



Course Catalog

2019-2020

Including Full Year and Semester 1 Courses



Loudoun School
for Advanced Studies

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MATHEMATICS

MATH: Pre-algebra

Rita Lahiri

Pre-algebra encompasses the study of integers, proportional reasoning, order of operations, expressions, and equations. This course emphasizes mathematical concepts with real-world applications. While learning the language of algebra, students develop critical thinking skills and problem solving skills. This course also highlights effective class participation and study skills.

- Ratios & proportion
- Number systems
- Expressions & equations
- Mental math
- Statistics

MATH: Algebra 1

Rita Lahiri

Algebra 1 is designed to give students a foundation for all future math courses. In this course, students will learn to use variables to represent unknown quantities to solve algebraic equations and inequalities. Modeling and problem solving are at the heart of the curriculum. Mathematical modeling consists of recognizing and clarifying mathematical structures that are embedded in other contexts, in mathematical terms, using mathematical strategies to reach a solution, and interpreting the solution in the context of the original problem. Students must be able to solve practical problems, by representing and analyzing the situation using symbols, graphs, tables, or diagrams.

- Expressions, equations, & functions
- Solving linear equations
- Graphing linear equations & functions
- Writing linear equations
- Solving and graphing linear inequalities
- Polynomials & factoring
- Statistics

MATH: Geometry

Clark Ragsdale

Geometry is primarily the study of spatial relationships, with a principal focus on two dimensional and three dimensional space. We will begin with lines and angles and then progress to various families of shapes and their relationships: triangles, quadrilaterals, circles, etc. Besides understanding fundamental concepts, we will also look at how objects change as they undergo various transformations: translations, rotations, reflections, and dilations. We will also use projects to help make the connection between mathematical concepts and the real world.

- Reasoning and proofs
- Parallel and perpendicular lines
- Congruent triangles/relationships with triangles
- Similarity
- Right triangles and trigonometry
- Quadrilaterals
- Properties of transformations

- Properties of circles
- Measuring length and area
- Surface area and volume of solids

MATH: Statistics - Data Science (Semester 1)

Ashley Gam

Statistics is centered around large project investigations of relevant applications of math. This course will place students in a collaborative environment where they will engage in project-based learning. They will explore methods of representing mathematical information symbolically, visually, and numerically. As a required course for entering high school, this course will prepare students to work in collaboration with their peers, analyze and effectively present data, perform experiments with statistical results in science classes, and create meaningful and effective projects throughout their high school body of work.

- Data analysis
- Descriptive statistics
- Sampling and experimental design
- Statistical distributions
- Inferential statistics

MATH: Algebra 2 (Semester 1)

Rita Lahiri

Algebra 2 provides students with a foundation for upper level mathematics by incorporating mathematical reasoning, communication skills, and increasingly sophisticated real-world problems. Students will learn to manipulate more advanced mathematical functions and algorithms. Quadratic functions are thoroughly investigated including graphing and multiple methods of solving which require an introduction to complex numbers and advanced algebraic techniques. Real-world applications will be investigated by modeling of quadratic functions. Students will also explore rational functions and master working with radicals and rational exponents.

- Quadratic functions
- Quadratic modeling
- Radicals and rational exponents
- Rational functions

MATH: Trigonometry (Semester 2)

Rita Lahiri

In this course, students learn trigonometric functions as well as the application of the functions in real-life problems. The students will analyze, graph, and solve trigonometric functions. In order to improve logical thinking and mathematical reasoning, there is an emphasis on the verification of trigonometric identities using all of the fundamental trigonometric identities.

- Trigonometric functions
- Trigonometric identities
- Applications of trigonometry

MATH: Precalculus (Semester 1)

Wendy Huth

Precalculus applies advanced data analysis techniques to working with a variety of functions. Students will examine conic sections, logarithmic, exponential, and polynomial functions. Sequences and series will also be explored. Students will strengthen their conceptual understanding of problems and mathematical reasoning in solving problems. We will consider numerical, graphical, and algebraic solutions for all functions and discuss when each of these solutions is applicable. The course's focus on problem solving is enhanced with the use of technology.

- Exponential and logarithmic functions
- Analytic geometry - conic sections
- Polynomial functions
- Sequences & series

MATH: Foundations in Calculus (Semester 2)

Wendy Huth

This course is designed to prepare students for Advanced Placement Calculus and SAT Math subject level exams. In this course, students use symbolic reasoning and analytical methods to represent mathematical situations, to express generalizations, and to study mathematical concepts and the relationships among them for an understanding of a broad variety of mathematical relationships. Students also connect ideas in algebra, geometry, probability, statistics, trigonometry, function families and graphing. Students will use concrete, numerical, algorithmic, graphical tools and technology to model functions and equations.

MATH: Advanced Financial Algebra (Semester 2)

Clark Ragsdale

While a pure math curriculum is standard in virtually every high school in the United States, how do these math concepts translate into real-world situations that students will face as adults? This course attempts to bridge the gap between theoretical concepts and actual life-skill mathematics: economic tradeoffs in buying a car; what to consider when investing for retirement and why stocks and bonds exist; how statistics and consumer surveys are used to improve the performance of a small business; etc. Most of the modules will include hands-on projects so students can practice implementing the math concepts that they learn in class.

- Personal finance: stock, market, investing, saving, taxes
- Independent living: renting, buying a car, buying a home, budgeting
- Business: industries, corporate structures, role in the economy, marketing
- Entrepreneurship: starting a business, buying a business, financial management tools

MATH: AP Calculus AB

Wendy Huth

This course teaches students to approach calculus concepts and problems when they are represented graphically, numerically, analytically, and verbally, and to make connections amongst these representations. Calculus concepts will be applied to the functions students have studied the past few years. The real-world applications of calculus will be explored using derivatives, integration, and differential equations. Students learn

how to use technology to solve problems, experiment, interpret results, and support conclusions.

- Limits
- Derivatives
- Applications of derivatives
- Integration
- Differential equation

MATH: AP Calculus BC

Wendy Huth

AP Calculus BC is roughly equivalent to both first and second semester college calculus courses. It extends the content learned in AB to different types of equations (polar, parametric, vector-valued) and new topics (such as Euler's method, integration by parts, partial fraction decomposition, and improper integrals), and introduces the topic of sequences and series. The AP course covers topics in differential and integral calculus, including concepts and skills of limits, derivatives, definite integrals, the Fundamental Theorem of Calculus, and series.

SCIENCE – Middle School Courses

SCI: Life Science

Ashley Gam

Students will engage in authentic science practices to investigate concepts of anatomy and physiology, genetics, genetic inheritance, natural selection, and evolution. Emphasis will be placed on the development of scientific skills such as hypothesis testing, experimental design, and data analysis as well as scientific reading and writing.

SCI: Physical Science

David Romero

Students in grade 8 will be introduced to topics in physics, chemistry, and engineering. Topics covered will include motion, atomic theory, and energy. Lab skills and engineering practices will be spread throughout the course. The goal of the course is to improve students' understanding of the physical world and expand their scientific curiosity.

SCIENCE – Introductory High School Courses

There is no prescribed sequence, but take the following into account:

Students interested in the Life Sciences should plan to take Chemistry before Biology to get the most out of the course.

Students interested in Physics, Mechanical or Electrical Engineering should plan on taking an introductory Physics course early. This will allow for more advanced electives early on. Conceptual Physics and AP Physics 1 are offered in alternate years. Either course will fulfill the physics requirement.

SCI: Chemistry

Clark Ragsdale

This course is intended to help students realize the important role that chemistry plays in the world around them as well as its place within the intersection of technology and pure science. Topics to be studied include: chemistry laboratory skills, the classification and structure of matter, ratio and proportion of chemical reactions, reaction stoichiometry, acid-base chemistry, kinetics, and thermodynamics. Critical thinking (the ability to carry out systematic thought processes in making decisions and solving problems), inquiry (solving problems through scientific investigation), and science ethics are stressed in this class.

SCI: Conceptual Physics (offered 2019-20 and 2021-22)

David Romero

The goal is for students to critically analyze information and generate new knowledge. Students will develop certain scientific abilities or habits of mind and practice thinking like a physicist. In simple terms, students will not be learning a collection of facts but learning how to do physics.

Physics is the study of the physical world. Feynman would say it is the most fundamental and all-inclusive of the sciences. Muller would describe it as the liberal arts of “high-tech”. The implication being if we have a question about the world around us, the

physicist has both pertinent knowledge and a way to analyze it. For pedagogical purposes, we will focus on topics that are relatively simple (note: this does not mean easy). For aesthetic purposes, we will focus on those topics considered fundamental to our understanding of nature.

Topic covered include: motion, dynamics, light & waves, and electric & magnetic fields.

Conceptual Physics is a gentler introduction to physics. It can serve as a good foundation for either AP Physics 1 (algebra-based) or AP Physics C (calculus-based).

SCI: AP Physics 1 (offered 2020-21 and 2022-23)

David Romero

“AP Physics 1 is an algebra-based, introductory college-level physics course. Students cultivate their understanding of physics through inquiry-based investigations as they explore topics such as Newtonian mechanics (including rotational motion); work, energy, and power; mechanical waves and sound; and introductory, simple circuits.” - College Board

The philosophy and routines in this course are very similar to Conceptual Physics since they are both introductory courses. This course covers much more material. The workload is higher and we have 50% more class time than a standard class. More attention is paid to mathematical rigor and methods. There is some overlap in material with Conceptual Physics but not much.

*Math prerequisite: Algebra 1 and Geometry.

SCIENCE – Higher Level High School Courses

Students are required to complete the corresponding introductory science course before enrolling in these courses.

SCI: AP Biology

Ashley Gam

Students examine biological concepts and skills introduced in Biology at a more advanced level, as well as new topics. This course focuses on applying knowledge of these concepts to answer student developed questions, using advanced biological research techniques and methodologies. This includes focus on experiment development and design, data analysis, use of statistical tools, and computational software. Students will also partake in primary literature research, analysis, and discussions.

Pursuit of these science practices will be structured around four big themes, outlined by the AP Biology curriculum: 1) the process of evolution drives the diversity of life, 2) biological systems utilize energy and molecular building blocks to grow, reproduce, and maintain homeostasis, 3) living systems retrieve, transmit, and respond to information essential to life processes, and 4) biological systems interact, and these interactions possess complex properties.

*Additional science requirement: Chemistry (may be taken concurrently)

SCI: AP Chemistry

Clark Ragsdale

This course is an in-depth exploration of chemistry for students who have had one year

of intro chemistry. AP Chemistry is considered one of the most rigorous of the high school AP curriculum offerings, and successful completion along with the AP Chemistry exam in May is the equivalent of a freshman year of college-level chemistry. Students should be prepared for a fast-paced class that will begin the year with completion of a summer review packet of concepts.

Topics usually not emphasized on the exam, such as organic and nuclear chemistry will be touched on.

Course includes experimental understanding through both standard and inquiry-based experiments.

*Math prerequisite: Algebra 2

SCI: AP Physics C

David Romero

The AP Physics courses are intended to be representative of courses commonly offered in colleges and universities. AP Physics C: Mechanics and AP Physics C: Electricity & Magnetism are specifically designed to match those calculus-based introductory courses typically taken by physics and engineering students.

The aim of an AP secondary school course in physics should be to develop the students' abilities to do the following:

- Read, understand, and interpret physical information - verbal, mathematical, and graphical
- Describe and explain the sequence of steps in the analysis of a particular physical phenomenon or problem; that is: describe the idealized model to be used in the analysis, including simplifying assumptions where necessary, state the concepts or definitions that are applicable, specify relevant limitations on applications of these principles, carry out and describe the steps of the analysis, verbally, mathematically or graphically, and interpret the results or conclusions, including discussion of particular cases of special interest.
- Use basic mathematical reasoning - arithmetic, algebraic, geometric, trigonometric, or calculus, where appropriate - in a physical situation or problem.
- Perform experiments and interpret the results of observations, including making an assessment of experimental uncertainties.

*Math prerequisite: AP Calculus AB

SCI: Principles of Engineering (Semester 1)

Clark Ragsdale

In this course, students will begin the exploration of general engineering principles. These concepts are in effect all around us and allow modern society to function from a mechanical standpoint. But, most people don't understand what principles are in effect at any given moment. This class will endeavor to raise your knowledge and awareness of a variety of engineering concepts. While there will be some in-class lecture, the majority of the class revolves around the construction of various devices that demonstrate the particular engineering principle that is being discussed.

A finished device will be the major output from each section of study.

LANGUAGE ARTS – Middle School Courses

ENG: English Composition 1 (Full Year)

Sarah Derr

This course provides students with a foundation of skills that will serve them in their advanced English coursework at LSAS. Writing will include frequent informal responses, double-sided (dialectical) journal entries, and at least three longer works that will go through the revision process. We will analyze classic and contemporary texts as a full class; however, students will have also have opportunities for individual and small-groups choice reading. Socratic seminar is a key component of this course: students will engage in regular formal discussions on a variety of texts and topics.

ENG: English Composition 2 (Full Year)

Sarah Derr

This course builds upon the work done in English Composition 1 with increasingly challenging texts and writing assignments of greater length and complexity. Students will produce at least one five-paragraph essay each semester, which will be included in their digital portfolios. They will continue to engage in Socratic seminar, including developing their own higher-level thinking questions.

LANGUAGE ARTS – High School Courses

ENG: AP Literature and Composition (Full Year)

Dan Clinton

This course is designed to prepare students for the exam in AP English Literature and Composition. Students will learn to interpret works of literature at a college level, attending to structure, theme, and the expressive use of language; they will also become familiar with key literary devices and critical terms.

Students (and parents) should expect this class to be both reading- and writing-intensive. We will invite students to enroll based on the quality of their written work and their demonstrated ability to participate in a seminar setting.

ENG: Exploring the Monsters of Classical Literature OR Epic and Drama in British Literature (Semester 1)

Dan Clinton

What is a monster? In art and literature, these unusual creatures seem to appear when ordinary explanations fail, when our ideas about human nature and natural law do not seem to be enough. We invent these characters to mark unexplored territory: “Here be dragons.” The readings for this course will help us explore the many ways that monsters figure in our understanding of cultural norms, moral rules, and natural forces.

The secondary goal of this course is to familiarize students with classic works of epic poetry, tragic drama, theater of the absurd, and film. We will discuss how these different genres of literature present different cultural associations and formal parameters. Students should expect a creative project in the first quarter and an analytic paper in the second quarter.

Potential readings: *Beowulf*, translated by Seamus Heaney; *The Odyssey* by Homer

(excerpts); *Macbeth* by William Shakespeare; *The Rhinoceros* by Eugene Ionesco.

Potential films: *Gojira*, directed by Inoshiro Honda; *The Elephant Man*, directed by David Lynch.

ENG: Race in American Film (Semester 1)

James Percoco and Dan Clinton

This course will explore the depiction of race, racism, and Civil Rights in a series of American films stretching from the silent era to the present day. We will discuss these films as both historical documents and works of art. In other words, students will examine the way that these films reflect changing attitudes about race, both in the film industry and in American society, but also the way that they function as the statements of individual artists working within the language of film.

Films may include: *Blackkklansman*, directed by Spike Lee; *In the Heat of the Night*, directed by Norman Jewison; *The Searchers*, directed by John Ford; and others.

ENG: The Literature of the Civil War (Semester 2)

Dan Clinton

This course will explore the depiction of the Civil War in poetry, fiction, art, and photography. During the war, even Americans far removed from the front lines experienced the war through mass media, in the form of newspaper reports and the young medium of photography. As a generation of young men marched into battle, they left an unprecedented number of portraits behind them, many taken in army camps and mailed to loved ones at home. For the first time, photographers like Alexander Gardner documented the aftermath of battle. Meanwhile, poets reflected on the war in verse, filling newspapers and magazines with their compositions.

This class will look at two kinds of art and literature: texts drawn from the time of the war and texts written with a sense of historical distance. Featured authors will include Walt Whitman, Herman Melville, Emily Dickinson, Stephen Crane, Frederick Douglass, and Louisa May Alcott.

SOCIAL SCIENCE – Middle School Courses

Conversations in US History (Full Year)

Jim Percoco

This course will examine, through selected readings, different themes that are pertinent to the American experience and address the notion of what it means to live in a democratic-republic. An emphasis on analytical writing will be part of the course matrix.

SOCIAL SCIENCE – High School Courses

Honors US History (Full Year)

Jim Percoco

This is a survey course that covers the history of the United States from the Age of Exploration to the present. While not strictly an AP course, students who take this course should receive the content knowledge base to score well on both the AP and the SAT US History tests. A focus on interpreting documents and preparation for completing Document Based Essay Questions (DBQ) will be part of the skill sets students will be taught.

Civil War and Reconstruction (Semester 2)

Jim Percoco & Kevin Oliveau

In this course, students will examine the background of the American Civil War and the various interpretations presented about the cause of that conflict. Students will also study the political, social, and military aspects of the war. Reconstruction will also be examined with an eye towards a more contemporary view of the era as opposed to interpretations that have been used to justify social, political, and economic inequity.

Philosophy Wars: Enlightenment Rationality vs its Enemies (Advanced)

Kevin Oliveau

Through reading, writing, and seminar discussion, students will participate in a centuries-old conversation about the most enduring epistemological (how do we come to know something?), metaphysical (what is the nature of our world?), and ethical (what should we do?) questions in the Western philosophical tradition. Students will learn argumentation and reasoning skills as they attempt to clearly articulate their position, orally and in writing, about complex ideas and college-level texts.

World History (Full Year)

Kevin Oliveau

The high school world history course will cover the story of humanity from the Ancient World to the present. Content will cover the rise of Civilization, the Ancient World, the Middle Ages, the Renaissance, the Age of Reason, and the modern world. The course will be global in outlook and not just a survey of Western Civilization.

World War One (Semester 2, Advanced)

Kevin Oliveau

WW I is arguably the worst disaster in Western History, a war almost no one wanted. Nationalism, mass mobilization, industrial production, and aristocratic leadership combined to kill more soldiers than any other war in human history. The course will focus on two aspects: the diplomatic events leading up to the unwanted war, and the actual conduct of the war itself. We will examine the complex international maneuvering as well as the internal struggles within each of the major powers (plus Serbia). The course will also cover the tactics and technologies used to wage the war. The war, often characterized as a static four year bloody stalemate, actually saw constant innovation on both sides. By the end of the war, WW II-like air-supported armored breakthrough attacks were being staged.

Current Events

Kevin Oliveau

We will observe and discuss current national, international, and financial events. In each case, we will learn the history and underlying political/economic structures which shape these events. Students will develop a command of recent history, an understanding of how the financial system works, a review of the mechanisms of the U.S. constitutional federal government, and an appreciation for how individuals can impact the course of events.

FOREIGN LANGUAGE

Spanish

Vanessa Moreno

FL: Spanish 1 – This is an introductory course to both the Spanish language and the cultures where the Spanish language is spoken. This course aims to develop basic and intermediate communicative skills in Spanish as a second language and to build basic knowledge about the cultures of the Spanish-speaking world. This course emphasizes fundamental grammatical structures and the acquisition and assimilation of practical vocabulary in conjunction with the development of the four language skills: writing, reading, speaking and listening. The use of audio and visual materials in class help students develop listening and speaking skills, enabling them to express themselves in Spanish from the start of the course.

FL: Spanish 2/2 Intermediate – A continuation of the first year course. By the spring semester, second year work is beginning and the classes are conducted primarily in the target language. Supplementary readings and other materials are introduced for reinforcement. Conversational language is emphasized. At the intermediate level, we will focus on more advanced grammatical structures and the continuation of acquisition and assimilation of more precise vocabulary in conjunction with the development of the four language skills: writing, reading, speaking and listening.

FL: Spanish 3 – The objectives of this course are identical to those of Spanish 2 Intermediate; however, this course is for students who have already studied Spanish 2 and display a good understanding of the language, but who are not sufficiently prepared for Spanish IV, needing more grammatical instruction. The pace will be faster, the second half of Realidades 3 is used as the third year program in an articulated sequence of instruction.

FL: Spanish 4 – This course is designed to enhance the Spanish language learning process through exposure to historical, cultural, literary themes as well as daily news. In addition, with the acquisition of more grammatical instruction and vocabulary, students will do individual and group projects, read works of short fiction, and follow current events in the Hispanic world. This course will use informative and thought-provoking films to focus on the contemporary history, art and culture of Spain and Latin America. Supplementary literature, texts, articles, video clips, music and presentations will provide background to historical events. Students will participate in debates and activities that promote effective oral and written communication.

FL: Spanish 5 – In this course, students continue to develop proficiencies across the full range of communication (interpersonal, presentational, and interpretive), honing their critical reading and analytical writing skills. This course will use informative and thought-provoking films to focus on the contemporary history, art and culture of Spain and Latin America. Supplementary literature, texts, articles, video clips, music and presentations will provide background to historical events. Students will participate in debates and activities that promote effective oral and written communication.

French

Carmen Carraway

FL: French 1 – In this course, students learn the basics of communication in French. With a strong emphasis on conversation, our curriculum takes us from basic greetings

to units that center around food, household objects, places in a city, family, and daily activities. Students create and maintain a vlog throughout the year in which they describe themselves, their friends, and their surroundings.

FL: French 2 – In French 2, our studies center around a year-long class project in which each student takes on the persona of an imaginary resident of an apartment building in Aix-en-Provence, France. Using this structure as our starting point, students get to know their neighbors, make friends and enemies, plan parties, and even solve a murder mystery! Class is almost exclusively in French. Throughout the year, students will encounter many new vocabulary units, and they will learn to communicate fluently in the past and future.

FL: French 3 / French 4 – At this level, we use authentic resources such as French films, news articles, novels, poems and podcasts to study advanced structures and learn sophisticated vocabulary. Class is conducted entirely in French, and students frequently use the language to deepen their understanding of French culture.

FL: French 5 Advanced – This course is designed around six themes: global challenges, science and technology, contemporary life, personal and public identities, families and communities, and beauty and aesthetics. Students read articles, listen to podcasts, watch videos and engage in meaningful discussions throughout the year, with the goal of being able to sustain informed, nuanced conversations in French about topics such as politics, social issues, and world events.

FL: Post-AP: Advanced French Literature – This course is designed to replicate undergraduate French literature seminars. Throughout the year, we will analyze 19th and 20th century French poems, novels, and plays, including seminal works by Jean-Paul Sartre, Honoré de Balzac, Charles Baudelaire, and Émile Zola. The discussion-based classes are conducted entirely in French, and are largely driven by student interest.

OTHER COURSES

AP Computer Science Principles

David Romero

Section 1 starts at the basics and requires no prior experience. Section 2 will move quickly through the basics and cover more advanced material.

This course is the product of the College Board's endeavor to introduce all students to computer science, covering a diverse set of skills and topics. For more information, you can visit this link to access the college board course description: [apcentral.collegeboard.org/courses/ap-computer-science-principles](https://collegeboard.org/courses/ap-computer-science-principles).

Second semester is largely spent on projects called the "through-course assessments" which make up 40% of the overall AP score. These assessments are done in class over multiple weeks with no interaction from the teacher. They come in two parts:

- Explore – Students identify a computing innovation, explore its impact, and create a related digital artifact (ex. digital art, video) accompanied by written responses to prompts.
- Create – Students create a computer program through a collaborative and iterative process. There will also be a written component.

The College Board's curriculum framework is flexible enough that we have adapted most of Computational Media, a course on creating animations, visualizations and art with code. The course is modeled on a graduate course of the same name at NYU's Tisch School for the Arts.

"What can computation add to human communication? Creating computer applications, instead of just using them, will give you a deeper understanding of the essential possibilities of computation. The course focuses on the fundamentals of programming the computer (variables, conditionals, iteration, functions, and objects) and then touches on some more advanced techniques such as image processing, computer vision, data parsing and 3D graphics." – NYU

The programming in this course is rigorous object oriented programming. However, the content and the programming environment used make it approachable for all skill levels. Since the results of our code are visual, programming is more concrete; the feedback more responsive. Skills and tools students learn are used by professional artists, designers, and researchers. The course emphasizes the philosophy of incremental development, the process of dividing large complex programs into their smallest possible pieces. See the following links and books for more details:

- Processing - A Programming Handbook for Visual Designers and Artists - Reas & Fry
- processing.org
- processing.org/exhibition/
- <https://github.com/ITPNYU/ICM-2015>
- <https://itp.nyu.edu/ranch/projects/>

Computer Science (MS)

Kevin Oliveau

Students will learn how to use basic data types and control structures to build their own algorithms. There will be a heavy emphasis on planning, iterative design and readability of code. Based on student population, this course will reinforce and apply topics in other courses, especially math.

Mathematics for Engineering, Science and Software Development

Sasha Draganov

This course is designed to bridge the gap between math in the high school and math in technical occupations. It will introduce students to methods that have long been in toolboxes of professionals but are not typically part of the school curriculum. Students will learn to view every problem not as an end to itself, but as a subject of exploration. They will see that every math equation has knobs to turn and levers to pull. While we will deal with problems ranging from personal finance to physics, prior knowledge of application areas is not necessary.

Prerequisite: Precalculus

- Units and dimensionality
- Limit cases
- Symmetry
- Scaling
- Order of magnitude estimates
- Successive approximations

Game Theory

Kevin Oliveau

In this class we will explore the world of game theory (multiple players, allowed moves, payoffs for each player in each position) using classic logic games (the Prisoner's Dilemma) and board games (Zombie Dice and Scythe). Along the way we will improve our skills in logical analysis, game playing, probability, optimization, risk analysis, and decision theory. Our text will be *The Joy of Game Theory: An Introduction to Strategic Thinking* by Presh Talwalkar.

Public Speaking (MS)

Clark Ragsdale

The ability to speak before a group with confidence and clarity is an important 21st century skill. At each grade level, LSAS students are provided with opportunities to find their voice and express their opinions in developmentally appropriate ways. Students complete a project where they create and present to their class and/or to the school community. 8th graders also take a public speaking class, culminating with each student delivering a speech on the topic of his or her choice.

Creating through CRAFT (MS)

Danielle Ferrin

Using the base of CRAFT, we will be studying the fundamentals of art and principles of design as it coincides with the maker movement. We complete projects that use a great variety of mixed materials, taking advantage of our new enlarged indoor/outdoor space. Students will have loose parameters on projects that allow them to truly use their creativity in both individual and group designing. We will engage in making our mark while learning the process of conceptualizing, building a proposal, and designing pieces that relate to an idea – layering the thinking, troubleshooting, rethinking and reflecting within that comes through the action of work. We will engage with our community through public art sharing, hosting a community craft event and studying Craftivism artists who “create for GOOD,” while also experimenting with recyclable materials, acrylic, wood building, string and more. This isn't your Grandma's art class.

AP Studio Art (HS)

Danielle Ferrin

In this full year course, students will be investigating the application of design, which involves purposeful decision making on how to use the elements of art and the principles of design in an integrative way to communicate meaning. Students will build to demonstrate mastery in a two dimensional medium or process of their interest, such as graphic design, painting, digital imaging, photography, collage, fabric design, weaving, fashion design, fashion illustration, and printmaking. While developing technical skills and becoming familiarized with the functions of visual elements, students will develop a portfolio personalized to their talents and interests, which has the option to be submitted for AP credit evaluation at the end of the course. This portfolio of work is judged on quality of selected works, concentration (sustained investigation) and breadth (range of approaches). We will continue to learn from current working artists through field trips and interviews, as well as artists of the past. We will participate in class discussions to analyze and critique our own work and peers', and engage with the community in sharing out what we are making. Please note that students may take this class and choose not to submit for AP credit as well.

Physical Education

Dan Merold

All middle school students take physical education classes. The program fosters integrity, respect, responsibility, and participation by focusing on cooperation, effort, and development in a fun environment over winning and losing. A primary goal is for students to enjoy being active in order to create lifelong habits of physical activity. Students learn to take risks, try something new, and develop their physical fitness in a safe and positive environment. Classes increase their self-confidence while providing them with experiences in teamwork, sportsmanship, collaboration, critical thinking, and resourcefulness.

Music Theory (MS)

Ellen Broetzmann

Learning how to read music can open many doors and opportunities for musicians. In some genres of music, it is absolutely essential that musicians be able to read in addition to having a good ear. Understanding the theory behind music will also equip songwriters with knowledge they need to compose music. Even if you aren't interested in pursuing music professionally, having knowledge in music theory is a major component in learning how to play an instrument if that is something you'd like to do throughout your life. In this course, middle school students will be introduced to the basics of music theory, including: reading pitches and rhythms on the grand staff, key and time signatures, scales, intervals, building triads and seventh chords, and roman numeral analysis.

Private Piano Lessons – Piano (offered for a fee)

Joe Omspach

Due to popular demand, we will be integrating music lessons into the school day. We will have a satellite instructor on campus to teach piano lessons on Tuesdays and Fridays from 9:00 am to 2:00 pm. Students that sign up will be assigned a regular weekly slot during one of their free blocks on either Tuesdays or Fridays for either a half hour or

hour lesson, according to their choice. Lessons will be \$35/half hour and \$65/hour. Payment will go directly to Mr. Omspach.

We will continue to grow our music program over the years and add additional teachers and instrument options.

CLUBS & EXTRACURRICULARS

Our clubs and extracurricular activities are discussed and decided upon during the first few weeks of school. We strongly support and encourage student-led clubs with faculty oversight. In recent years, the most popular have been:

- Model UN
- Odyssey of the Mind
- Human Powered Vehicles
- Guitar
- Monarch Butterfly Garden
- Chess
- Animation
- Literary Magazine
- Yearbook

Additional interests expressed for 2018-2019:

- Drama
- Golf team
- Gamer
- Programming / 3D modeling
- Craft Club
- Outdoor structure design & build