

A background network diagram consisting of numerous gray circles of varying sizes connected by thin gray lines, creating a complex web-like structure.

MSON

MALONE SCHOOLS
ONLINE NETWORK

2020 - 2021
COURSE CATALOG

MSON COURSE CATALOG

The Malone Schools Online Network (MSON) provides motivated upper level students at participating Malone Schools with a variety of academically challenging courses that enhance each member school's existing curriculum. These interactive seminars bring students together from across the country with dedicated teachers in real time. MSON joins the best of independent school education with the latest video conferencing technology to chart new territory in online learning.

Students enroll in MSON classes through their schools, which make course requests to MSON by April 15th. Interested students should reach out to their MSON Academic Liaisons for more information and to understand the processes at their schools. MSON works with member schools to seat students in courses based on the requests of each school, course space constraints, and program goals.

PARTICIPATING SCHOOLS

2020-2021

Augusta Preparatory School (GA)
Brownell Talbot School (NB)
Canterbury School (IN)
Casady School (OK)
Chadwick School (CA)
Derryfield School (NH)
Fort Worth Country Day School (TX)
Hopkins School (CT)
Indian Springs School (AL)
Manlius Pebble Hill School (NY)
Newark Academy (NJ)
Maret School (DC)
Mounds Park Academy (MN)

The Prairie School (WI)
Porter-Gaud School (SC)
Roeper School (MI)
St. Andrews Episcopal School (MS)
Severn School (MD)
Stanford Online High School (CA)
Trinity Preparatory School (FL)
University School in Nashville (TN)
Waynflete School (ME)
Wichita Collegiate School (KS)
Wilmington Friends School (DE)
Winchester Thurston School (PA)

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WORLD LANGUAGES

ADVANCED SPANISH LINGUISTICS (FALL)

Tuesday/Thursday

12:15-1:15 pm EST

Target Grade Level: 11-12

Prerequisite: Spanish 4 or equivalent

Instructor: Weslie Wald, Indian Springs School, Indian Springs Village, AL

This course exists to allow students with at least 4 years' exposure to Spanish to dive deeper into the study of the language itself, including its history, development over time, sounds (phonetics and phonology), structure (morphology and syntax), words (lexicon) and their meaning (semantics and pragmatics). While much of the instruction may be conducted in English to accomplish those goals, the aim is for this deeper research to equip students with the content knowledge, skills, and confidence necessary to continue to communicate at a mid- or high-intermediate level of proficiency in Spanish (or higher) and to continually reflect on how language both shapes and reflects culture.

ADVANCED SPANISH THROUGH FILM AND LITERATURE (SPRING)

Tuesday/Thursday

12:15-1:15 pm EST

Target Grade Level: 11-12

Prerequisite: Spanish 4 or equivalent

Instructor: Weslie Wald, Indian Springs School, Indian Springs Village, AL

This course exists to allow students with at least 4 years' exposure to Spanish to dive deeper into the study of the language by exploring literature and film in Spanish. Selections will cover various historical and geographical contexts, writing styles and genres, and cultural connections. All readings, films, and class discussions and assignments will be conducted in Spanish, therefore equipping students with the content knowledge, skills, and confidence necessary to continue to communicate at a mid- or high-intermediate level of proficiency in Spanish (or higher) and to continually reflect on how language both shapes and reflects culture.

ANCIENT GREEK I (YEAR)

Monday/Wednesday

3:35-4:35 pm EST

Target Grade Level: 11-12

Prerequisite: None

Instructor: Briana Titus, Casady School, Oklahoma City, OK

This is a beginning course for students who have not studied ancient Greek before or whose background in Greek is not sufficient for more advanced work. Students proceed through a study of grammar and vocabulary to the reading and writing of sentences and short narratives in the language of Athens of the fifth century B.C.E. Selected topics in Greek history and art are also considered.

WORLD LANGUAGES

ARABIC I (YEAR)

Section A

Monday/Thursday

12:15-1:15 pm EST

Section B

Tuesday/Thursday

3:35-4:35 pm EST

Target Grade Level: 9-12 (Juniors receive priority)

Prerequisite: None

Notes: First of a two-year sequence

Instructors: Farha Abu Baker, Hopkins School, New Haven, CT

Kaveh Niazi, Stanford Online High School, Stanford, CA

This first-year course of a two-year sequence is an introduction to Modern Standard Arabic, the language of formal speech and most printed materials in the Arab-speaking world. Students will learn to read and write the Arabic alphabet and will develop beginning proficiency in the language. Through frequent oral and written drills, students will develop their basic communication skills.

ARABIC II (YEAR)

Tuesday/Friday

12:15-1:15 pm EST

Target Grade Level: 10-12

Prerequisite: Arabic I

Notes: Second of a two-year sequence

Instructor: Farha Abu Baker, Hopkins School, New Haven, CT

This course is a continuation of the introduction to Modern Standard Arabic, the language of formal speech and most printed materials in the Arab-speaking world. Students will learn to read and write the Arabic alphabet and will develop beginning proficiency in the language. Through frequent oral and written drills, students will develop their basic communication skills.

CHINESE V (YEAR)

Split

Wednesday

Friday

Schedule 11:05-12:05 pm EST 12:15-1:15 pm EST

Target Grade Level: 11-12

Prerequisite: Chinese 4 or Honors Level

Instructor: Lan Lin, Hopkins School, New Haven, CT

This intermediate level course, conducted entirely in Chinese, involves the reading of authentic texts of modern Chinese society and culture. Students explore current cultural topics through stories, dialogues, and documentaries using multimedia materials ranging from Internet, television, and films to traditional textbooks. Throughout the year, students write papers, critique films, and participate in oral discussion and debates.

ADVANCED MACROECONOMICS (FALL 2021) *Alternating Year Offering*

Wednesday / Friday

10:00-11:00 am EST

Target Grade Level: 11-12

Prerequisite: Students who have not taken a microeconomics course will need to read some chapters of the text and watch some screencasts prior to the beginning of the class.

Instructor: Julien Meyer, Severn School, Severna Park, MD

Advanced Macroeconomics is a semester course that covers the study of an economic system as a whole. Topics include economic performance measures, price-level determination (inflation and deflation), the financial sector, monetary and fiscal policies, economic growth, productivity, unemployment, and international trade and the balance of payments. Students will manipulate economic models and “think like an economist.” While the course does not follow the AP curriculum, students will be positioned, with extra work on their own, to take the AP exam if they wish.

ADVANCED MICROECONOMICS (FALL 2020) *Alternating Year Offering*

Wednesday / Friday

10:00-11:00 am EST

Target Grade Level: 11-12

Prerequisite: Completion or concurrent enrollment in Precalculus

Instructor: Julien Meyer, Severn School, Severna Park, MD

Advanced Microeconomics is a semester course that covers decisions at the individual consumer, producer and market level. Topics include scarcity, supply and demand, elasticity, international trade and the theory of the firm. The role of the government, both distortive and restorative, in the areas of regulation, public goods, market failures and the environment, will be debated. Students will manipulate economic models and “think like an economist.” While the course does not follow the AP curriculum, students will be positioned, with extra work on their own, to take the AP exam if they wish.

THE AMERICAN FOOD SYSTEM: PAST, PRESENT, FUTURE (FALL)

Monday / Thursday

11:05-12:05 pm EST

Target Grade Level: 11-12

Prerequisite: None

Instructor: Lindley Shutz, Derryfield School, Manchester, NH

The American Food System consists of the interrelated components of how we get food from “farm to fork,” including the producing, harvesting, processing, transporting, marketing, distributing, and the eating of food. Through a humanities-based, interdisciplinary approach the course will examine the political, social, economic, and environmental aspects of the system, as well as the challenges and opportunities in moving from our current industrial food system to a more sustainable one. Students will engage in a variety of projects, allowing them to understand their regional and local food systems, while learning from their classmates throughout the country. Topics to be covered include animal agriculture, organic farming, local production and distribution, the debate over GMOs, the marketing of unhealthy food to children, and the problem of hunger in America.

ARE WE ROME? (SPRING)

Monday / Thursday

11:05-12:05 pm EST

Target Grade Level: 11-12

Prerequisite: Completion of US History (may be concurrent); background in Classics not required

Instructor: Michael Leary, Derryfield School, Manchester, NH

Inspired by Cullen Murphy's 2007 book of the same name, "Are We Rome" will examine the similarities between the Roman empire and the United States. This course is designed to be a capstone for study in classics and history. The interdisciplinary nature of this course will serve as a vehicle by which students of Latin and history can expand their knowledge and apply that knowledge in an intercultural comparison. Since 1776, from our system of government to the architecture of government buildings, the United States has used Rome as a foil for itself, and forefathers of the US created many institutions using Rome as a model. This course will be structured around one basic question: How can the United States learn from Rome?

We will examine political and social ideologies, privatization, globalization, borders, and exceptionalism. Taking our beginnings from the founding of these two nations, we will discuss the governing practices and bodies, the rhetoric of politics, and the public view of governmental institutions with emphasis on how these progress and change. The course will culminate with analysis of the most recent political and social events in the U.S. and form a final conclusion on our topic. Our class discussions will be centered around primary sources from both Rome and the US. Weekly reading and writing assignments will be required.

BOB DYLAN'S AMERICA (FALL)

Monday/Wednesday

4:40-5:40 pm EST

Target Grade Level: 11-12

Prerequisite: Previous or concurrent enrollment in American Literature and American History

Instructor: Dean Masullo, University School of Nashville, Nashville, TN

Arguably the most influential, important, and closely scrutinized American artist of the past six decades, Bob Dylan is as difficult to define as the nation that produced him. Connecting his work to contemporary theories of cultural memory, this course looks at the ways in which Dylan, both in his music and his cultivation of various public personae, maps the contours of the national imagination and explores the prevailing attitudes of class, race, gender, and place in American culture.

Proceeding chronologically and using Dylan's masterworks and subsequent official "bootleg" recordings as touchstones, students will consider a variety of texts, including poetry, fiction, and cultural history; biography and autobiography; and popular and documentary film, including Greil Marcus' *The Old, Weird America: The World of Bob Dylan's Basement Tapes* (2001), Murray Lerner's *Festival* (1967), D. A. Pennebaker's *Dont Look Back* (1967), and Martin Scorsese's *No Direction Home* (2005) and *Rolling Thunder Review: A Bob Dylan Story* (2015). Access to a music streaming service such as Spotify or Apple Music is required; access to video streaming services such as Netflix and Amazon Prime is strongly recommended.

BUILDING UTOPIA (FALL)

Monday / Wednesday

3:35-4:35 pm EST

Target Grade Level: 9-12

Prerequisite: None, but background in Ancient and European History recommended

Instructor: Mary Ellen Carsley, Severn School, Severna Park, MD

Utopia, “a good place,” as defined by the Greeks, is a term coined by Sir Thomas More referring to a fictional ideal island society. The act of intentionally shaping one’s environment to be “a good place” modeled after sustainability, economy, and delight is a uniquely human endeavor. This semester long study examines the course of Western Architecture from the Ancient Egyptians to the 21st century through the lens of the primary philosophic ideas that have been the drivers of aesthetic vision of Western civilization architecture through the ages. The course will offer an introduction to design principles, the visual language of architecture, and design analysis. The necessities, desires, and spiritual beliefs which go into the shaping of a culture’s aesthetic vision of their ideal built environment will be examined in a series of seven units of the course of the semester:

1. Forming the Human Universe: Mark Making and the Necessity of Shelter
2. Creativity and Humankind: Beauty Defined and the Building of Civilizations
3. Immortality and the Gods: Building for the Greater Glory
4. Getting Perspective: Perfect Geometry in Design & Building in the Humanist and Rational World
5. Power and Production: Society and the Machine
6. Modern Utopia and the Architect’s Vision: Shaping an Individual World
7. Back to the Future: Palimpsest and Irony

CREATIVE WRITING IN THE DIGITAL AGE (FALL)

Monday / Thursday

10:00–11:00 am EST

Target Grade Level: 11-12

Prerequisite: None

Instructor: Julia Maxey, Severn School, Severna Park, MD

Storytelling is as important today as it was hundreds of years ago. What has changed, in many cases, is the media through which writers tell their stories. Today’s literary artists take advantage of digital tools to spread their messages and tell their stories in new ways that combine narrative and contemporary form. Students will begin with the traditional forms of poetry, short prose, and literary non-fiction and then go beyond those forms to explore how contemporary tools can enhance expression. We will study master writers in each of the traditional forms and be inspired by their examples. Then, we will look at how communication in the 21st century has provided us with even more ways to share our thoughts and to be creative. Possible explorations include hyperlinked narratives, social media as inspiration and tool, animated text, audio, videos, and all manner of non-linear narrative. The class will ask an essential question: what happens when communication becomes wider and has an instant audience? The class routine, based around writing, reading, and discussion, will include weekly critiques of student work and required writing, including in some non-traditional, contemporary formats.

CREATIVE NON-FICTION WRITING WORKSHOP: IF ONLY YOU COULD SEE THIS PLACE (SPRING 2022)

Tuesday / Thursday

Alternating Year Offering

2:30–3:30 pm EST

Target Grade Level: 11-12

Prerequisite: None

Instructor: Susan Conley, Waynflete School, Portland, ME

How do we write great non-fiction (and this includes all flavors of essays – college essays, literary journalism, memoir, and more), so that our stories have an injection of narrative tension that invites the reader to sit down inside our stories and stay awhile? This workshop will help you become a better writer so that your stories contain an electrical charge that starts at the sentence level and travels through the entire piece. This tension, or electrical charge, is the engine that great non-fiction runs on. Students will search the places in one's life that have mattered most, and using a series of fun writing prompts, generate new writing, using place as a portal to help land on the life stories that students' most want to tell.

Later, the class will move into class workshops of each student's work. Each session will also look at other specific craft aspects: primarily beginnings, endings, and the weaving of multiple story lines in one essay. This is an ideal course for juniors beginning to think about ideas and drafts of their personal essay for college.

DIVERSITY IN A GLOBAL COMPARATIVE PERSPECTIVE (FALL)

Tuesday / Thursday

3:35–4:35 pm EST

Target Grade Level: 11-12

Prerequisite: None

Instructor: John Aden, Canterbury School, Ft. Wayne, IN

This course examines the ways our Human Family has sought to create, marshal, contest, and maintain identities through Culture and relations of power. These identities can be appreciated through "lenses of analysis." The course critically engages the traditional "Big Three" lenses of analysis: Race, Class, and Gender, understanding that Culture serves as an important backdrop against which these identities emerge.

Once students appreciate the important ways the Social Sciences have engaged with, written about, and debated these three core modes of analysis, the course expands to incorporate other, equally rich, lenses: age, ableism, intellectual diversity, geographic diversity, cognitive and neurological diversity, and the business case for Diversity, as well as how to study synergistically intertwined phenomena. Film and Critical Film Studies, as well as the role Colonialism has played in the major conflicts of the last 500 years, each serve to enrich student understandings of Diversity.

ENVIRONMENTAL BIOETHICS (*SPRING*)

Tuesday / Friday

3:35–4:35 pm EST

Target Grade Level: 11-12

Prerequisite: None

Instructor: Ellen Johnson, Wilmington Friends School, Wilmington, DE

This course will focus on such cases as environmental sustainability, global energy and food resources, gathered from sources in literature, journalism, and film. The academic study of ethics examines how people make the decisions.

Curricula will build on a foundation of theoretical moral theories, more specifically, how one makes decisions when faced with complex, often controversial, issues. No prior knowledge of philosophy is assumed, however, authentic assessment of students' initial facility with logical analysis will ensure that all students are challenged to grow and deepen their theoretical and practical understandings of the subject.

ETYMOLOGY OF SCIENTIFIC TERMS (*FALL*)

Tuesday / Friday

2:30–3:30 pm EST

Target Grade Level: 11-12

Prerequisite: None

Instructor: David Seward, Winchester Thurston School, Pittsburgh, PA

The purpose of the course is, to quote the textbook, "By teaching ... the root elements of medical terminology – the prefixes, suffixes, and combining forms of Greek and Latin ... not only to teach students modern medical terminology, but to give them the ability to decipher the evolving language of medicine throughout their careers."

This is in many ways a language course and deals with elements that are used to create terms to meet the specific needs of medical scientists. As material is introduced, students will complete practice exercises during each class meeting, as well as complete approximately one quiz per week. Outside of class, students are expected to analyze and define fifty terms each week. Additional material deals with complex etymologies, the history of our understanding of certain aspects of medical science, and relevant material from Greek and Latin texts.

MAKING ETHICAL MEDICAL CHOICES IN A DIVERSE WORLD (FALL)

Wednesday / Friday

3:35-4:35 pm EST

Target Grade Level: 11-12 (occasional 10th, at the recommendation of home school administrator)

Prerequisite: None

Instructors: Ellen Johnson, Wilmington Friends School, Wilmington, DE
Joyce Lazier, Canterbury School, Ft. Wayne, IN

The objective of this course is to provide students with the tools and experience necessary to better make difficult, ethical decisions. In order to achieve this, we will study and evaluate critically several different ethical theories including Utilitarianism, Virtue Ethics, and Deontology. Which framework students choose to use as their guide is up to them, but by the end of this course they should be able to defend their choices and ethical decisions clearly. The course strives to develop a cross conversation between two academic disciplines - philosophy (ethics) and biology (medical research, molecular genetics).

This is a collaborative teaching effort between Joyce Lazier (background in philosophy and ethics) and Ellen Johnson (background in biology and genetics), and an evolution of two previously existing courses. Both teachers will be present for all classes, focusing on the growth that comes from a shared discourse.

POLITICAL IDENTITY, AMERICAN DEMOCRACY AND CIVIC ENGAGEMENT (FALL)

Monday/Wednesday

1:20-2:20 pm EST

Target Grade Level: 11-12

Prerequisite: None

Instructor: Geoff Wagg, Waynflete School, Portland, ME

Political Identity, American Democracy, and Civic Engagement is a study of our political beliefs and behaviors, the American form of Democracy, and what it means to be an engaged citizen. Students will learn how individual citizens form a political identity and how those identities form the foundation of U.S. political culture. We will look at the unique form of government found in the United States and have an opportunity to get involved with contemporary politics in an election year. We will pay particular attention to federalism, the separation of powers, and checks and balances.

The course takes advantage of the broad geographic diversity inherent in the Malone School Online Network to experience how political ideology and perspectives on democracy differ in various parts of the country. In this course, special emphasis will be placed on engaging in respectful conversation across the political divide.

NATIVE AMERICAN LITERATURE (SPRING)

Tuesday / Friday

2:30-3:30pm EST

Target Grade Level: 11-12

Prerequisite: None

Instructor: Joseph Addison, Hopkins School, New Haven, CT

Native American literature and history are often overlooked in the conceptualization of what it means to be American. This course uses novels, short stories, poetry, primary and secondary sources to introduce students to Native American literature and to foster discussion about American identity. Students also discuss oral and written traditions, issues of nationality, and Native American relationships with the US government.

PHILOSOPHY IN POP CULTURE (SPRING)

Wednesday / Friday

1:20- 2:20 pm EST

Target Grade Level: 11-12

Prerequisite: None, but some familiarity/experience with logic helpful

Notes: Netflix subscription required

Instructor: Joyce Lazier, Canterbury School, Ft. Wayne, IN

Have you ever had a realistic dream that you were sure was true and then work up confused? How do you know that you are not in the Matrix? What is real and what is not? This course will investigate the nature of existence. It will combine classic philosophic works, like Descartes, with contemporary movies like The Matrix and Inception, to contemplate what it is to exist and what the meaning of life is or should be.

POSITIVE PSYCHOLOGY (FALL AND SPRING)

Monday / Thursday

3:35-4:35pm EST

Target Grade Level: 10-12

Prerequisite: None

Notes: Course has limited enrollment

Instructor: Blake Keogh, Waynflete School, Portland, ME

This course begins by providing a historical context of positive psychology within broader psychological research and helps explain why the field is of particular importance to those in a high school or college setting. Students will be introduced to the primary components and related functions of the brain in order to understand the biological foundation of our emotional experiences. Current research will be used to develop a broader sense of what positive psychology is and is not, and how it can be applied in students' own lives. Additionally, students will gain an understanding of basic research methods and their application to the science of psychology. This course will require substantial reading (sometimes on par with 100 level college courses) and writing. Students will be asked to reflect regularly on their individual experiences in order to integrate course material into their daily lives. One of the key learning outcomes is to have each participant identify his or her own strengths while simultaneously recognizing and respecting the attributes others bring to the course.

SUGAR, TOBACCO, IRON AND SILICON: AN ECONOMIC HISTORY OF THE UNITED STATES (FALL)

Wednesday / Friday

2:30–3:30 pm EST

Target Grade Level: 11-12

Prerequisite: None

Notes: Reading a national newspaper is recommended

Instructor: Benson Hawk, Newark Academy, Newark, NJ

By 1871, the United States had emerged as the world's largest economy and was well on its way to achieving dominance across a number of fields, including manufacturing. Is it an accident that this growth occurred so soon after the Civil War? What linkage does it have to the end of slavery? And why is it, so close to this date, that America become what many referred to as "the Imperial Republic?"

Students in this course will be deeply engaged with examining the causes and consequences of the US's rise to global economic dominance over the past 150 years. They will critically analyze key primary texts as they explore relevant historical content and methodologies. Additionally, students will be taught how to use introductory micro and macroeconomic analysis, including the use of supply and demand and aggregate supply and aggregate demand graphs. Texts used in the course include Sidney Mintz's *Sweetness and Power* (1986) and Scott Nations' *A History of the United States in Five Crashes* (2017).

THINK GLOBAL, DEBATE LOCAL (FALL)

Tuesday / Thursday

4:40–5:40 pm EST

Target Grade Level: 10-12

Prerequisite: None

Instructor: Dan Jacobs, Roeper School, Bloomfield Hills, MI

Water justice. Gentrification. Housing. Education. Race Relations. Public Safety. Environmental Issues. Is it wrong to shut off water service to households that are delinquent on their water bills? Is access to affordable housing a human right? Should environmental issues take priority over the needs of businesses? Do we have an obligation to help asylum seekers? People all around the world struggle with these and other challenges. In Think Global, Debate Local, we use issues in our own neighborhoods to take deep dives into the facts and philosophies underlying the challenges, values, and perspectives that shape our world on scales ranging from the personal to the global.

The overarching goal of this course is for students to teach each other about important topics in their own neighborhoods, towns, states, and regions, and to use debate as a tool to examine the perspectives surrounding those topics. Other goals include achieving a better understanding of complex issues by taking on and arguing for the viewpoints of various stakeholders; discovering ways to shift from an adversarial to a cooperative relationship when disagreements arise; and understanding the ways different values can be used as filters through which a given issue can be viewed. Please note that this course is geared toward beginning debaters with an emphasis on basic argumentation, not competition, although more experienced debaters are welcome.

WARTIME DISSENT IN AMERICAN HISTORY (FALL)

Tuesday / Friday

8:30–9:30 am EST

Target Grade Level: 11-12

Prerequisite: AP US History or equivalent suggested

Instructor: John French, Prairie School, Racine, WI

Benjamin Franklin once said that “They that can give up essential liberty to obtain a little temporary safety deserve neither safety nor liberty.” An oft-cited quotation by champions of American civil liberties protections and anti-war activists, Franklin’s passage illustrates how dilemmas regarding the balance between free speech and national security have tested and often perplexed American politicians, courts, and citizens since the inception of the country. During wars the government reserves the right to draft men into the armed services, confiscate the property of individual citizens, set prices, ration food and fuel, and drastically increase taxes. Viewing them through the prism of the nation’s existential crisis, most citizens accept these compromises on their liberty. Ben Franklin, however, lived in a premodern world devoid of anthrax, drones, Internet communication, and long-range nuclear weapons. The Founding Fathers could not have foreseen the awesome power nor puissant pressure of commanders-in-chief who, obligated to protect the lives of millions, regularly criticize dissenters. And thus, lines must be drawn between civil liberties and national security - but where?

Through reading, discussing, and critically analyzing primary and secondary sources from each American war (from the Revolutionary War through the War on Terror), students will emerge with a better understanding of American wars, their dissenters, and the meaning of freedom under its most intense stress tests.

ADVANCED TOPICS IN CHEMISTRY (SPRING)*Monday / Thursday**2:30–3:30 pm EST***Target Grade Level:** 11-12**Prerequisite:** Chemistry**Instructor:** Jocelyn Rodgers, Maret School, Washington, DC

This semester course explores aspects of chemistry that are often skimmed over or omitted in most chemistry courses—chemical applications and the history of chemistry. Real-world applications abound in areas such as nuclear, medical, atmospheric, industrial, food, water, and consumer product chemistry. We will begin with an exploration of energy sources such as nuclear power, solar power, and lithium ion batteries. We will then explore computing—both the properties of the elements that power the computers we use every day as well as computational techniques that have revolutionized the ability of scientists and students to visualize and understand chemical processes at a molecular level.

Throughout the semester, we also explore the history and life events of scientists who discovered the chemical elements and have impacted the history of the world through chemistry. In independent projects, students will explore the periodic table for daily applications and technologies, from cell phones to photovoltaic cells to medical treatments. This course will be heavy in applications and theory, with less of the traditional problem-solving found in other courses.

ADVANCED APPLIED MATH THROUGH FINANCE (SPRING)*Monday / Thursday**10:00–11:00 am EST***Target Grade Level:** 11-12**Prerequisite:** Completion of Algebra II**Instructor:** Julien Meyer, Severn School, Severna Park, MD

This one-semester course will provide students a mathematical and conceptual framework with which to make important personal financial decisions using algebraic tools. Specifically, the class will investigate i) the time value of money (i.e., interest rates, compounding, saving and borrowing) using exponential functions; and ii) the characteristics and risk/reward tradeoff of different financial instruments/investments, such as stocks, bonds and mutual funds, using algebra, probability and statistics. Other financial algebra topics selected with student input may include financial accounting, depreciation methods and foreign currency exchange.

The course will stress use of the TI-83/84 calculator, Excel spreadsheets and iPad apps. Students should be comfortable with exponential growth models and, preferably, the concept of the number e for continuous compounding. They should be willing to exhibit an interest in mathematical reasoning and display a hefty dose of curiosity about the language and problem-solving nature of personal finance.

CSI: MSON – FORENSIC SCIENCE (SPRING)

Tuesday / Thursday

1:20–2:20 pm EST

Target Grade Level: 11-12

Prerequisite: Completion or concurrent enrollment in Chemistry or Biology and Algebra II

Notes: Lab kit required (sent by teacher)

Instructor: Carrie Lopez, Trinity Preparatory Day School, Winter Park, FL

This course is designed for those interested in learning the discipline of forensic science and crime scene investigation. Students will be introduced to some of the specialized fields of forensic science and topics will include blood spatter and pattern analysis, death, ballistics, trace and glass evidence, toxicology, entomology, anthropology, serology, and DNA fingerprinting. Students will explore the forensic analysis of substances such as glass, soil, hair, bullets, gun powder, blood and drugs. This class includes a mixture of laboratory experiments, demonstrations, and speakers who are experts in the field.

DATA STRUCTURES AND DESIGN PATTERNS (YEAR)

Monday / Thursday

4:40-5:40 pm EST

Target Grade Level: 11-12

Prerequisite: AP Computer Science A or equivalent experience with the Java programming language

Notes: Laptop required

Instructor: J.D. DeVaughn-Brown, Chadwick School, Palos Verdes, CA

This course is a yearlong course that will give advanced students the strong foundation needed to build complex applications using object-oriented principles and the skills needed to gain a top-level internship at a tech firm. This course covers the design and implementation of data structures including arrays, stacks, queues, linked lists, binary trees, heaps, balanced trees (e.g. AVL-trees) and graphs. The course will also serve as an introduction to software design patterns. Each pattern represents a best practice solution to a software problem in a specific context. The course covers the rationale and benefits of object-oriented software design patterns. Numerous problems will be studied to investigate the implementation of good design patterns. Students will receive assistance in crafting an effective resume and go through sample interview questions.

EINSTEIN'S RELATIVITY AND THE EVOLUTION OF THE QUANTUM MODEL (FALL)

Monday / Thursday

2:30–3:30 pm EST

Target Grade Level: 11-12

Prerequisites: Physics or AP Physics 1; **Co-requisite:** AP Calculus AB

Instructor: Ben Taylor, Hopkins School, New Haven, CT

This is a mathematically rigorous course in which students study contemporary physics. The course begins with Einstein's theory of relativity, and then takes on a chronological exploration of the development of quantum mechanics. Time travel, quantum tunneling, and the acceptance of seemingly impossible dualities mark highlights of this course.

EXPLORATIONS IN COMPUTER SCIENCE: SOLVING MULTIDISCIPLINARY PROBLEMS WITH COMPUTATIONAL METHODS (YEAR)

Tuesday / Thursday

11:05-12:05 pm EST

Target Grade Level: 9-11 (Students must have maturity and time management to succeed in a project-based, independent course.)

Prerequisite: None

Notes: Students will need access to a laptop and other devices and equipment, up to about \$100.

Instructor: Page Lennig, Waynflete School, Portland, ME

This project-based course will teach computational thinking skills through problem solving in computer science. Students will choose real projects based on their interests in the arts, humanities, STEM, and the world around them and then leverage the power of computer science to approach them. For example, students might design a website to bring attention to an issue in their communities, draw on big data to answer an environmental or historical question, compose music through code, or explore autonomous vehicles through robotics.

For each project, students will break down a problem into pieces, build a sequence of steps to solve the problem, and translate those steps into a digital or technological solution. Students will often work collaboratively in groups, give one another feedback, and discuss/debate ethical questions related to current topics in computer science and the world. The course will function at the introductory level and is suited for students who wish to gain a broad exposure to computational methods, coding, and other tools of computer science.

GENETICS AND GENOMICS (FALL)

Wednesday / Friday

12:15-1:15 pm EST

Target Grade Level: 11-12

Prerequisites: Chemistry and Biology

Notes: Laptop required

Instructor: Audrey Yeager, Manlius Pebble Hill School, Syracuse, NY

This course will emphasize classic Mendelian genetics, molecular genetics, and population and evolutionary genetics. The topics include structure and function of genes (and the genome), biological variation, and regulation of gene expression. Subsequently, the course will explore current genome analysis methods, and genome manipulation technologies such as CRISPR. We will also discuss the implication of our use of this information in society. Topics include recombinant DNA technology, mathematical models and statistical methods for data analysis. Papers from the current and classic literature will supplement lecture materials.

INTRODUCTION TO ORGANIC CHEMISTRY (FALL)*Monday / Thursday**2:30–3:30 pm EST***Target Grade Level:** 11-12**Prerequisite:** Chemistry**Instructor:** Jocelyn Rodgers, Maret School, Washington, DC

This semester course will provide useful background information in organic chemistry by covering topics not typically found in high school chemistry courses. The course will give insight into the importance of the chemistry of carbon compounds to our daily lives. Topics covered will include organic nomenclature, structural formulas, stereochemistry, bonding, reaction mechanisms, and chemical transformations of functional groups. Completion of the course should make students more confident in their chemical background when entering college biology or chemistry courses.

A MATHEMATICAL MODELING APPROACH TO SOCIAL JUSTICE (SPRING)*Tuesday / Thursday**4:40–5:40 pm EST***Target Grade Level:** 11-12**Prerequisite:** Precalculus (prior or concurrent)**Instructor:** Jay Noland, Mounds Park Academy, St. Paul, MN

The main purpose of this course is an introduction to mathematical modeling through graphical, numerical, symbolic, and verbal techniques. We will focus on data from and explore social justice issues such as the Wealth Gap, Achievement Gap, Climate Change and others. We will use elementary functions (polynomial, exponential, logarithmic, etc.) to build models and address questions with the goal of developing scientific reasoning and problem-solving skills. Students will also use technology in a range of ways to effectively communicate their hypotheses and conclusions.

MULTIVARIABLE CALCULUS (YEAR)*Section A**Monday / Thursday**8:10–9:10 am EST**Section B**Monday / Wednesday**2:30–3:30 pm EST***Target Grade Level:** 11-12**Prerequisite:** BC Calculus**Notes:** Laptop required**Instructors:** Josh Link, Maret School, Washington, DC

Erika Amaya, Chadwick, School, Palos Verdes, CA

The mathematics of three dimensions is the emphasis of this college-level course. Multivariable Calculus will explore the geometry of three-dimensional space, including vector arithmetic. It will also explore three-dimensional surfaces, using the tools of derivatives and integrals expanded into multiple dimensions. A robust unit on differential equations will allow students to review the topics of single-variable calculus. The emphasis throughout the course will be on problem-solving and on real-world applications of the tools students learn in fields such as economics, astronomy, physics, engineering, and medicine.

