



## Berkshire Waldorf High School

### SEMINARS • 2019-2020

#### *9<sup>th</sup> Grade*

**Physics: Thermodynamics (Susan Bilodeau):** This course provides students with a solid understanding of the foundational principles of thermodynamics by focusing on phenomena that can be perceived with students' own bodily senses. The course includes observation of phenomena associated with heating, cooling, temperature, and phase changes. As such the course challenges the students to develop inquiring habits of mind and to articulate and explore questions that arise out of phenomenological observation. By using the scientific method, students learn how to plan and carry out investigations and then analyze and interpret the data they collect, using written and mathematical descriptions as appropriate.

**Topics:**

Behavior of matter when heated  
Thermal Conductivity  
Temperature / Thermometers  
Heat Transfer  
Internal Combustion Engine  
Specific Heat

**Organic Chemistry (Susan Bilodeau):** Organic chemistry is the study of the structure, properties, composition, reactions, and preparation of carbon-containing compounds, which include hydrocarbons and also compounds with any number of additional elements, including hydrogen (most compounds contain at least one carbon-hydrogen bond), nitrogen, oxygen, halogens, phosphorus, silicon, and sulfur. This branch of chemistry was originally limited to compounds produced by living organisms but has been broadened to include human-made substances such as plastics. The range of application of organic compounds is enormous and also includes, but is not limited to, pharmaceuticals, petrochemicals, food, explosives, paints, and cosmetics.

**Topics:**

Carbon Cycle  
Photosynthesis  
Cellular Respiration  
Macromolecules  
Atomic Structure

**Human Anatomy & Physiology (Elizabeth Orenstein):**

This course builds on students' prior knowledge of anatomy to delve into the study of physiology. Beginning with metabolic processes, students are able to describe and give examples of the anabolic and catabolic pathways that convert and create energy. Students are able to describe homeostasis and give examples in which the human body is able to maintain a stable internal environment through positive and negative feedback loops. Students explored human metabolism through studies of extreme weight loss and resulting metabolic disruptions. In lab activities, the central and peripheral nervous systems are analyzed by their reaction times to stimulus-response. Students collect data, graph results, and write the analysis of their results. A second lab involves mapping nerve endings in the exploration of neural processes. Students model a nerve cell and explain the electro-chemical signaling of neural cells. Students are able to name regions of the brain and their respective neural functions; i.e. the hippocampus, associated with long term memory; the prefrontal cortex; and the regions which process sensory stimuli. Students build on prior knowledge of six basic senses by writing an essay on their favorite/least favorite sense experience, the receptors involved and the pathways leading to specific regions of the brain. Students are able to describe the human endocrine systems, the associated signaling hormones and neurotransmitters which respond to the environment, regulate growth and development, and maintain homeostasis. A final project involves a comparative analysis of the physiology and anatomy of an animal of their own choosing.

**History through Art (Stephen Sagarin):** This course covers the evolution of human consciousness through Western civilizations and cultures from prehistory through ancient Egypt, Greece, Rome, Early Christianity, Byzantium, and the Middle Ages to the Italian and Northern Renaissances, as manifested in the works of art that various peoples produced. We look at art as symbolic or symptomatic of the human consciousness that produced it. Egyptians, for example, expended most of their GDP building tombs for their kings. This tells us that their worldview was markedly different from ours, because we spend most of our GDP on social welfare programs or on the military, depending on how you look at it. Their society was hierarchical, spiritually oriented, and more concerned with reincarnation than ours, which is generally democratic, materialistic, and primarily concerned with the here-and-now. Students write descriptions of works of art as essays. A final exam, for which students identify ten works of art by title, artist, date, culture and period, and material or medium, concludes the course.

**History of Science (Susan Bilodeau and Samantha Stier, co-teachers):** This course is new for 2019-2020. Course description currently under construction. This course will replace the following course:

**History of Technology (Stephen Sagarin):** Technology has increasingly transformed the world in which we live, particularly over the past six hundred years or so. In this course we study technological innovation and its effects on human existence from the invention of the clock in the late middle ages and the moveable type printing press in the early modern period through the inventions of the industrial revolution to the invention of the computer. Students write up notes on class presentations and discussions and complete projects on inventions that they choose to investigate. Class work and student projects focus on understanding the key insights that led to each invention and on developing a clear understanding of how each invention works. Students also read and discuss Thomas Thwaites' *The Toaster Project* for its relevance to our study. Their final exam is a letter to Mr. Thwaites, comparing our course to his book. (*Not offered in 2019-2020.*)

**U.S. History in the 20<sup>th</sup> Century (Stephen Sagarin):** This course focuses primarily on the U.S. in the 20<sup>th</sup> century. After a brief review of U.S. history to the late 19<sup>th</sup> century, the course introduces and examines the persons, facts, and events of our history through the end of the Cold War in order to show the threads that lead to the state of the nation at home and in the world as we find it today. The U.S. started the 20<sup>th</sup> century with a growing economy, lots and lots of new inventions (with more on the way), a policy of "avoiding foreign entanglements," and domestic relations troubled by the aftermath of the Civil War and a growing women's rights movement. By the end of the century, the U.S. was the strongest and largest economy in the world, had soldiers and diplomats in many, many countries, and enjoyed some real successes in civil rights, women's rights, gay rights, and environmental awareness. We trace the path of the U.S. through the 20<sup>th</sup> century, including the ups and downs, fits and starts, and oppositions and alliances. Students take notes in class, summarized them for credit, and complete at least one project per week.

**History of Drama (Samantha Stier):** In this course we explore the development of drama from its origins in Ancient Greece to postwar experimental theater. We watch how the roots of drama play out in the Middle Ages, through Shakespeare's innovations, and into modern times. Texts vary from year to year, but include a Greek tragedy (often "Oedipus Rex"), a Shakespeare play, and a play written in the 20<sup>th</sup> century.

**American Literature (Samantha Stier):** This course provides an overview of works of fiction produced in the

United States in the last two centuries. We explore what qualities define these works as inherently "American," and examine how the geography, ideologies, and founding impulses of the country have impacted its canon of writing. We look at how historical and philosophical issues have affected literature, beginning with a full background of the founding documents of the United States, such as the Declaration of Independence and the Gettysburg Address, and moving through Puritanism, Slavery, the Civil War, the disregard for and erasure of the Native population and culture, and important social and political movements of the 20<sup>th</sup> century. How have these historical events and shifts shaped our understanding of what it means to be "American"?

## 10th Grade

**Physics: Kinematics (Susan Bilodeau):** This course introduces and works with the basic concepts of objects in motion, as well as developing a sense for the historical development of the subject from Aristotle to Galileo and Newton. The course challenges the students to inquire thoughtfully and articulate and explore questions that arise from observing objects in motion. Students also calculate the behavior of objects in various circumstances as a key aspect of physics.

**Topics:**

Vectors & Fundamental Quantities  
Acceleration  
Aristotle's Laws of Motion  
Gravity  
Bodies in Free Fall / Projectile Motion  
Newton's First and Second Laws  
Newton's Law of Gravitation  
Forces in Simple Situations  
Forces in Complex Situations: Numerical Methods  
Newton's Third Law – Collisions

**Inorganic Chemistry (Susan Bilodeau):** This course introduces the basics of chemical reactions and the language and mathematical models that describe them. The concepts and skills introduced and developed in this course lay the necessary foundation for further study in chemistry.

**Topics:**

Atomic Structure  
Significant Figures  
Moles/Grams Conversions  
Measurements/Conversions  
Percent Composition  
Balancing Reaction Equations

**Cell Biology/Embryology (Elizabeth Orenstein):** This course focuses on cell structure and function, genetics, and embryology. Students learn the evolutionary development of living cells, introduction to taxonomy, and the structure and function of organelles. Students are able

to describe the cellular processes involved in protein synthesis, perform genetic probability analysis for dominant and recessive traits, and sculpt the early stages of embryonic development. Assessments of student understandings of material is achieved through labs, illustration projects, essays, class discussion, and independent research projects. Extra credit opportunities are provided.

**Labs:**

Students complete three labs:

Lab #1: Microscopy: Students research the history of the microscope, calculate magnification tables, describe resolution, contrast, orientation of image, parts of the microscope, and demonstrate how to make a wet-mount slide.

Lab #2: Diffusion and Osmosis: Students study the structure and function of a semipermeable membrane and the properties of diffusion and osmosis. Microscopy skills were used to explore eukaryotic cells, students defined the differences in structure and function between plant vs animal cells, cellular processes of photosynthesis and cellular respiration.

Lab #3: Cell division and observing mitosis in plant cells: Students diagramed and properly identified each stage of mitosis.

**Geology (Carrie Anne Petrik-Huff):** This course is new for 2019-2020. Course description under construction. It replaces the following course:

**Earth Science:** This course covers geologic history of the earth, paleontology, geology, hydrology, meteorology, and climatology. Students study the changing planet by focusing on plate tectonics, paleontology, the evolution of the atmosphere reflecting the evolution of the biota, the rock and water cycle, as well as climate change and the impacts of it. Upon completion, students are able to apply knowledge of earth science to posters addressing the impacts of climate change. At the Beneski Natural History Museum in Amherst, MA, students study paleontology, the evidence of the beginnings of life on earth, and the transitions life took from one form to another through fossil evidence. At the American Museum of Natural History, students focus on oceanography with interactive exhibits providing an opportunity for a richer understanding of the science involved in studying the ocean and its inhabitants. Students demonstrate proficiency in collection of field data along the shores of the Hudson River by class participation in the NY Dept. of Environmental Conservation's "Day in the Life of the Hudson River" and applying that knowledge to a detailed field report of their own design. This course culminates in presentations of independent research projects which provide students the opportunity to use foundational understandings and apply them to a specific topic related to climate change.

**Ancient History (Stephen Sagarin):** This course introduces students to the study of the ancient world in the Western hemisphere, beginning with the transition of human beings from Stone Age nomadic hunter-gatherers, through early settlements, to the first cities. We examine the difficulties inherent in these transitions, and we see that they were by no means easy or predictable. We then study the ancient Bronze Age civilizations of Sumer, Egypt, and the Hebrews, and the Iron Age civilization of Greece. In the transition from Bronze Age to Iron Age, which people recognized as it was happening, human beings centered their lives and monuments less on religion, the spiritual world, and life after death, and, increasingly, on philosophy, politics, history, and life here on earth. Students complete a portfolio of class notes and writing assignments, independent projects, and an open-book final exam.

**U.S. Constitution and Bill of Rights (Peter Elliston):**

This course introduces students to the history and interpretation of Constitutional law. By studying—and arguing—landmark cases, students come to understand the dynamic interpretation of the Constitution, including the Bill of Rights, in the history of the United States. Texts include Roxanne Dubar-Ortiz's *Loaded*, on the 2<sup>nd</sup> Amendment, and Peter Irons's *The Courage of their Convictions*, on civil liberties cases.

**World Religions (Samantha Stier):** In this course, students learn about the varieties of religious experience, including beliefs, teachings, traditions, and practices of seven major religions: Hinduism, Buddhism, Taoism, Judaism, Christianity, and Islam, and we touch on Primal religions (focusing on Aboriginal spirituality). By the end of this course, students know the basic biographies of the founders or leaders of the religions: (Buddha, Lao-Tzu, Abraham, Christ, Muhammad); are able to identify specific religious beliefs regarding creation, birth, death, god, destiny, and afterlife; are familiar with some of the sacred texts of each religion and where they came from; and have a basic historical and geographical background of each religion. Required reading: *The World's Religions* by Huston Smith and *The World's Wisdom—Sacred Texts of the World's Religions* by Philip Novak.

**Homer's Odyssey (Samantha Stier):** The Odyssey is the epic tale of Odysseus's long journey home after the Trojan War. His bravery and resourcefulness is tested and tried in many ways before and after he reaches his homeland. The structure of the poem is 24 'books,' or chapters: the first twelve describe his adventures in his attempt to get home; and the final twelve take place on his home island of Ithaca. In this seminar, we look at the adventures of Odysseus and the evolution and transformation of the main characters, including his son, Telemachus. We explore the role of the gods and the goddesses; the theme of

retribution; the rules of hospitality, and many archetypes that emerge. How does our hero's journey, with all the temptations and sufferings he experiences on the way, serve him as a human being?

## 11th Grade

**Physics: Electromagnetism (Susan Bilodeau):** In this course students learn to distinguish clearly the concepts related to electricity and magnetism and to developing clear conceptual understandings of this subject through laboratory experiments and demonstrations. The block culminates in students presenting research projects on topics of interest.

### Topics:

Charging objects via the triboelectric effect and induction  
 Conductors, insulators, and semiconductors  
 DC circuits, both series and parallel  
 AC vs. DC circuits  
 Comparison of Coulomb's Constant to the Gravitational Constant  
 Magnetic fields and the right- and left-hand rules  
 Transformers  
 Ohm's Law

**Atomic Chemistry (Susan Bilodeau):** In this course we take a deeper look into the chemical makeup of our world. This class explores the development of atomic theory from ancient Greece to the present using primary source texts. Students then research the elements, their properties, and the structure of the periodic table and how we can use this structure to make predictions about how compounds are formed.

**Botany (Elizabeth Orenstein):** In this course we explore different ways of knowing plants. Our investigations span the beginnings of life on earth to our own experiences with the most recently evolved plants. We define our conceptions of what plants are, compare differences between plants and animals, reacquaint ourselves with plant cells, and learn about the father of modern taxonomy, Carolus Linnaeus. We discuss different kinds of plant names, botanical or scientific and common, and how these names can help and hinder knowing plants. We get to know Protista and algae, bryophytes (mosses) and ferns, gymnosperms (mostly conifers but also ginkgos and cycads) and angiosperms (flowering plants). For each category of plant we learn both what defines that category and how its life cycles progress. Many days each student spends time observing a plant, either in class or in the field. We take excursions to nearby properties of botanical interest. We hike to Ice Glen to observe, draw, and discuss ferns and mosses. We meander around Bartholomew's Cobble to draw spring ephemerals (woodland wildflowers) and learn about gymnosperms. We investigate the early-bloomers at the Berkshire Botanical Garden and talk about

angiosperms. Each student produces two, 2-3 page reports on plants of their choice, as well as a hand-made seminar book that synthesizes their work from the course.

### Medieval & Renaissance History (Stephen Sagarin):

This course is a brief history of Medieval Europe, Africa, and the Middle East from the fall of the Roman Empire through the Renaissance in Italy and northern Europe. Major topics include the migrations of people, the rise and fall of kingdoms and empires, the spread and clash of religions, and economic changes. Major events include the life of Charlemagne, the Crusades, and the Black Death. Students have a number of choices for earning credit for the course, including notes, essays, and projects. The course focuses particularly on the following questions:

- What intentions did historical actors bring to their lives?
- How did this period transform the world?
- What causal connections lead from ancient Rome through the middle ages to the world of today?
- How can we understand the consciousness of those who lived earlier than we do?

*(This course is not offered in 2019-2020.)*

**History through Music (Julia Nunez):** We study Western music and how it reflects the evolution of humankind. We begin with the modal music of the ancient Greeks and move through the ages to contemporary music, which is sometimes atonal. In class we listen to the music of many composers. The focus is on being aware of what we are hearing, on developing a sense for the evolution of music as a reflection of human history, and an appreciation of unfamiliar music.

**History & Culture of China (Peter Elliston):** This course introduces students to the history and culture of China, from Confucius through Maoism and the Cultural Revolution to today. Students complete creative or research projects that deepen their understanding of different aspects of contemporary Chinese culture and events. Texts include Dai Sijie's *Balzac and the Little Chinese Seamstress* or Peter Hessler's *River Town*. Guest speakers discuss Chinese medicine and poetry. (In some years, this course is replaced by a course in the History & Culture of India.)

**Medieval Literature (Samantha Stier):** In this course we learn about the forms, literary conventions, themes, plots, and characters of European medieval literature. In reading the selected texts, we gain understanding of how medieval life and thought influenced the canon of literature produced in Europe during this time. What are the cultural values at work? For example, it is easy to think of love as a "universal language," but do ideas about love always translate across history, culture, and identity? It can be argued that many of our modern ideas about love originate

in the narratives of medieval literature. What can these perspectives teach us about the uniqueness of the Middle Ages—and how do medieval ideas continue to influence the beliefs and ideals of our own culture?

**Dante's *Inferno* (Beth Robbins):** Dante believed that our life after death is determined through our actions. Another way of understanding this is to say that everything on Earth is eternalized once life ends. Both protagonist and writer, Dante journeys to meet the worst. He is lost and alone, until he meets Virgil who acts as guide. Dante needs to experience the consequences of estrangement from the truth. His suffering comes from his alienation from the order of the world. We will descend with Dante through his fully imagined Hell, exploring the first work in the *Comedy* in its literary, philosophical, and moral aspects. Work will include close readings of the cantos, a brief overview of Dante's biography and its impact on his work, written interpretations and summaries, quizzes, performance, recitations, and—mostly—discussions. Our study entails different levels of interpretation—philosophical, literary, biographical, religious, and more. We will look at visual and sculptural interpretations of *Inferno*, including works by Botticelli, Blake, Dore, and Rodin.

## 12th Grade

**Physics: Optics (Susan Bilodeau):** In this course we explore optics from several different perspectives. We read the first half of Richard Feynman's *QED: The Strange Theory of Light and Matter*, examine the differences between seeing and perceiving, explore the anatomy of the human eye, and learn to diagram and solve equations with convex and concave lenses. Students complete projects in an area of interest and present to their classmates. Topics include lasers, forensic optics, human eye development, spectroscopy, optical illusions, photonic crystals, laser tweezers, sighting scopes, animal vision, and fiber optics.

**Biochemistry (Susan Bilodeau):** This seminar focuses on the scientific study of the chemistry of living systems, their fundamental chemical substances and reactions, and their chemical pathways and information transfer systems, with particular reference to carbohydrates, proteins, lipids, and nucleic acids and cellular respiration. We then extend our knowledge and apply it to biochemical mechanisms in toxicology.

**Statistics and Experimental Design (Susan Bilodeau):** This seminar focuses on the collection and analysis of data. Some topics included are surveys and sampling, distinguishing between potential sampling error and bias, identifying the important characteristics of an experiment, distinguishing between lurking and confounding variables, and measures of central tendency and dispersion.

**Zoology & Evolution (Elizabeth Orenstein):** This course studies and discusses the writings and work of Aristotle, Darwin, and Mendel to understand the development of Charles Darwin's theory of evolution. Students also study refinements of the theory through analysis of writings by E.O. Wilson, S. J. Gould, R. Dawkins, and L. Margulis. In addition, students explore anthropogenic disruptions to the environment through excerpts from Rachel Carson's *Silent Spring* and in labs on Hermit Island. The course incorporates lecture, lab work, field work (at Hermit Island), and student-led discussion.

### **Objectives:**

In successfully completing this seminar, students will be able to:

- Understand biological evolution: Demonstrate understanding of the forces and mechanisms of evolution and the evidence supporting it
- Understand and perform statistical analysis of Mendelian genetics
- Zoology: perform field analysis, classification, and data collection of marine invertebrates
- Ecology: Analysis of organisms and their niches

### **Lab work:**

Students camp at Hermit Island, ME. Through lecture, labs, and field studies, students study the anatomy and physiology of four invertebrate marine phyla (Mollusca, Annelida, Arthropoda, and Echinodermata). Through lecture, lab, art, and poetry, students learn about the ecology of tidal wetlands. Students cooperatively manage preparation of all meals and clean up duties. The class actively participates in relevant discussions with other Waldorf students on global issues such as ecology, technology, environmental threats, and poverty. The time spent by students sharing this experience together and in solos, provides a space for the cultivation of a deeper personal connection to the sea, ecology, and the evolution of all life on the planet.

**History through Architecture (Stephen Sagarin):** From the mounds of the Americas and the megaliths of Stonehenge through the curtain-wall and reinforced concrete structures of the 20<sup>th</sup> century, we study the history of architecture as symptomatic or symbolic of the evolution of human consciousness. At each point, we ask what each structure—pyramid, temple, theater, courthouse, palace, and so on—reveals about the worldviews of the persons who designed and built it. Students keep an illustrated notebook for the course and complete model building and architectural design projects to better understand the craft of architecture.

**Modern World History (Stephen Sagarin):** This course introduces students to the history of the 20<sup>th</sup> Century, in particular to the rise of the modern mindset, or modern consciousness, which takes a quantitative, mechanistic, reductive model of the world for reality. Historically, we

begin with Europe prior to World War I. The course generally examines historical changes as they occur in politics, economics, and culture, centered in Europe and the New World, but not limited to these spheres. We examine the intellectual revolutions wrought by Sigmund Freud and, briefly, Albert Einstein. We contend with the brutality of fascism, totalitarian communism, two World Wars, and the proxy wars of the following Cold War era, including the Korean War and the Vietnam War. Against the backdrop of this brutality, we read Solzhenitsyn's Harvard Address of 1978, a paper by Douglas Sloan on the modern mind, and selections from Joseph Weizenbaum's *Islands in the Cyberstream*. These materials provide ways of working toward dignity and meaning for every individual. Each student prepares a research report and presentation on a border dispute somewhere in the world today (there are roughly 200 nations on the planet, and there are a roughly equal number of border disputes).

**History of Latin America (Julia Nunez):** We study the history of Spanish-speaking Latin America from the time of the Spanish colonization through the movements for independence, revolution, dictatorships, and neoliberalism. "Tierra y libertad" (land and liberty) is the theme of the course. Another theme is the saying that "poor people inhabit rich lands." We look at why the region has moved from being a paradise to poverty-stricken and why the majority of the people are still poor in the 21st century. We also focus on the historical reasons for the large numbers of Central Americans seeking asylum in the United States.

**Social Justice (Julia Nunez):** The anchor of the course is *Mountains Beyond Mountains* by Tracy Kidder, about the work of Paul Farmer, M.D., in Haiti, Peru, and Russia, as well as his work as a medical anthropologist on the relationship between structural violence and human rights violations. We also study Indian removal in the United States, homelessness, sex trafficking, white privilege, climate justice and the situation of refugees and displaced people, including the current crisis on the U.S. southern border. This course includes two service trips to feed the needy or the homeless. (*This course is not offered in 2019-2020.*)

**Economics (Stephen Sagarin or Peter Elliston):** This course includes a brief, practical introduction to economics and political economy. It included an introduction to macroeconomics and microeconomics, and to the history of economics from Adam Smith through Karl Marx and John Maynard Keynes to Milton Friedman. We read selections from Rudolf Steiner's *Towards Social Renewal* to gain perspectives on capitalism, communism, and the place of economics in contemporary social life, and we develop a glossary of economic terms and concepts. Students complete and present projects on contemporary economic topics. (*This course is not offered in 2019-2020.*)

### **The Transcendentalists (Beth Robbins):**

You shall no longer take things at second or third hand,  
Nor look through the eyes of the dead, nor feed on the  
spectres in books;  
You shall not look through my eyes either, nor take  
things from me,  
You shall listen to all sides and filter them from yourself.  
==Whitman, "Song of Myself"

Nothing is at last sacred but the integrity of your mind.  
==Emerson, "Self-Reliance"

In 19th century America, a radical group emerged arguing for the individual and exploring the link between the microcosm and the macrocosm. Emerson said there "is one mind common to all individual men" and no hierarchical structure that forced obedience should be necessary. The transcendentalists demanded originality and freedom in all spheres. We will immerse ourselves in the world of the transcendentalists by focusing on three seminal figures. The following books will provide the foundation for our work, but a significant component will be engaged and creative responses to the ideas and the poetry that arise from reflection and discussion.

- *The Essential Writings of Ralph Waldo Emerson* R.W. Emerson. Modern Library. 2000.
- *Song of Myself*. Walt Whitman Dover Thrift Edition. 2001.
- *The Portable Thoreau*. H. D. Thoreau. Penguin Books. 2012.

### **Modern Literature & Philosophy (Samantha Stier):**

This course provides an introduction to major philosophical ideas. We read selections of various texts (provided in a course packet) and discuss them in class. The philosophy of ethics primarily deals with concepts of right and wrong, good and bad, how human beings should act, happiness, obligation, and moral values. In addition to the selections from philosophers, we read *Man's Search for Meaning* (Part I) by Viktor Frankl. Through this text we examine how one can find meaning in a world pervaded by evil and suffering. Frankl's therapeutic system, Logotherapy, is developed partly from his experiences in concentration camps. He wondered how to "weave . . . slender threads of a broken life into a firm pattern of meaning and responsibility." He searched for meaning and connections, and studied the role of the individual in the world.

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**Please note: Not all courses are offered every year. Some alternate years, and some are replaced by new courses. See a Seminar Block Schedule for information on current courses. And see our Course of Studies for additional courses in English, math, foreign language, electives, and the arts.**