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# Course Catalog

2021-2022

Including Full Year and Semester 1 Courses



**Loudoun School**  
for Advanced Studies

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# MATHEMATICS

## **Pre-algebra (full year)**

*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.

## **Algebra Explorations (full year)**

*Rita Lahiri*

Foundations of Algebra students will be introduced to algebra concepts through both theory and applications. Students will continue to build number sense and computation, proportional reasoning, and applications with rational numbers. Modeling and real-world problems are woven in throughout this course.

## **Algebra 1 (full year)**

*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.

## **Geometry (full year)**

*Julie Sohl*

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. Emphasis will be on building students' confidence in problem-solving and on persevering when challenged with difficult problems. Practical as well as whimsical applications of geometry will be explored.

## **Algebra 2 (fall semester)**

*Wendy Huth*

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.

## **Trigonometry (spring semester)**

*Wendy Huth*

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.

## **Precalculus (fall semester)**

*Wendy Huth*

Precalculus applies advanced data analysis techniques to working with a variety of functions. Students will examine conic sections and 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.

## **Foundations in Calculus (spring semester)**

*Wendy Huth*

This course is designed to prepare students for Advanced Placement Calculus. 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, and graphical tools and technology to model functions and equations.

## **AP Calculus AB (full year)**

*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.

## **AP Calculus BC (full year)**

*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

#### Living Systems and the Environment (full year)

*Ashley Gam*

Students in grade 6 and 7 will learn topics in chemistry and biology to understand processes between living and non-living things. The class will culminate in students integrating knowledge to understand and evaluate local ecosystems. We will use class investigations, discussions, and writing to build our understanding.

#### Physical Science (full year)

*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.

### 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 engineering, or electrical engineering should plan on taking an introductory Physics course early. This will allow for more advanced electives early on. Either Conceptual Physics or AP Physics 1 will fulfill the physics requirement.
- Conceptual Physics is offered in alternate years.

#### Biology (full year)

*Ashley Gam*

In this course, we will examine major themes of biology: biochemistry, genetics, physiology, evolution, natural selection, and ecology. This will be done using case studies to integrate themes of biology and create deeper understandings of biological phenomena. Modeling of biological processes, reading of scientific literature, formal scientific writing, discourse, biological techniques, and data analysis will be practiced and developed throughout the year.

## **Chemistry (full year)**

*Julie Sohl*

This course is intended to help students realize the important role that chemistry plays in the world around them as well as its connections to technology and other sciences. Topics to be studied include: the classification and structure of matter, ratio and proportion of chemical reactions, reaction stoichiometry, acid-base chemistry, kinetics, and thermodynamics. Students will be taught laboratory safety and perform experiments whenever possible. In addition, students will learn to document, analyze, and communicate their experimental results.

*Math prerequisite: Algebra 1.*

## **AP Physics 1 (full year)**

*David Romero*

The philosophy and routines in this course are very similar to Conceptual Physics, since they are both introductory courses. However, this course covers much more material, and the workload is higher. More attention is paid to mathematical rigor and methods. This is the course for students especially interested in physics. See the College Board website for an outline of topics.

*Math prerequisite: Algebra 1 and Geometry.*

## **Conceptual Physics: Mechanics (fall semester) [Not offered in 2022-23]**

*David Romero*

The goal for this course is for students to critically analyze information and generate new knowledge. Students will develop certain scientific abilities, or habits of mind, as they practice “thinking like a physicist.” For pedagogical purposes, we will focus on topics that are relatively simple. For aesthetic purposes, we will focus on those topics considered fundamental to our understanding of nature. The fall semester will focus on mechanics, which attempts to describe how objects move and interact. Conceptual Physics is a gentler introduction to physics. It can serve as a good foundation for either AP Physics 1 (Algebra-based) or other electives such as Astronomy.

*Students in this course must take Conceptual Physics: Light & Electromagnetism in the spring.*

## **Conceptual Physics: Light & Electromagnetism (spring semester) [Not offered 2022-23]**

*David Romero*

This course builds upon the fundamentals learned in the first semester’s Conceptual Physics course and also studies some special topics. Waves are covered with a focus on electromagnetic waves (i.e. light). Applications covered include optics, human vision, and astronomy. Electromagnetism is covered with an introduction to fields as a mechanism for understanding electric circuits, the power grid, and the Earth’s magnetic field. Because these topics are not covered in AP Physics 1, this course can be taken by those students who are interested in these topics. Based on enrollment and interest, we may offer an advanced version of this class in the future.

# Additional High School Science Courses

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

## **AP Physics C: Mechanics/AP Physics C: Electricity and Magnetism (full year) [Not offered 2021-22]**

*David Romero*

AP Physics C is a calculus-based, college-level physics course, which is especially appropriate for students planning to specialize or major in physics or engineering. The mechanics portion explores topics such as kinematics; Newton's laws of motion; work, energy, and power; systems of particles and linear momentum; circular motion and rotation; oscillations; and gravitation. The electricity and magnetism portion focuses on electrostatics; conductors, capacitors, and dielectrics; electric circuits; magnetic fields; and electromagnetism. Due to the fast-paced nature of this course, students must have successfully completed an introductory calculus course before enrollment.

*Math Prerequisite: AP Calculus AB.*

*Other Prerequisite: AP Physics 1 (or instructor permission).*

## **Biochemistry (advanced course, fall semester)**

*Julie Sohl*

This course will review biomolecule structures and functions and then move to more advanced topics based on student interest. Topics may include protein folding, enzyme kinetics and inhibition, the molecular etiology of diseases, RNA vaccines, RNAi and other biotechniques, mechanisms of gene regulation, and/or student suggested topics. This course will have a substantial homework load.

*Prerequisites: Biology and Chemistry (or instructor permission).*

## **Reading, Writing, and Research (advanced course, fall semester)**

*Julie Sohl*

How do scientists share their results and find new questions to explore? Students will identify an area of scientific interest, read articles to understand the relevant background material as well as current research in that area, and finally, develop a novel hypothesis. The final project will be a 5-10 page background paper that summarizes the current state of understanding of the topic and outlines the rationale for the new hypothesis.

*Juniors and seniors only (10th graders may take this class in spring 2022)*

## **Independent Science Research (advanced course, fall and spring semesters)**

*Julie Sohl*

Students who developed an independent research project in Reading, Writing, and Research can take this class if they want to do their experiment. They will plan a detailed experimental protocol and then will conduct their experiment. Students are strongly encouraged to take this course for at least two semesters to be able to finish



their research. In addition to doing the research, students are expected to regularly present their progress in lab meetings. At the culmination of the research, students will prepare a poster presentation for the LSAS community and write a final scientific paper describing their experiment and its results.

*Prerequisite: Reading, Writing, and Research.*

## LANGUAGE ARTS

### Middle School Courses

Middle School English Language Arts courses provide students with a foundation of skills upon which to build their advanced English coursework at LSAS and beyond. Through both writing and discussion, students practice close reading skills and learn how to use textual evidence to build support for their claims. Students produce several formal essays that they take through the full writing process, culminating in polished works to be added to their digital portfolios. Socratic seminar is another key component of these courses: students learn and practice speaking, listening, and self-awareness habits in discussions, so as to gain the tools key to building productive dialogue in any setting. This year's courses explore the theme of identity as it relates to memory, morality, and inclusion. See below for major texts and assignments.

#### **ELA: Identity and Memory (full year)**

*Sarah Derr*

- Possible Texts: Alan Gratz, *Refugee*; Rick Riordan, *The Lightning Thief*; Malala Yousafzai, *I am Malala* (young readers ed.); as well as various short fiction, nonfiction, poetry
- Major Assignments: personal narrative essay, seminar discussions, literary analysis one-pagers, journalism essay

#### **ELA: Identity and Morality (full year)**

*Sarah Derr*

- Possible Texts: Alan Gratz, *Refugee*; Gene Luen Yang, *American Born Chinese*; Louis Lowry, *The Giver*; William Shakespeare, *The Tempest*; William Golding, *Lord of the Flies*; as well as various short fiction, nonfiction, poetry
- Major Assignments: graphic personal narrative, seminar discussions, literary analysis one-pagers, mock trial
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#### **ELA: Identity and Belonging (full year)**

*Sarah Derr*

- Possible Texts: Louis Lowry, *The Giver*; S.E. Hinton, *The Outsiders*; Sherman Alexie, *The Absolutely True Diary of a Part-Time Indian*; Jacqueline Woodson, *Brown Girl Dreaming*; Sandra Cisneros, *The House on Mango Street*, John Steinbeck, *Of Mice and Men*; as well as various short fiction, nonfiction, poetry
- Major Assignments: literary analysis essay, literary device project, persuasive essay, seminar discussions

# High School Courses

## English 9: Myth, Epic, and Drama (fall semester)

*Dan Clinton*

In this course, we will read texts that look backward to a legendary past, where heroes struggle with monsters (or perhaps become monsters themselves). Myths and epic poems were defining texts for the cultures that produced them, so we will ask fundamental questions: What did these stories mean to their original audience? What do they reveal about the values and beliefs of these communities? And why are we still reading them now? At the same time, students will learn to read and analyze poetic narrative, whether that means a long poem such as *Beowulf* or a verse drama such as *Macbeth*. Students should expect a creative project in the first quarter and an analytic paper in the second quarter.

Texts: Neil Gaiman's *Norse Mythology*; *Beowulf* (translated by Seamus Heaney); William Shakespeare's *Macbeth*

## Gothic Fiction: Studies in Narrative (fall semester)

*Dan Clinton*

Gothic fiction emerged in response to the rationalism of the Enlightenment, to express the historical and emotional baggage that the newfound world of reason would not acknowledge. This movement fixated on haunted castles, stormy skies, blasted trunks, and skeletons in the closet. We will read a series of texts that use the Gothic style to express ideas about history, human nature, and art. In short: boo.

Texts: Mary Shelley's *Frankenstein*; Charles Dickens' *A Christmas Carol*; stories by Edgar Allan Poe, Nathaniel Hawthorne, Edith Wharton, and others; poetry by Samuel Taylor Coleridge, Robert Burns, and others

*Prerequisite: English 9.*

## American Classics: Moby-Dick (fall semester)

*Dan Clinton*

This course will be a deep-dive into the great American novel, with an instructor who has published scholarship on Herman Melville. During the semester, students will read the novel, study its historical context, and explore artwork inspired by this text, ranging from paintings to poetry to heavy metal to pop-up books. This course can be taken at two levels:

Standard: At this level, students will be responsible for a selection of chapters, regular written responses, and an analytic essay.

Advanced: At this level, students will read the unabridged texts and complete an independent project in addition to the regular course requirements.

Texts: Herman Melville's *Moby-Dick*; criticism and artwork inspired by the novel.

*Juniors and seniors only (or instructor permission).*

## Creative Writing (fall semester, elective)

*Dan Clinton*

In this course, students will write original fiction and poetry. The assigned reading will provide models and inspiration for writing assignments that ask students to experiment

with new ideas and techniques. For instance, we might spend one session exploring found poetry and another composing blank verse, haiku, or odes (“oh toaster, how slow you burn my bread”). Fiction assignments may emphasize unreliable narration, twist endings, or even a particular time of day. We will read and write in a wide variety of styles. The final project may be a short story, a work of literary nonfiction, or a collection of poems. Students will develop this project independently during the second half of the semester. Students will also have the option to elect an editor and collaborate on a literary magazine instead of completing separate projects. During this course, students will share their work with classmates and exchange constructive feedback. This class will often function as a workshop, so participation is crucial, and that includes creating a supportive environment for others.

### **AP Literature and Composition (full year) [Not offered in 2021-22]**

*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 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.

### **AP Language and Composition (full year) [Not offered in 2021-22]**

*Dan Clinton*

This college-level course is designed to prepare students for the exam in AP English Language and Composition. Organized around three units (rhetorical analysis, argumentation, and synthesis), AP Language introduces students to nonfiction texts from 18th-21st century American and British authors. Students should expect this class to be both reading and writing intensive.

## **SOCIAL SCIENCE**

### **Middle School Courses**

#### **American Civics: Fulfilling the American Dream (full year)**

*Jim Percoco*

This middle school course (grades 6 and 7) is designed to prepare students to participate in American Democracy. It is a process course divided into two semester components. During the first semester, students will study and learn about the roots and foundation of American Republican Democracy, examining seminal documents such as the Declaration of Independence, the U.S. Constitution, and the Bill of Rights -- our Charters of Freedom. During the second semester, students will study the legacy of these documents as it pertains to American cultural, social, and political life, as well as examine the nuts and bolts and mechanics of the American democratic system.

## **The Cold War (fall semester)**

*Kevin Oliveau*

In this grade 8 course, we will examine the U.S./U.S.S.R. global rivalry from 1948-1990 including the Berlin Airlift, Korea, Afghanistan ('79-'89), Hungary in '56, Czechoslovakia in '68, Poland '80, Iran in '54, Chile in '73, Vietnam, the Space Race, the Cuban Missile Crisis, the Nuclear Arms Race, Nuclear Arms Control, the Chernobyl Nuclear Accident, and the collapse of the Soviet Union. We will screen historic and fictional movies and TV shows such as *The Spy Who Came In from the Cold*, *Dr. Strangelove*, *The Missiles of October*, *From the Earth to the Moon*, and *Chernobyl*.

## **High School Courses**

### **Reckoning with US History (full year)**

*Jim Percoco*

This will be a survey United States history course combining an intellectual approach to American history with a focus on pivotal moments that defined the nation, for better or worse. Rather than examine U.S. history in a linear approach, we will examine themes from our past that have brought us to this critical juncture in our American narrative. In studying U.S. history, the objectives of the instructors are to provide a look at our collective past, which at times can be difficult, but to also provide hope for the future. The selected texts reflect the given themes and approach to our course of study. The course will also help students develop critical thinking and writing skills in an effort to prepare students for further academic and intellectual growth and success.

### **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.

### **Philosophy Wars: Enlightenment Rationality vs. its Enemies (advanced, fall semester)**

*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.

### **What Will Kill You First? (fall semester)**

*Kevin Oliveau*

This is an exploration of disasters. We will explain, do risk analysis of, and learn about prevention of things such as climate change, pandemics, meteor strikes, and nuclear war. How dangerous are these? How have we dealt with (or failed to deal with) these

things so far? What can be done to prevent or mitigate them looking forward? How do humans mis-perceive risk? How dangerous are everyday activities such as driving to school versus the risks of skydiving? There will be some history, biology, psychology, physics, and math.

## FOREIGN LANGUAGE

### Spanish

#### Spanish 1 (full year)

*Vanessa Moreno*

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.

#### Spanish 2 (full year)

*Vanessa Moreno*

This class is a continuation of the first year course. By the spring semester, second year work is beginning and the classes are conducted primarily in Spanish. 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.

#### Spanish 3 (full year)

*Vanessa Moreno*

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.

#### Spanish 4 (full year)

*Vanessa Moreno*

The objectives of this course are identical to those of Spanish 3 but this course is at a higher level. The pace will be faster and the second half of *Descubre 3* is used as the fourth year program in an articulated sequence of instruction.

## **Spanish 5 (full year)**

*Vanessa Moreno*

This course is designed to enhance the Spanish language learning process through exposure to historical, cultural, and 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.

## **AP Spanish (full year)**

*Vanessa Moreno*

The AP Spanish Language and Culture course provides students with opportunities to develop language proficiency across the three modes of communication: interpretive, interpersonal, and presentational. Students learn about culture through the use of authentic materials that are representative of the Spanish-speaking world. Materials include a variety of different media, e.g., journalistic and literary works, podcasts, interviews, movies, charts, and graphs. AP Spanish Language and Culture is a language-acquisition course designed to provide students with the necessary skills and intercultural understanding to enable them to communicate successfully in an environment where Spanish is spoken. As such, it is an immersion experience requiring almost exclusive use of Spanish, a requirement which class participation grades reflect.

## **French**

### **French 1 (full year)**

*Anne Buld*

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.

### **French 2 (full year)**

*Anne Buld*

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.

## **French 3 (full year)**

*Anne Buld*

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.

## **French 4 (full year)**

*Anne Buld*

Each month in French 4, we use an in-depth study of a short French film as a starting point for discussions about timely cultural topics such as: the challenges and opportunities of urban living, the influence of media on daily life, and the rights and responsibilities of global citizens. Class is discussion-based, and conducted exclusively in French.

## **French 5 (full year)**

*Anne Buld*

This course is designed around three themes: community living, technological progress, and everyday beauty. 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 the fine arts.

## **French 6 AP (full year)**

*Anne Buld*

At this level, we study contemporary life, personal and public identities, and global challenges. We continue to use authentic resources to launch discussions, build vocabulary, and increase the sophistication of written and spoken work. Complete fluency is the goal of this course. At the end of the year, after extensive preparation, students will take the French AP language exam.

# **ADDITIONAL COURSES**

## **Middle School**

### **Exploring Music (fall and spring semesters)**

*Joe Omspach*

The course will cover a broad range of topics, including electronic music, history, world music, and basic music theory. The goal of this course is to investigate all the various facets of music around the world and start a discussion about what music is and what it can be. For the final project students will learn the basics of setting up a Digital Audio Workstation (DAW), so that they can create their own piece of music using a computer. No prior musical experience is required.

## **Computer Science (fall and spring semesters)**

*Kevin Oliveau*

This middle school computer science course provides an introduction for students new to programming. Students will learn new concepts and apply them to projects. We encourage those students with prior programming experience to go further by providing mentoring and frequent feedback to peers.

## **Art Essentials (fall and spring semesters)**

*Danielle Ferrin*

This is an exploratory class designed to improve basic art skills (drawing, painting, and sculpting), develop students' creativity and self-expression, and teach them to recognize and use art elements and design principles. We will be experimenting through themed units, answering questions with our art, and learning different mediums and techniques.

## **High School – STEM**

### **AP Computer Science Principles (full year) [Offered based on interest.]**

*David Romero*

This course is the product of the College Board's endeavor to introduce all students to computer science. It covers a diverse set of skills and topics, allowing students to explore what interests them. Second semester is largely spent on projects of increasing length. The final project is completely independent and will make up 40% of the overall AP score. The other 60% is determined by a traditional exam. This course is adapted from Computational Media, a course on creating animations, visualizations, and art with code. Since the results of our code are visual, programming is more concrete and the feedback more responsive. Skills and tools students learn are used by professional artists, designers, and researchers.

### **Linear Algebra for Computer Science (advanced, fall semester)**

*David Romero*

Linear Algebra is a foundational subject in mathematics that is rich in both applications and geometric beauty. This course covers the areas of linear algebra that are most useful for computer science. Computational tools will be used both for practice as well as to demonstrate certain applications.

*Math Corequisite: Students should be taking or have taken Precalculus.*

### **Introduction to Machine Learning (advanced, spring semester)**

*David Romero*

Building on students' knowledge of linear algebra, we will tackle the problem of building algorithms that can improve themselves. There are a host of problems that cannot be solved with traditional algorithms but seem so simple that we don't even question how we as people can do them: recognizing a face in a photo, distinguishing language from



noise, separating an important message from a spam phishing scam.

*Prerequisite: Linear Algebra for Computer Science.*

## High School – Humanities

### **Artistic Activism: Finding Voice (fall semester)**

*Danielle Ferrin*

It is said by Gerhard Richter, “Art is the highest form of hope.” While hope is much needed today, art is a powerful tool with strong and unique powers to tell a story or shine a light on something that needs commentary. Activism affects the material world, while art affects the emotional; the blend of these creates the most powerful type of activism with “Effective Affect.” By thinking “outside the box,” we will use guerrilla art, upcycling, collaborative art, conversations, and a grand variety of mixed materials to create dialogue with political and social intent for positive change.

### **Digital Creating: Drawing & Animation (spring semester)**

*Danielle Ferrin*

Procreate is a great digital drawing tool that has everything an illustrator/designer would need, but is much more user-friendly than Photoshop. From a Procreate platform, this class will teach digital drawing from a beginning level, but also advance to those features and filters that equip the more-seasoned digital illustrator. The class will include illustrating with layers, texture and color; experimenting with brushes; creating repeating patterns; stylizing photographs; and using design to create final pieces, collections, and products ready for print on-demand. We will also create an animated GIF, a stylized animated drawing, and a short animated video. You will be hooked and able to use this skill for many applications in the future.

*iPad & Procreate (\$10) required.*

### **WWII Through Film (fall semester)**

*Jim Percoco and Kevin Oliveau*

Students enrolled in this elective course will learn the history of World War II through a variety of films that cover a wide range of topics connected to the war. This will be a film studies course that will examine the whole scope of World War II, not just the American experience.

### **The Graphic Novel (spring semester)**

*Kevin Oliveau*

We will learn the art of comics by reading and analyzing some of the greatest graphic novels of the last 40 years: *The Dark Knight* by Frank Miller, *The Watchmen* by Alan Moore, and *The Sandman* by Neil Gaiman. We will also screen some classic anime movies by Hayao Miyazaki and Studio Ghibli such as *Spirited Away*. Using visual art as well as written text to tell a narrative creates an immersive experience when done by a master. We will attempt to understand how it’s done and what makes good art.

# Middle School and High School

## Physical Education

*Tom Kalka*

The physical education program fosters integrity, respect, responsibility, and participation by focusing on cooperation, effort, development, and fun 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.

## CLUBS & EXTRACURRICULARS

We have active chapters of both the National Junior Honor Society and National Honor Society. Clubs vary year-to-year as determined by student interest in the fall: recent favorites have included United Nations, Odyssey of the Mind, theatre club, art club, I-STEAM club, Harry Potter club, and intramural softball. We also offer private piano lessons on site during school hours.

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[www.loudounschool.org](http://www.loudounschool.org)