

# MSON COURSE CATALOG

2018 – 2019

Malone  
Schools Online  
Network  
(MSON)

The Malone Schools Online Network (“MSON”) provides upper level students at registered Malone Schools with a variety of superior online courses that enhance each member school’s existing curriculum. These courses promote the values of the Malone Family Foundation and are conducted by teaching professionals that are experts in their fields, have experience with independent school education, and share a commitment to excellence, small class sizes, and personal relationships. Course offerings target the most talented high school students, who demonstrate sufficient independence and commitment to succeed in a virtual discussion seminar setting.



Each course takes a blended approach, combining synchronous instruction—real-time video conferencing seminars—with asynchronous instruction including recorded lectures and exercises that students complete outside of the class. Each course has a maximum of 16 students, allowing for a virtual discussion seminar, and is delivered in high-definition classroom set-ups that allow students and teachers to see one another, interact throughout class, and form meaningful relationships.

## Participating Schools (2018-2019)

- |                                    |                                     |
|------------------------------------|-------------------------------------|
| Brownell Talbot School (NB)        | The Prairie School (WI)             |
| Canterbury School (IN)             | Porter-Gaud School (SC)             |
| Casady School (OK)                 | Roeper School (MI)                  |
| Chadwick School (CA)               | St. Andrews Episcopal School (MS)   |
| The Derryfield School (NH)         | Severn School (MD)                  |
| Fort Worth Country Day School (TX) | Stanford Online High School (CA)    |
| Hopkins School (CT)                | Trinity Preparatory School (FL)     |
| Indian Springs School (AL)         | University School in Nashville (TN) |
| Manlius Pebble Hill School (NY)    | Waynflote School (ME)               |
| Newark Academy (NJ)                | Wilmington Friends School (DE)      |
| Maret School (DC)                  | Winchester Thurston School (PA)     |
| Mounds Park Academy (MN)           |                                     |

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## 2018-2019 COURSE DESCRIPTIONS

### Languages

#### **ANCIENT GREEK I** (Language and Literature) (Year)

**Target Grade Level:** 9-12

**TEACHER:** John Anderson, Hopkins School, New Haven CT

*This course has a split time schedule – Monday 1:15-2:15pm / Wednesday 10-11am EST*

**Prerequisite:** None

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.

#### **ARABIC I** (first part of a two-year sequence) (Year)

**Section A:**

**Target Grade Level:** 9-12 (juniors receive priority)

**TEACHER:** Farha Mohamed, Hopkins School, New Haven CT  
*Monday / Thursday 12:10 –1:10 pm EST.*

**Section B:**

**Target Grade Level:** 9-12 (juniors receive priority)

**TEACHER:** Kaveh Niazi, Stanford Online High School, Stanford CA  
*Monday / Thursday 5:45 –6:45 pm EST.*

**Prerequisite:** None

This course 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)

**Target Grade Level:** 10-12

**TEACHER:** Farha Mohamed, Hopkins School, New Haven CT  
*Tuesday / Friday 12:10 – 1:10pm EST*

**Prerequisite:** Completion of Arabic I

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)

**Target Grade Level:** 11-12

**TEACHER:** Lan Lin, Hopkins School, New Haven CT

*This course has a split time schedule – Wednesday 11:05-12:05 pm EST / Friday 12:10-1:10pm*

**Prerequisite:** Completion of Chinese 4 or Honors Level

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.

## 2018-2019 COURSE DESCRIPTIONS

### Humanities and Social Sciences

#### **ADVANCED ECONOMICS** (Year)

**Target Grade Level:** 11-12

**TEACHER:** Kelly Aull, Trinity Preparatory Day School, Winter Park FL  
**Tuesday / Friday, 11:05-12:05pm EST**

**Prerequisite:** *Completion or concurrent enrollment in Precalculus*

Advanced Economics is a year-long MSON course that covers basic concepts in macroeconomics, the study of economic systems, and microeconomics, the study of individual economic actors. Specific topics include the study of economic performance measures, the financial sector, stabilization policies, economic growth, international trade, the nature of product and factor markets, game theory, and the role of government in promoting efficiency and equity in the economy. Students will deliberate on these topics, manipulate economic models, and practice "thinking like an economist." Course completion will prepare students to sit for the AP Economics exams if they wish, but this course does not strictly follow the AP curriculum.

#### **THE AMERICAN FOOD SYSTEM: PAST. PRESENT. FUTURE** (Spring)

**Target Grade Level:** 11-12

**TEACHER:** Regina Assetta, The Derryfield School, Manchester NH  
**Monday / Thursday, 11:05 am -12:05pm EST**

**Prerequisite:** *None*

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.

#### **AMERICAN VOICE. AMERICAN SPEECH: WORD AS ACTION FROM ANNE BRADSTREET TO DONALD TRUMP** (Spring)

**Target Grade Level:** 11-12

**TEACHER:** Sharon Louise Howell, Indian Springs School, Indian Springs AL  
**Monday / Wednesday, 3:35-4:35pm EST**

**Prerequisite:** *Completion of US History (may be concurrent)*

In this course, students will listen across history to the American voice—from Bradstreet and John Winthrop, through Franklin, Thoreau, Whitman, Dickinson, Jacobs, Douglass, Twain, Cole Porter, James Baldwin, and Gertrude Stein, to MLK, Dylan, Steinem, and Obama. We will listen to music, look at art and film, and consider the more tangled "voice" of advertising, television, and political theater.

Even as it has proliferated and transformed, the American voice has maintained an urgent ambivalence about what it means to speak the truth, who should speak it, and to what end. Some of our guiding questions will be: what does it mean to speak as an American--to have an "American" voice? Does it have a distinctive character? Does it want to cause trouble, or solve problems, or both? Does it need to interact with history? We will look at the ongoing, central tension in much of American speech between the individual and the democratic collective, and also consider the related tension between reflection and action as conditions of possibility. We will also investigate what forms of speech are surrounding our students and how we might replicate them in order to understand them.

Among other writing assignments, students will maintain an ongoing analytical blog and submit a final paper on a topic of the student's choosing in consultation with the teacher.

# 2018-2019 COURSE DESCRIPTIONS

## Humanities and Social Sciences

### **ARE WE ROME?** (Fall)

**Target Grade Level: 11-12**

**TEACHER: Michael Leary, The Derryfield School, Manchester NH**

**Monday / Thursday, 11:05 am -12:05pm EST**

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

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, among other things, 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 United States 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.

### **BUILDING UTOPIA** (Fall)

**Target Grade Level: 9-12**

**TEACHER: Mary Ellen Carsley, Severn School, Severna Park MD**

**Monday / Wednesday, 3:35-4:35pm EST**

*Prerequisite: None. Background in Ancient and European History recommended*

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 21<sup>st</sup> 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 and 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 NON-FICTION WRITING WORKSHOP: IF ONLY YOU COULD SEE THIS PLACE** (Spring of 2020) (Alternating year offering)

**Target Grade Level: 11-12**

**TEACHER: Susan Conley, Waynflete School, Portland ME**

**Time Band TBD**

*Prerequisite: None*

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. Students will also read some fantastic published works.



## 2018-2019 COURSE DESCRIPTIONS

### Humanities and Social Sciences

#### **CREATIVE WRITING IN THE DIGITAL AGE** (Fall)

**Target Grade Level:** 11-12

**TEACHER:** Julia Maxey, Severn School, Severna Park MD  
*Monday / Thursday 10:00–11:00 am EST*

*Prerequisite: None*

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.

#### **DEBATE LOCAL. THINK GLOBAL** (Fall)

**Target Grade Level:** 11-12

**TEACHER:** Dan Jacobs, Roeper School, Bloomfield Hills MI  
*Tuesday / Friday 4:40 – 5:40 pm EST*

*Prerequisite: None*

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? Should a city invest limited funds in education or public safety? Should cities and states focus more on improving neighborhoods or enticing business investments? When in conflict, should environmental issues take priority over the needs of businesses? What about mandating affirmative action quotas when a large, national business moves into a low-income neighborhood? Many cities in the United States (and around the world) struggle with these and numerous other conflicts. We will use our own local experiences to take deep dives into the facts and philosophies underlying the challenges, values, and perspectives that shape our cities, neighborhoods, and homes, and that form the foundation of our experiences within them. This course uses the city of Detroit as the starting point to explore the relationship of a government to its people, of rights and responsibilities of citizens, of the balance between environment and economic activity, and more. Students will be given an overview of different issues, choose debate topics, and vet different ideas in the crucible of critical thinking, focusing on using debate as a tool for deeper understanding, and not simply as a means to win a competition. Post Detroit, students will teach others in the course about important topics in their own neighborhoods, towns, and states, with the goal of running other debates in the class about their own local topics.

#### **DIVERSITY IN A GLOBAL COMPARATIVE PERSPECTIVE** (Fall)

**Target Grade Level:** 11-12

**TEACHER:** John Aden, Canterbury School, Ft. Wayne, IN  
*Tuesday / Thursday 3:35 –4:35 pm EST*

*Prerequisite: None*

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.

## 2018-2019 COURSE DESCRIPTIONS

Humanities  
and Social  
Sciences

### **ENVIRONMENTAL BIOETHICS** (Spring)

**Target Grade Level:** 11-12

**TEACHER:** Ellen Johnson, Wilmington Friends School, Wilmington DE  
*Tuesday / Friday, 3:35 – 4:35pm EST*

*Prerequisite: None*

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.

### **ETHICS IN THE DIGITAL AGE** (Fall)

**Target Grade Level:** 11-12

**TEACHER:** Joyce Lazier, Canterbury School, Fort Wayne IN  
*Wednesday / Friday, 1:15 – 2:15pm EST*

*Prerequisite: None*

In the age where anonymity is prevalent and trolls abound, the study of ethics is more imperative than ever. Why be good if the world's gone bad? The objectives of this course are to provide students with the tools necessary to better make difficult ethical decisions in our digital age. In order to achieve this, we will study and critically evaluate several different ethical theories including Egoism, Relativism, Divine Command Theory, Utilitarianism, Virtue Ethics, and Deontology. We will examine several current events and evaluate them in terms of the ethical theories we are covering. The course will culminate in a debate where we apply ethics to a real world issue that the students will choose. Topics may include: Should Twitter ban hate speech? Should Facebook be responsible for the content of its users? It is the concept of Snapchat unethical?

### **ETYMOLOGY OF SCIENTIFIC TERMS** (Fall)

**Target Grade Level:** 11-12

**TEACHER:** David Seward, Winchester Thurston School, Pittsburgh PA  
*Tuesday / Friday 2:30 – 3:30pm EST*

*Prerequisite: None*

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 especially complex etymologies, the history of our understanding of certain aspects of medical science, and relevant material from Greek and Latin texts.

## 2018-2019 COURSE DESCRIPTIONS

Humanities  
and Social  
Sciences

### **INTRODUCTION TO MUSIC THEORY** (Fall of 2018) (Alternating year offering)

**Target Grade Level:** 11-12

**TEACHER:** Janet MacKay-Galbraith, Canterbury School, Fort Wayne IN  
*Tuesday / Friday 10:00 – 11:00 am EST*

*Prerequisite: Basic music literacy (rhythm and note reading (at least in one clef)) required. Must have access to a keyboard, even an inexpensive roll-up one.*

Music theory deepens the knowledge and intellectual understanding of the building blocks of music: scales, rhythms, chords, formal analysis, counterpoint, musical forms, and the different stylistic periods of music history. This class is geared primarily for musicians who are serious about music performance, improvisation and/or composition, but also perhaps just interested in pursuing a deeper understanding of the theoretical components of music. Basic musical literacy is a prerequisite. During the course of this class students will learn to:

- Identify all notes in both clefs and all key signatures
- Learn and identify all forms of minor scales
- Learn to transpose within different keys
- Learn and identify time signatures
- Aurally and visually identify major, minor, augmented and diminished chords
- Practice and attain proficiency in rhythmic and melodic dictation
- Learn the basics of voice-leading
- Harmonize a simple tune
- Practice rhythmic and melodic dictation
- Chord analysis
- Discuss and identify different characteristics of Medieval/Renaissance/Baroque/Classical/Romantic eras, as well as cover some of the compositional techniques of the 20<sup>th</sup> and 21<sup>st</sup> century.
- Discuss and identify major composers within the above noted eras.

### **JAMES JOYCE’S “ULYSSES”** (Spring)

**Target Grade Level:** 11-12

**TEACHER:** Aaron Lehman, Porter-Gaud School, Charleston SC  
*Wednesday / Friday 3:35 – 4:35 pm EST*

*Prerequisite: Completion of MSON Modernism (Fall semester)*

If novels were mountains, James Joyce’s *Ulysses* would be Everest: massive, daunting, awe-inspiring—and, at times, responsible for making people surrender. Joyce created the most beautiful—and perhaps the most maddeningly difficult—literature of the Twentieth Century, prose that has thrilled and often intimidated readers for generations, and his 1922 masterpiece changed the landscape for the novel as a whole. This course will unpack the mystery and loveliness of Joyce’s work, giving students the close-reading tools to appreciate and make sense of Joyce’s particular literary power, to scale the edifice of *Ulysses* to see it for what it truly is: a marvel of stylistic achievement, a testament to the ways in which language shapes us as we shape it, and, at its core, a gorgeous love story and an exploration of the everyday heroism that we often overlook.

In particular, we will explore how Joyce tried to render the authentic human experience through language: how Joyce wanted literature to look and feel more like life than like “art,” how he wanted literature to mirror the texture of the actual thinking and feeling mind. To that end, while the course will give students an intensive look at arguably the greatest literary mind since Shakespeare, it will also have us—teacher and student alike—consider what it means to inhabit fully our hearts, minds, and selves in the modern world.



## 2018-2019 COURSE DESCRIPTIONS

Humanities  
and Social  
Sciences

### MAN'S INHUMANITY TO MAN: GENOCIDE AND HUMAN RIGHTS IN THE 20<sup>TH</sup> CENTURY (Spring)

**Target Grade Level:** 11-12

**TEACHER:** George Dalbo, Mounds Park Academy, St. Paul MN

*Wednesday / Friday 4:40 – 5:40 pm EST*

*Prerequisite: None*

The story of genocide in the 20th century stands in stark contrast to the social progress and technological advancements made over the last 100 years. As brutal culmination of nationalist and racist attitudes and policies, as well as a poignant reminder of both the cruelty and resilience of human beings, these genocides punctuate modern history with harsh reality. This course explores the many facets of genocide through the lenses of history, literature, art, sociology, and law. We will turn our attention to understanding the framing of genocide as a legal concept. Using the holocaust as our foundation, we will examine examples of additional genocides from the 20th century. Ultimately, we will train our attention to the enduring legacy of genocides around the world, especially as we consider attempts to recognize, reconcile, and memorialize genocide from the individual to the collective. Students will read and analyze primary source material, secondary historical accounts, genocide testimony and memoirs, in addition to examining individual fictional and artistic responses and the collective memories and memorials of whole societies

### MEDICAL BIOETHICS (Fall)

**Target Grade Level:** 11-12

**TEACHER:** Ellen Johnson, Wilmington Friends School, Wilmington DE

*Tuesday / Friday, 3:35 – 4:35pm EST*

*Prerequisite: None*

The academic study of ethics examines how we make the decisions. This course will focus on such cases as medical practice, medical research and development, and health care policy, examined through a wide array of case studies, gathered from sources in literature, journalism, and film. Curricula will build on a foundation of theoretical moral theories, more specifically, how we make 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.

### MODERNISM (Fall)

**Target Grade Level:** 11-12

**TEACHER:** Aaron Lehman, Porter-Gaud School, Charleston SC

*Wednesday / Friday, 3:35 – 4:35pm EST*

*Prerequisite: Seniors only. Completion of AP Literature (may be concurrent)*

Literary Modernism, that period dating roughly from 1910 until World War II, was at once totally thrilling and utterly strange. At their core, Modernist writers challenged all forms of certainty, all forms of accepted knowledge—exploding our notions of what poems and novels should look like, of what the human self was, of the very nature of experience—in attempts to, as Ezra Pound declared, “Make it new.” In this course, we’ll explore that thrilling and strange literature of Modernism, investigating how its poets and novelists created forms and textures and works—at times confusing and shocking—that the world had never seen before. Looking at the poetry of Yeats, Pound, Eliot, Moore, Williams, and Stevens and the fiction of Hemingway, Faulkner, Woolf, and Joyce, we’ll consider the ways in which the Modernists both shaped and were shaped by the world around them—and how they managed to produce work that feels, even some hundred years later, so exciting, innovative, real, and human.

## 2018-2019 COURSE DESCRIPTIONS

Humanities  
and Social  
Sciences

### THE ORIGINAL PAPERS – A “JOURNAL CLUB” OF BIOLOGICAL LITERATURE (Spring)

**Target Grade Level: 11-12**

**TEACHER: Eric Witzel, Severn School, Severna Park MD**

**Tuesday / Friday, 10:00 – 11:00 am EST**

*Prerequisite: Completion of Introductory Biology at the high school level*

So, what exactly is a journal club? Around the world, journal clubs have a long-standing tradition at many colleges and universities. Members of these academic communities regularly join together and consider current, published, research papers. During the semester, we will read and discuss classic scientific papers from biologists such as Mendel and McClintock. We will also read and discuss cutting edge papers that push the boundaries of our current understanding of life, papers that utilize techniques such as CRISPR. By engaging in our journal club, we will become more adept at reading biological literature, understanding the current landscape of biology research, and analyzing scientific literature in general. These skills translate to seeking out internships/mentorship in science research and preparing to conduct scientific research. Join us and seek mastery of this primary method of scientific communication.

### PHILOSOPHY IN POP CULTURE (Spring)

**Target Grade Level: 11-12**

**TEACHER: Joyce Lazier, Canterbury School, Fort Wayne IN**

**Wednesday / Friday, 1:15-2:15pm EST**

*Prerequisite: None. Some familiarity/experience with logic helpful. Netflix subscription required.*

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 (Spring)

**Target Grade Level: 10-12**

**TEACHER: Blake Keogh, Waynflete School, Portland ME**

**Monday / Thursday 3:35-4:35pm EST**

*Prerequisite: None*

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.

# 2018-2019 COURSE DESCRIPTIONS

## STEM

### ADVANCED TOPICS IN CHEMISTRY (Spring)

**Target Grade Level:** 11-12

**TEACHER:** David Walker, Maret School, Washington DC

**Monday / Thursday, 2:30 – 3:30pm EST**

*Prerequisite: Completion of Chemistry. Laptop required.*

This semester course explores real-world applications to chemistry that are often skimmed over or omitted in most chemistry courses. Possible topics include nuclear, medical, atmospheric, industrial, food, water, and consumer product chemistry. Learn how a nuclear power plant works, how fuels are chemically altered for vehicles, and what chemicals are added to drinking water. We will explore the history and life events of scientists who discovered the chemical elements and have impacted the history of the world through chemistry. This course will be heavy in applications and theory, leaving out much of the problem-solving found in other courses. Students will explore the periodic table for daily applications and technologies, from cell phones to photovoltaic cells to medical treatments.

### ADVANCED APPLIED MATH THROUGH FINANCE (Spring)

**Target Grade Level:** 11-12

**TEACHER:** Julien H. Meyer III, Severn School, Severna MD

**Monday / Thursday, 10:00 – 11:00 am EST**

*Prerequisite: Completion of Algebra II*

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.

### COMPARATIVE ECOSYSTEMS (Spring)

**Target Grade Level:** 11-12

**TEACHER:** Marks S. McWhorter, St. Andrews Episcopal School, Ridgeland MS

**Tuesday / Thursday, 4:40-5:40pm EST**

*Prerequisite: Completion of high school Biology. Lab kit will be provided to each school.*

Comparative Ecosystems will provide an opportunity for students to study and understand large-scale interactions between biological communities and their physical environments on a global scale. Students will study geological processes, soils, and nutrient availability, analyze how these characteristics shape environments, and examine nutrient cycling, weather and climate, water cycles, and organismal interactions among these systems.

Students will engage in interactive lab-based projects examining ecosystems within their own environments, and compare these results with their peers, as well as data from ecosystems around the globe. This style of analysis creates an opportunity for students to compare and contrast data and understand how statistics and collection methods are used to appropriately study communities and ecosystem processes. Students will also collect data on the environment in which they live. By studying material in an immersive setting, this approach provides an opportunity for students to see how ecological interactions occur and appreciate how climate systems connect these habitats on a global scale.

# 2018-2019 COURSE DESCRIPTIONS

## STEM

### CSI: MSON – FORENSIC SCIENCE (Spring)

**Target Grade Level:** 11-12

**TEACHER:** Carrie Lopez, Trinity Preparatory Day School, Winter Park FL  
*Tuesday / Thursday, 1:15-2:15pm EST*

*Prerequisite: Completion or concurrent enrollment in Chemistry or Biology and Algebra II. Lab kit required (sent by teacher)*

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)

**Target Grade Level:** 11-12

**TEACHER:** J.D. DeVaughn-Brown, Chadwick School, Palos Verdes CA  
*Monday / Thursday, 4:40-5:40pm EST*

*Prerequisite: Completion of AP Computer Science or equivalent. Laptop required.*

This course is a yearlong course that will give advanced students the strong foundation needed to build complex applications using object-oriented principles. 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.

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### GENETICS AND GENOMICS (Fall)

**Target Grade Level:** 11-12

**TEACHER:** Audrey Yeager, Manlius Pebble Hill School, Syracuse NY  
*Wednesday / Friday 12:10 - 1:10pm EST*

*Prerequisite: Completion of Chemistry and Biology. Access to compound microscope, laptop required.*

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)

**Target Grade Level:** 11-12

**TEACHER:** David Walker, Maret School, Washington DC  
*Monday / Thursday, 2:30 – 3:30pm EST*

*Prerequisite: Completion of Chemistry*

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.

# 2018-2019 COURSE DESCRIPTIONS

## STEM

### **LINEAR ALGEBRA** (Fall)

**Target Grade Level:** 11-12

**TEACHER:** Jon Gray, Indian Springs School, Indian Springs Village AL

*Monday / Thursday, 4:40 – 5:40 pm EST*

**Prerequisite:** Calculus BC

A standard treatment of linear algebra as presented to university-level science and engineering majors. Course topics will include row-reduction, matrix equations, linear transformations, matrix operations, invertibility, LU-factorization, subspaces of Euclidean space, dimension, rank, determinants (elementary product definition, expansion by minors, and row-reduction), vector spaces, null and column spaces, linear independence, bases, change of basis, eigen-theory, algebraic and geometric multiplicity, diagonalization, inner product, length, orthogonality, orthogonal sets, projections, the Gram-Schmidt process, QR-factorization, and the method least-squares. Time-permitting, the remainder of the course will be spent exploring applications of linear algebra to various disciplines. Regular problem sets will allow the students to practice and master the techniques introduced in class. Topic mastery will be exhibited through both written and oral exams.

### **MULTIVARIABLE CALCULUS** (Year)

**Section A:**

**Target Grade Level:** 11-12

**TEACHER:** TBD, Stanford Online High School, Stanford CA

*Monday / Thursday, 12:10 - 1:10 pm EST*

**Section B: \*Limited availability**

**Target Grade Level:** 11-12

**TEACHER:** Erika Amaya, Chadwick School, Palos Verdes Peninsula CA

*Tuesday / Friday, 4:40 – 5:40 pm EST*

**Section C: \*Limited availability**

**Target Grade Level:** 11-12

**TEACHER:** Josh Link, Maret School, Washington DC

*Monday / Thursday, 8:10 – 9:10am EST*

*Prerequisite: Completion of BC Calculus. Laptop required*

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.

### **THE QUANTUM MECHANICAL WORLD** (Spring)

**TEACHER:** Andrew Blechman, Roeper School, Bloomfield Hills MI

**Target Grade Level:** 11-12

*Wednesday / Friday, 11:05 am - 12:05 pm EST*

*Prerequisite: Completion of AP Physics-C, Mechanics, or equivalent and AP AB Calculus.*

This class is designed for students who have a firm introduction to classical (Newtonian) mechanics and would like to see how things change when working on the atomic/sub-atomic scale. The first third of the class begins with a review of some of the important facts from classical mechanics, and follows a historical introduction to how we learned that there was more going on than what Newton's Laws suggest. While we learn of these discoveries, we will begin to introduce some of the mathematics needed to understand quantum mechanics, such as complex numbers and probability theory. In the second third of the course, we will begin to study some of the consequences of the principles of quantum physics by solving the trapped "particle in a box" problem. We will use this system to understand many of the difficult concepts of quantum physics in a definite setting, such as the probability interpretation, expectation values of observables, and the uncertainty principle. In the last third of the course, we will study the issues of Quantum Theory that caused Schrodinger to say, "I don't like it, and I'm sorry I ever had anything to do with it!" We will consider the EPR Paradox, the Measurement Paradox, Bell's Inequalities, and survey some "Quantum Philosophies" such as the Copenhagen, Many-worlds and Hidden-variables interpretations.