

MSON COURSE CATALOG

2017 – 2018

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 (2017-2018)

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

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2017-2018 COURSE DESCRIPTIONS

Languages

ANCIENT GREEK I (Language and Literature) (Year)

Target Grade Level: 9-12

TEACHER: David Harpin, Hopkins School, New Haven CT

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

No Prerequisite

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)

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

Section 1: TEACHER: Farha Mohamed, Hopkins School, New Haven CT

Monday / Thursday 12:10 –1:10 pm EST.

Section 2: TEACHER: Kaveh Niazi, Stanford Online High School, Stanford CA

Monday / Thursday 5:45 –6:45 pm EST.

No Prerequisite

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: 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: 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.

2017-2018 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

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
Tuesday / Thursday, 11:05-12:05pm EST

No Prerequisite

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: US History (prior or 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.

2017-2018 COURSE DESCRIPTIONS

Humanities and Social Sciences

ARE WE ROME? (Spring)

Target Grade Level: 11-12

TEACHER: Michael Leary, The Derryfield School, Manchester NH
Wednesday / Friday, 11:05-12:05pm EST

Prerequisite: US History (prior or 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?

In our discussions, 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. Toward the end of the term, 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 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 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)

Target Grade Level: 11-12

TEACHER: Susan Conley, Waynflete School, Portland ME
Tuesday / Friday 2:30-3:30pm EST

No prerequisite

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.

2017-2018 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
Tuesday / Friday 2:30–3:30pm EST

No prerequisite

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.

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

No prerequisite

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)

Target Grade Level: 11-12

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

No Prerequisite

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.

2017-2018 COURSE DESCRIPTIONS

Humanities and Social Sciences

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

No Prerequisite

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.

MAN'S INHUMANITY TO MAN: GENOCIDE AND HUMAN RIGHTS IN THE 20TH CENTURY (Spring)

Target Grade Level: 11-12

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

Wednesday / Friday 4:40 – 5:40 pm EST

No Prerequisite

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

No Prerequisite

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.

2017-2018 COURSE DESCRIPTIONS

Humanities and Social Sciences

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

No prerequisite; some familiarity/experience with logic helpful.

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.

Materials required: Netflix subscriptio

POSITIVE PSYCHOLOGY (Spring)

Target Grade Level: 10-12

TEACHER: Blake Keogh, Waynflete School, Portland ME

This course has a split time schedule – Monday 4:40-5:40pm / Thursday 3:35-4:35pm EST

No prerequisite.

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.

2017-2018 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: Chemistry

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. Students will create presentations for their classmates on nuclear and chemical topics of interest.

Materials required: Personal device/laptop

ADVANCED MATH TOPICS: ADVANCED APPLIED MATH THROUGH FINANCE (Spring)

Target Grade Level: 11-12

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

Monday / Wednesday, 2:30 – 3:30 pm EST

Prerequisite: 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.

ASTRONOMY (Fall)

Target Grade Level: 11-12

TEACHER: Kalee Tock, Stanford Online High School, Stanford CA

Monday / Thursday 11:05-12:05pm EST

Prerequisite: High School Physics

This semester-long course introduces students to historical and modern astronomy. Topics include the nature of light, the atom, telescopes, and orbits. In addition, students will learn about the life cycles of stars, including an introduction to dark matter and black holes. Through various activities and experiments, students will explore our place in the universe as well as the relative scales of astronomical objects. Engaging with current research, we will examine the modern astronomical data used to search for and categorize the thousands of planets outside our solar system, and the considerations involved in the ongoing search for extra-terrestrial life.

Materials required: Lab kit

2017-2018 COURSE DESCRIPTIONS

STEM

ASTRONOMY RESEARCH SEMINAR (Spring)

Target Grade Level: 11-12 (priority to 11th grade students)

TEACHER: Kalee Tock, Stanford Online High School, Stanford CA

Monday / Thursday 11:05-12:05pm EST

Prerequisite: High School Physics

This course introduces students to modern research in astronomy by having them actually perform some. After learning about binary stars, teams of students will select a binary system, take images of it using the Skynet robotic telescope network, analyze the images in the context of past observations of the system, and write a paper for the Journal of Double Star Observations. Once their paper has been through a process of peer review by the journal editors, the data point will be added to the Washington Double Star Catalogue.

Materials required: Access to an Apple computer with Python installed

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: High school Biology

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.

Materials required: Lab kit

COMPUTER SCIENCE: BEYOND THE GRAPHICAL USER INTERFACE (Fall)

Target Grade Level: 11-12

TEACHER: Siffat Hingorani, University School of Nashville, Nashville TN

Tuesday / Friday, 11:05-12:05pm EST

Prerequisite: Programming experience in a structured language, such as Python or Java

A project-based course in which students will spend the semester learning and thinking about a new paradigm in user interfaces: voice. Students will design and build an application of their choosing for a voice-operated assistant service, like Google Home or Alexa. Students will be exposed to the software development life cycle, with an emphasis on design, and will learn how to collaborate with classmates on a code base. Students should be comfortable working individually with limited assistance on projects. Coursework will include individual lab and homework assignments, as well as group projects.

Materials required: Computer; Apple preferred

2017-2018 COURSE DESCRIPTIONS

STEM

CSI: MSON – FORENSIC SCIENCE (Spring)

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

Target Grade Level: 11-12

Tuesday / Thursday, 1:15-2:15pm EST

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

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.

Materials required: Lab kit

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

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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Materials required: Laptop

GENETICS AND GENOMICS (Fall)

Target Grade Level: 11-12

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

Tuesday / Thursday 1:15-2:15pm EST

Prerequisites: Chemistry and Biology

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.

Materials required: Access to compound microscope, slide of onion root tip mitosis, laptop

INTRODUCTION TO ORGANIC CHEMISTRY (Fall)

TEACHER: David Walker, Maret School, Washington DC

Target Grade Level: 11-12

Monday / Thursday, 2:30 – 3:30pm EST

Prerequisite: 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.

2017-2018 COURSE DESCRIPTIONS

STEM

MULTIVARIABLE CALCULUS (Year)

TEACHER: Joshua Link, Maret School, Washington DC

Target Grade Level: 11-12

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

Prerequisite: BC Calculus

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.

Materials required: Laptop