTIVES

- Students will evaluate various explanations for actions or events and determine which explanation best accords with textual evidence, acknowledging where the text leaves matters uncertain.
- Students will be able to evaluate authors' differing points of view on the same historical event or issue by assessing the authors' claims, reasoning, and evidence.
- Students will be able to integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, as well as in words) in order to address a question or solve a problem.
- Students will be able to evaluate an author's premises, claims, and evidence by corroborating or challenging them with other information.
- Students will be able to integrate information from diverse sources into a coherent understanding of an idea or event, noting discrepancies among sources.
- Students will cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
- Students will be able to analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.
- Students will be able to integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.

- Students will evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.

- Students will be able to 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.