



## High School Seminar Courses · Grade Nine

### Universal Themes in Art History

This course follows the evolution of Western Art, from its Paleolithic beginnings to the modern era, covering two primary areas of focus: the connection between human development and art forms, and careful, objective observation of works of art in context. The students look at art from various cultures in parallel time frames, and art today through contemporary news articles. Students are evaluated on class participation, two quizzes, their main lesson book (which includes an essay and an original ekphrastic poem), and a final oral presentation on an artist of their choosing.

### American History to 1865

This course begins with an important question and discussion: "What marks the beginning of American History?" Does American history begin with the first settlers who populated these lands 12,000 or more years ago? Does American history begin with the coming together of continents through the Columbian exchange? Or, is history dependent on the narrative of those who created the borders and built the nation we know of today? While answering these questions, the class learns about early Amerindian settlers, European trade and colonization, and the death, enslavement and forced migration of millions of Amerindian and African people up to the end of the Civil War. Thus, through individual histories as told through primary and secondary sources, and micro-historical events, the students study the story of America through the interactions between diverse groups, the search for an American identity, the call for independence and the struggles experienced by a fledgling nation, as well as the fight for unity out of division.

### American History after 1865

America after the Civil War was a nation built on invention and industry, boom and bust, the fight for rights, empire building, and war. This course focuses on the study of interactions between diverse groups of people, as well as their search for an American identity.

### Social Studies I: US Government

This course begins with a study of the Constitution of the United States, taking a close look at how the Legislative and Executive branches were created, as well as how a bill is sponsored, proposed, and becomes a law. Students also learn about the process behind presidential elections, from voting and voting rights, to the nuances of the electoral process.

### The History of Western Drama

The History of Drama is the study of the development of thought and perspective through the physical and literary aspects of theater. This course begins with studying the origins of Western drama in ancient Greece and reading Oedipus Rex, a text by Sophocles from that period. Students learn about the classical elements of tragedy as set out by Aristotle. Discussion includes the virtual death of drama through the Roman invasion, and drama's resurrection in Europe through liturgical performances. The second text studied, Shakespeare's A Midsummer Night's Dream, offers an experience of the elements of comedy, as well as an example of where theater had arrived, the influences of commedia dell'arte, and the re-marriage of literature and performance art. Moving into modern drama, students delve into theater's evolution in the United States and its various branches following political, philosophical and social movements in the post-WWII era.

### The Novel, Moby Dick (Honors)

In this course, students focus on Herman Melville's Moby Dick. They trace the development of the epic, drama and lyric to the birth of the novel in England in the 1600s, to its flowering in Russia and North America in the 1800s. They are steeped in the dangerous adventure of the whaling industry that fueled the colonies and England in the 1800s. Students explore the history of whaling, the epic, dramatic and lyrical aspects of Moby Dick, particulars of the sperm whale, the whale ship and, of course, the life of Herman Melville. Students focus mainly on the novel, Moby Dick. They experience the compelling story of a group of whalers from different parts of the world brought together by the monomania of their captain in his relentless hunt for the White

Whale. They also consider the many profound ideas which Melville brings through a series of symbols and metaphors. Students also travel to Mystic Seaport where they tour the Charles W. Morgan (the only remaining whaling vessel in America), speak with a leading Melville scholar, make ropes, use compasses, row a whaling boat, throw a harpoon, sleep aboard a ship, and climb the rigging.

## Codes and Number Theory: Secrets and How to Keep Them (Honors)

This first course in number theory opens with an exploration of codes and ciphers. Students decipher a range of increasingly challenging encrypted texts using historically significant cipher techniques. Each student also develops an original cipher. Discussions of the security of various cipher methods lead to questions such as "How many scrambled-alphabet cipher disks would one need to have a complete set?" and "how secure are my passwords?" Students see that there are many similar questions, such as "In how many seating arrangements can this class of students sit?" or "What is the chance of a randomly shuffled deck of cards being well-ordered?" Considerations of these questions lead to a general theory of combinatorics, which could be applied to many situations. For example, the pupils calculate how many different outfits their wardrobes offer, leading to some astonishing revelations. The students soon discover that there are several different types of situations: wholly independent choices, choices drawn from a fixed group where items cannot be reused and whose sequence matters, and choices drawn from a fixed group whose items cannot be reused but their sequence does not matter. Pascal's triangle plays a major role in these considerations. The course closes with the related theme of number systems, which can also be considered an encoding technique.

## Thermodynamics, the Delicate Balance between Fire and Ice

This course seeks to develop the ability of the ninth grade students to perceive phenomena in the world and then note patterns and relationships that help use and organize these observations. The course begins with a few experiential exercises that help the students develop a more conscious understanding of how different thermal science words are used. The students begin their explorations with a look into the historical development of the thermometer and how the different temperature scales were developed.

## Earth Science: Geology

In this course we investigate the processes of physical geology that shape and mold the earth. During the course of their study, students examine the changing picture of how Earth's landforms

came to be, from antiquity to the present theory of Plate Tectonics. Students use modern GPS data to understand the continued motion of tectonic plates and to make predictions of future movement. Finally, they use data to analyze the boundary type at a specific location on earth and present their findings to the class.

## Human Biology 1

This course is a study of human anatomy and physiology, grounded in an exploration of the physical senses and how they enable us to interact with the external world. Students participate in activities and observe demonstrations of sensory experiences, then explore the way that human anatomy and physiology connect to the observable phenomena. The experiences and learning are documented through the creation of a main lesson book.

## Chemistry

In this course, students explore the activity and relationships of substances. Through demonstrations and experiments, they make observations and arrive at some basic conclusions about the role of carbon in basic organic substances. Students trace the path of carbon from its solidifying nature in coal to the life-giving properties of carbohydrates and finally culminate with the volatile nature of alcohols, ether and esters.

## A Writer's Workshop

In this course, students are engaged in a process writing approach from brainstorming to thesis writing, outlining, drafting and revising. Students study parts of the sentence and vocabulary from assigned readings, as well as correct spelling. Students work with descriptive, expository, and narrative writing. They also work to develop an advanced understanding of subject, predicate, adverb, adjective, direct object, and prepositional phrases. This is the foundation upon which all understanding of phrases and clauses rests.

## The Art of Speech

In this course, the focus of study is Oratory and Rhetoric. The students learn not only the qualities of good public speaking but also the power of the written word, when spoken effectively, to change the world. They study relevant speeches such as those by Greta Thunberg, Dr. Martin Luther King, Jr., and Muhammad Ali, among others, and learn how appeals to authority, emotion, logic, and even humor can be powerful modes of persuasion. Each week, students have the opportunity to practice their speaking skills in tasks such as tongue twisters, jokes, and an instructional speech on a topic of choice.



## High School Seminar Courses · Grade Ten

### Human Origins and Ancient Cultures

This course introduces students to an overview of the ancient world through the lens of several cultures. They first study the hunter-gatherer Mbuti tribe of central Africa, as an example of people still living in the contemporary world who represent an ancient way of co-existing. They also study the Catal Hoyuk and Indus Valley Neolithic civilizations, the Mesopotamian Basin, Ancient India, Ancient Egypt, and the foundations of Buddhism. Students read the ancient epic, Gilgamesh, an excerpt of the Bhagavad Gita, the origin story of the Egyptian pantheon, and an excerpt from the Lotus Sutra.

### An Actor's Dream: The Tenth Grade Play

The tenth grade spends four intensive weeks developing a theater production. Students are responsible for every aspect of the production: understanding the play, learning lines and developing a character, working together to bring group scenes to life, creating a set, collecting and producing props, creating costumes, working with songs and instruments, creating and running lighting, and finally performing the play.

### Greek History: Axial Age

In this course, the students revisit the ancient world; in a study of the Hellenic and Hellenistic periods. Greek History is an alliterative series of events and stories from the myths of Prometheus and Pandora, to the Persian, Peloponnesian, and Punic wars, life in the poleis, Pericles and the plague of Athens, as well as the philosophical impulses behind Plato's Allegory of the Cave. Throughout the course, students are asked to find similarities and differences between the ancient world and the modern one. They also study such figures as Socrates, Alexander of Macedon, Julius Caesar, and Cleopatra, and discuss characteristics that helped to set these individuals apart from others.

### Mechanics, Motion and Gravity

This course explores one of the fundamental revolutions in science: the discovery that nature, in particular motion, follows systematic and quantitative laws. Aristotle's sensible observations are tested; some check out, others are found wanting. The course then recapitulates Galileo and Newton's investigations of kinetic

phenomena, where the students collect their own data to test their results, which are written up in lab reports. This includes a review of motion at an unchanging velocity. Galileo's idea that velocity is relative turns out to make problem solving much easier in certain cases; in addition, it foreshadows the much broader movement of relativism, in physics and generally, that took place in the twentieth century. The centerpiece of the course is a determination of the acceleration due to gravity using precise measurements of a falling object, recapitulating the first discovery of the laws governing falling objects. Students conduct research about Emilie du Châtelet, who was far ahead of her time in introducing an entirely different way of thinking about motion as energy.

### Descriptive Geometry (Technical Drawing)

In the study of descriptive geometry, students develop skills in observation, graphical representation, and mathematical imagination through the art and science of orthographic projection. Students work through a series of Platonic solids constructed in accurate parallel projections using drafting equipment and learn to construct precise axonometric projections of any object of their choice.

### Earth Science: Climatology

This course includes a study of the forces that generate local and global weather and produce the world's climates. Students explore the concepts of cloud forming, high/low pressure systems, the Coriolis force, cyclones and anticyclones and the thermohaline current. They make observations and conduct research to understand the structure of the atmosphere, the jet stream, dominant North American air masses, and the geometry of the changing relationship of the earth to the sun throughout the year, as well as the importance of the ozone layer and ionosphere. Students learn how to use humidity charts and make calculations involving relative humidity.

## Information Technology: The Digital World

This course begins and ends with the question of whether computers are, or could be, intelligent. To address this question in an informed way requires understanding the actual workings of computer hardware and software. Students look at the hardware that drives modern devices and how signals are sent, represented, and understood. They then build logic circuits using electro-mechanical switches, culminating in a one-bit adder. This understanding of how numbers can be represented with electrical flows, which we interpret as 0s and 1s, opens up the theme of number bases. Finally, students explore the evolution of programming languages through machine, assembly, and higher level languages.

## Inorganic Chemistry

This course focuses on the study of Stoichiometry and Acids & Bases. The students start out by investigating the Laws of Chemistry, such as the law of conservation of mass and law of definite proportions through experiments and demonstrations. The investigation of these laws also includes their historical development, enabling the students to peek at the life of alchemists and the first chemists, which brings us to names such as Lavoiser and Dalton. As the class explores their way of thinking they travel through time, seeing how the element names we use today have developed, as well as their representations as symbols. The course then moves on to looking at relative reactive strengths and behavior, which leads to the concept of chemical compounds. Using a relative reactive strength chart the students practice writing the names and formulae of different types of compounds, ionic and molecular. Writing and balancing equations and conducting experiments and demonstrations of different types of chemical reactions such as decomposition, synthesis, single displacement and double displacement (precipitation and neutralization) are themes in this course. Students practice writing balanced equations just from the names of compounds given, and then using laws of chemistry to solve some mathematical problems regarding them. The course concludes by looking at acidic and basic qualities through different indicators as well as neutralization reactions.

## Human Biology II

In this course students explore how the structure of the cell and cell division relates to the development of the physical human being. They study cell division, gametogenesis, fertilization, and various stages of embryonic development and differentiation. These concepts are used to explain biological phenomena such as non-identical monozygotic twins.

## The Art of Poetry

In this course students study the sound qualities of poetry such as meter, rhyme, and alliteration and identify traditionally metered forms of poetry and how poets use words to create sensory experiences. They also learn poetic devices that, when used, create connections to the complexity of the human experience. These tools, the building blocks of poetry, create a foundation for

the students to explore their own creative expressions, creating a few original poems.

## Social Studies II: U.S. Judicial Studies

This course begins by discussing concepts of justice through such questions as: When is it acceptable to lie? Are people innately good? Why do people take advantage of others? Why do we need laws? The students then learn about landmark Supreme court cases in history, and the lasting impact of those cases. The course continues with a study of the judicial system, focusing on state vs. federal courts, the various kinds of courts, and the jurisdiction of U.S. courts. Students also learn about the major aspects of trial court. The last two days of the quarter are devoted to a mock trial in which the students are able to put into practice all that they learn throughout the course.

## The History of the English Language

In this course the students trace the evolution of the English language from Indo-European roots to its contemporary forms. Key texts are Beowulf, The Canterbury Tales, and selections of poetry and prose from the Elizabethan era to the current moment. Along the way, quizzes test students' knowledge of the historical impacts on language. Students also write heroic epics in the style of Beowulf, recite Middle English and present a character from The Canterbury Tales, and write a paper on an aspect of our contemporary language.

## The Odyssey of Richard Wright

In this course, students closely read and respond to Richard Wright's autobiography, *Black Boy*, through discussion and written prompts. Students work on identifying recurring themes in Wright's life such as: violence, racism, and Wright's emerging self. They identify themes that help to guide class discussions, and are also taken up for the end-of-term essay. In addition, the students are asked to master vocabulary words derived from the book, engage in vocabulary practice, and work on weekly exercises to help broaden their lexicon and deepen their understanding of the text. Grammar lessons in this quarter include the study of clauses (independent and dependent) and phrases.

## The Short Story

In this course, students read many short stories including, "Just Lather, That's All," by Hernando Tellez, "The Story of an Hour," by Kate Chopin, "Everyday Use," by Alice Walker, and "The Pedestrian," by Ray Bradbury, among others. They are invited to practice close reading, recognizing that each word in a short story is carefully chosen to create a setting, characterization, and a narrative arc. The students also read from the perspective of writers to recognize how authors intentionally work with devices such as point of view, symbolism, and irony to add depth and meaning to their stories. They maintain journals to record their observations about the stories they read and to engage in pre-writing sketches as they develop the elements of their own stories. The students draft their own original short stories and then work with teacher and peer feedback to revise their stories into mature final drafts.

## Physics: Mechanics

In this course students work towards understanding and differentiating the concepts of force, work, energy, power and become familiar with the units of each in SI and English units. They explore the relationship between position, velocity (speed), and acceleration, and learn to use elementary equations of motion. Through observation and experimentation, students explore the historical development of the concept of gravity, identify the connection between freefall and orbital motion, and recognize that any circular motion requires a center-pulling force. (If time allows, students also study simple machines with a focus on the point of energy/work conversion including mechanical advantage and efficiency. )



## High School Seminar Courses · Grade Eleven

### Medieval History: Empires and Encounters

This course begins with highlights of major events and people of the Roman Empire. These include the rise and fall of the Western Roman Empire, and its fracturing and continuation as the Eastern Roman Empire. The people highlighted range from such leaders as the Julio-Claudian emperors in the west to Justinian in the east. Along the way, the 11th graders learn about the geographical, social, economic, and spiritual structures of the Roman Empire, which influenced the following ages. The course touches upon the life and teachings of Jesus, which helps to frame the rise of Christianity, monasticism, and papal authority. The life and teachings of Mohammad help to frame the rise of Islam, its expansion into Europe, the Islamic Golden Age and the meeting of people of these two religions during the Crusades. Through these frameworks, the 11th graders also learn how the two religions influenced people in Europe and in the Middle East throughout the Middle Ages. Additionally, the 11th graders learn about the transformation of European tribes into fiefdoms, kingdoms, and empires from the Merovingian and Carolingian empires to the House of Plantagenet.

### Western Civilization

In this course, students learn about the historical conditions and developments which made it possible for a humanistic perspective to emerge in 14th through 19th century Europe. Human beings in general began to find inspiration in the capacity of each individual to think, act upon their thinking, and experience their personal truths, much as the 11th grader is experiencing the same process developmentally.

In addition to historical conditions, the class content includes those individuals who were among the first to help bring new perspectives and paradigm shifts to the western world. This includes the study of people of faith, artists, enlightened and unenlightened rulers, enlightened thinkers, revolutionaries, and conservative reactionaries. The 11th graders also learn how the cultural, political, intellectual, and religious ideas of the past, in particular in European history, not only transformed the world of the past, but also continue to influence the world of the present.

### Human Transformation: the Life of Malcolm X (Honors)

This course is anchored in Alex Haley's *The Autobiography of Malcolm X* as the central text. Two "The Ethicist" columns by Kwame Anthony Appiah from the New York Times on questions of ethical responsibility are also referenced. Students watch speeches and clips of relevant current events as well as the Academy Award-winning documentary, *Summer of Soul*.

Through the examination of one notable human being's life, students discuss the history of race and racism in the United States, the politics of institutional racism, the religion of Islam, and some aspects of the Civil Rights Movement. In addition, they witness the human potential for transformation and development as seen in the life of Malcolm X.

### To Hell and Back: Dante's Inferno (Honors)

In this course, the eleventh graders study the medieval world view as expressed in what we call the Ptolemaic Universe or the Great Chain of Being. They ponder the causes and effects of such a world view and try to understand multiple correspondences between planets, days, trees, colors, impulses, metals, etc. that were believed to have existed. Students also study Dante Alighieri's biography and his beloved medieval city of Florence. The main focus of this class is Dante's *Inferno*. The class examines the contrapasso of sin and punishment, the development of the individual through pity and fear, the significance of the environment, and many other themes within Dante's enduring vision of Hell. Students review the structure of Purgatorio and Paradiso with special attention to the final canto of Paradiso. Students write a *Vita di Dante* and an original canto and create charts and illustrations of moments in *Inferno* or the various levels of Hell.

### Physics of Electricity & Magnetism (Honors)

This course begins with some simple demonstrations and experiments from which students develop the fundamental conditions, principles and relationships associated with triboelectric phenomena. It is important to note that this work is

developed using the principle of polarity and fields as a conceptual framework tying together the invisible interactions that resulted in visible movements of objects. The principles of electrical induction are also developed as well as the general concepts behind the operation of the Van De Graff generator. The first part of our work ends with a clear understanding of the concepts of resistance, voltage and current. The course adds the study of magnetic phenomena, and the principle of polarity is elaborated upon. The interaction of electromagnetic phenomena results in the understanding of many of today's contemporary technologies.

## Chemistry: The Nature of Matter

This course consists of two major themes. The first part of the course covers an overview of the Historical Development of the Concept of the Atom. Beginning with the ancient Greek view of the nature of the atom as expressed by Democritus, the class then follows the evolution of this concept through the views of Dalton, Crooks, Thompson, Rutherford, DeBroglie, Heisenberg, Schrodinger and others up to the most modern conceptions as outlined by Higgs. The key to this inquiry is to see that the view of the atom is less an expression of object interactions and more a view of how relationships express themselves in a manner we call the physical world.

The second part of the course looks into the nature of an element and how we can see how each element can be recognized by the particular way it interacts with other materials. A few different elements are investigated in this manner and used to characterize how all elements can be known in this deeper way. Such elements include silver, Oxygen, Hydrogen, Sulfur, sodium and Magnesium. Patterns in the periodic table are also investigated as the difference between isotopes, allotropes and other interesting relationships.

## Shakespeare's Lasting Influence (Honors)

In this course students study William Shakespeare's life, theater, and work, but the focus of the course is his play, *The Tragedy, Hamlet Prince of Denmark* (1600-1601). Students analyze the play for Hamlet's experience as an individual who must think when he is expected to act. They focus on the manner in which other characters do not understand and trust his feelings. They look at the relationship of Hamlet's thinking, his emotions, and his actions. Students watch several different versions of key soliloquies and scenes. Each writes an analytical essay on Hamlet's character, a theme, or another character in the play. Students also study several sonnets, analyze one, and write one of their own. Based upon their own research, each student writes a creative narrative piece from the point of view of an Elizabethan character who spends a day at The Globe, weaving in the key facts. Students work in groups to memorize, rehearse and perform a scene from a Shakespeare play.

## Character and Monologue

In this course students ask the question, what is the importance of windows and mirrors in education? Who, throughout history, has been reflected and who has not? They explore the historical roots

and major themes of Black literary, artistic and musical traditions from pre-colonialism to the current day, studying authors from Phillis Wheatley to Toni Morrison, artists from Gordon Parks to Kehinde Wiley, and musical influences from spirituals, to the blues, to hip-hop.

Next, students focus their study on character and the art of the monologue. They discover the elements of a character, such as background, education, culture, interests etc. in written and filmed monologues. To further explore character, they also speak improvised monologues from the point of view of items they find in the classroom and bring from home. Students also analyze monologues for the elements of a monologue, focusing on conflict, motivation, and intention. Each student builds a character of their own and then composes a monologue from the point of view of that character. These are rehearsed and performed for the class at the end of the course.

## The Art of Writing: Comparison Contrast

During this course in 11th grade English, the students exercised deep critical thinking as they compared and contrasted two pieces of visual art. Out of this examination of similarity and difference, their own analytical ideas emerged. By using the writing process and incorporating teacher and peer feedback, students completed a paper of significant substance and length.

## Projective Geometry: Multiple Perspectives on Reality (Honors)

This course begins by looking at the changing conceptions of truth, objectivity, and subjectivity evidenced in the evolution of artistic production. It then illuminates the origins of linear perspective in Renaissance art, and students learn to construct one-, two-, and three-point perspective drawings. We then explore how the new geometry implied by the use of vanishing points in linear perspective challenged mathematicians to develop a theoretical framework that encompassed infinitely distant elements. Exploring these "ideal" elements and their interrelationships leads us into surprising symmetries, or "dualities," in various forms. This new perspective also provides a new understanding of conic sections. Each student chooses an independent project, either drafting a three-point perspective drawing or exploring a new configuration for the conic section generation.

## Botany & Ecology: The Life of Plants

This course provides an introduction to botany through the study of plant evolution and life cycles, as well as plant adaptations to different environments. Sketching in the field is included most days so that students become familiar with the plants nearest to us. Students read and discuss an excerpt from "Braiding Sweetgrass" and take a field trip to the New Jersey Botanical Garden.

## Human Physiology and Human Health

This course studies the location and function of endocrine glands, the cellular processes of mitosis and meiosis, the ovarian and uterine cycles in detail and their role in the production of eggs and reproduction in the human being. Other explorations include the process of blood clotting, the immune system, and sexual health topics

## Human Embryology

In this course, students learn about the physiological, structural and behavioral polarities of the human sperm and egg and the sequence of events in fertilization. They explore the morphological gestures of gastrulation and how the germ layers of ectoderm, mesoderm and endoderm are formed. They continue their studies with the morphological gestures of neurulation and the formation of the primordial heart, nerve system, axial mesoderm, spinal cord and vertebrae, the cerebro-spinal cavities and primitive gut. Further inquiry includes morphological movements in the formation of the eye and the kidney, as well as the morphological movements and tissue differentiation that determine sex in the early embryo and the morphological gestures in limb formation. They learn about the ontogenetic similarities in the development of vertebrates in general





## High School Seminar Courses · Grade Twelve

### American Voices, American Literature (Honors)

This course seeks to understand the uniquely American voice engendered by the writers and thinkers of the mid-nineteenth century. In the context of slavery, restrictive roles of women, a lack of understanding for education, mental disabilities and the value of every individual, rebellious free blacks, women, and the transcendentalists spoke out in bold new ways which became the foundation of uniquely American literature and thought. Students explore the work of Ralph Waldo Emerson, Frederick Douglass, Henry David Thoreau, Walt Whitman, Nathaniel Hawthorne, Emily Dickinson and others for the unique perspectives of each. They foster their own perspectives in class discussion and daily journal writing. Each student writes a song of self, inspired by Whitman's work, and gives a formal presentation on an important contemporary American voice. The aim of the course is twofold; to understand the roots of the North American voice and to foster the development of each student's individuality.

### The Shaping of the Modern World and Contemporary World History

In this course the students learn how certain events and ideas transformed the pre-modern world into the modern one. The events covered included the French, Haitian, and Latin American Revolutions, as well as wars that framed the 20th century, including the Spanish American War and World War I. The ideas examined include imperialism, nationalism, liberalism, conservatism, radicalism, capitalism, socialism, and communism. The students complete readings on such topics as globalization, the forming of nation states and international organizations, issues of gender in the world, human rights, and disease. Finally, the 12th graders also hear from guest speakers from different parts of the world such as Ghana, Laos, Burma, Dubai, Lebanon, and Germany. Connections are made between events from the 18th and 19th centuries, and the long term effects of these events in the world today.

### History of China: Dynasties, Asian Philosophies, and the PRC

In this course the 12th graders take in the sights and sounds of Chinatown, learn about Chinese legends and dynasties, look back at 5,000 years of history, and finally learn about events leading up to the fall of the dynasties and the shaping of present-day People's Republic of China. Students learn the major tenets of Asian philosophy through Confucianism, Taoism, and Buddhism.

### The House We Live In: The History of Architecture

This course offers an overview of architectural history, beginning with international vernacular styles, and glimpses of the primary historical periods and styles in terms of their respective characteristics and innovations.

### The Play's The Thing: The Senior Play

After looking at several plays, the senior class chooses one to work on. They know it is difficult to carry a full-length ensemble play and that it involves a strong group commitment. Students are responsible for every aspect of the play production: understanding the play, learning lines and developing a character, working together to bring group scenes to life, creating a set, collecting and producing props, developing publicity, creating choreography, costumes, make-up, and hair, creating and running lighting, music and sound effects, and finally performing the play and running technical elements of the production in only a little more than three weeks. The students work hard. The various talents of the group help to deepen the world they are creating on stage so that, night after night, something surprising and truly delightful might happen.

## Ethical Philosophy: In Search of a Good Life (Honors)

Questions such as: "Who am I? What is reality? How can we find truth? What is the purpose of life?" have occupied humanity for thousands of years. This course offers a brief survey of one tradition of exploration into such issues, Western ethical philosophy, offering an opportunity for seniors to explore some of the meaningful questions philosophy raises for human existence. The central question that permeates the course, meant for seniors about to go out into the world, is: "What is the good life?"

## Zoology & Evolution: What does it mean to be human? A biological perspective

This course gives an overview of the animal kingdom viewed through the lens of evolution and natural selection, as a way to better understand the connections between the myriad species on earth. We begin by exploring the question "Why Study Evolution?," then move through a study of the 9 major phyla that exist today. At the end of the block we study Charles Darwin's role in the development of evolutionary theory and the human being's relationship to the rest of the world of living organisms.

Through field experience on the coast of Maine, students discover the relationship between environment, niche, behavior, physiology and economic survival strategies in the major invertebrate phyla.

## Biochemistry

This course consists of three major themes. The first part of the course is dedicated to understanding the biochemistry of the respiration system. Beginning with the challenges faced by high-altitude climbers while climbing in the death zone, our explorations progress through the mechanical processes of partial pressure gas diffusion, the differences between how a fish's gills and human lungs work, and a final deep understanding of how hemoglobin works and the critical role of the enzyme carbonic anhydrase plays in respiration. Next, students focus on the decomposition processes found in bacteria, mold and fungus as it relates to both building a functional compost pile as well as the role similar processes play in the digestive tract in the rumen of the cow. Students then study the work of Francis Ashcroft and her development of an understanding of how neurotoxins interfere with the sodium and potassium ion channels in the neuromuscular system of the body.

## Waves, Optics, Modern Physics

Upon completion of this course, students will be able to:  
Recognize perception as the way we first experience the world before we form concepts or judgments.  
Understand basic properties of sound: pitch, loudness, and quality and how a sound wave "embodies" these qualities.  
Understand types of waves and basic properties including amplitude, wavelength, frequency, reflection, refraction, interference, Doppler effect, etc.

Recognize basic properties of light such as reflection, refraction, color and color mixing, polarization, etc.

Understand refraction and reflection mathematically using mirror laws, Snell's Law, thin lens formulas, and optical drawings. Understand applications in optical instruments such as corrective lenses, cameras, telescopes, etc. (The camera & photography is an ideal study for integrating numerous topics in this block.)

Understand the history of our understanding of a physical mechanism for light from particle (Newton) and wave (Huygens) approaches, and the discoveries leading to a blended theory and quantum physics.

Contemplate the nature of human thought, of our ways of "describing" nature, and whether any limitations might exist in how we can understand the world beyond the observer/observed interface.

## Advanced Topics in Mathematics: How Weird is Weird? (Honors)

This course covers two themes. The first includes aspects of calculus such as the Taylor series, culminating in Euler's beautiful identity that combines  $i$ ,  $\pi$ , and  $e$  in a single expression, and L'Hopital's Rule, which allows evaluation of expressions that appear to be completely indeterminable. The second constitutes a brief history of logic; key themes include Zeno's paradoxes, Aristotelian fallacies and syllogistic logic (with examples by Lewis Carroll), Boolean algebra, and Russell's paradox, culminating in a brief picture of Gödel's work.

## Statistics

In this course students apply topics in statistics to authentic, real-world problems that don't have one solution, and use their mathematical reasoning to deepen their understanding. Lessons use real-world contexts, showing how to use quantitative reasoning to analyze the world around us. Some lessons explore sociopolitical contexts using statistics and mathematics, such as potential bias in access to credit, potential bias in sentencing for crimes, and the relationship between gun ownership and homicide by firearm.

## Economic Principles for a Just and Sustainable World

This course begins with a study of basic concepts in economics including incentives, trade-offs, opportunity costs, marginal thinking and how trade creates value. The students then embark on a study of the American food system through an economic lens. Through weekly projects, the 12th graders research the economics of food production, transportation, and consumption. This research helps students to discover and unveil hidden inequities in the system with regard to affordability and accessibility.