

## **8 WEEK SUMMER SPANISH CLASSES DESCRIPTIONS**

### **MIDDLE SCHOOL SPANISH FOUNDATION (Middle School)**

This course is designed for beginning students with little or no previous knowledge or exposure to Spanish. Students will be introduced to the sound system and grammatical structure of the Spanish language. The focus will be on developing skills in the areas of listening, speaking, basic reading, and writing. By the end of the session, the student will have a basic understanding of grammar, including word formation, verb conjugation, idiomatic expressions, and cognates. Active participation in class, homework preparation, and memorization are essential to succeed in this course.

### **AP/IB SPANISH FOUNDATION**

AP Spanish Language and Culture course is designed to provide students with various opportunities to further improve their proficiency in listening, speaking, reading, and writing skills. The instructional philosophy of this course includes the integration of the four required language skills that are critical to the successful usage of Spanish: reading, writing, speaking, and listening. The general flow of each week's work comprises vocabulary, grammar structure, literary analysis, application of passive and active vocabulary, supplementary reading, and finally, writing assignments and tests. The class will be conducted exclusively in Spanish. Students are required to speak Spanish as much as possible.

## **8 WEEK SUMMER ENGLISH CLASSES DESCRIPTIONS**

### **LITERATURE APPRECIATION (Middle School)**

This class is designed to foster a deep appreciation for literature and its functions in our personal lives and society. Analytical, historic, and personal approaches are taken to fully understand the themes, lessons, and other insights within a particular book. Activities and exercises are incorporated that not only improve students' comprehension but also empower them to analyze and effectively critique a work of literature. The skills gained through literature appreciation are transferable to many other academic subjects since "inquiry" is at the core of this class. Further, because the class is dynamic and student-driven, it allows for full participation and inclusion of all students, regardless of their current academic level. The end result is a more thoughtful young person who is better able to articulate opinions based on textual references and has the confidence to be heard.

### **ESSAY WRITING (Middle School)**

Our Essay Writing course offers an intensive study of the different kinds of essays required of middle school and high school students with an emphasis on narrative, persuasive, and research essays. We explain the how and why of essay writing, i.e. the structures and strategies needed and the purpose of a given framework. Students learn how to plan, draft and revise essays, and also why such essays matter. Further, the class introduces appropriate language and vocabulary for each type of essay, which is essential for successful writing. This class builds students' writing confidence by affirming students' strengths and addressing weaknesses in a fun and collaborative environment. Ultimately, the student will be prepared to meet and exceed the expectations of their home academic institutions.

## **CREATIVE WRITING (Middle School)**

**This class is designed to foster creativity, self-expression and excitement about writing. We encourage students to challenge themselves technically and artistically through guided daily writing, one-on-one instructor evaluations, group editing sessions, and creative presentations of their work. Emphasis is placed on expressive writing as a process rather than in rules or formulas. Instructors consistently encourage students to discover and refine their own unique voices with the ultimate aim of readying students for publication. Students grow their confidence and skills throughout the writing and editing process as they become more effective writers. Creative writing has many benefits, even for those students whose goals do not include becoming published authors; it can unleash creativity in students that eases stress and guide students toward future fulfillment and academic success.**

## **PUBLIC SPEAKING (Middle School)**

**The purpose of this class is to break down the barriers to speaking in front of others through a variety of structured activities that build baseline fundamental logical and rhetorical skills in addition to practicing speaking in a public setting. Students will learn and practice critical academic and professional skills, including logical thinking and argumentative structure, which directly mimic the academic and professional writing process. Students also learn to choose topics, establish captivating introductions, organize speech content and deliver compelling conclusions. Emphasis is placed on the classic rhetorical triangle of pathos, ethos, and logos with significant discussion on modern interpretations and delivery. This class is sensitive to cultural nuances and varying levels of English language mastery; therefore, it is appropriate for all students with the desire to better their public speaking**

skills. By building superior speaking skills, students will prepare to excel in school, attain their dream jobs, defend their beliefs and values and become leaders in their schools and communities.

## **COLLEGE ESSAY WRITING**

This is an intensive writing course, in which students are guided through the daunting process of writing an effective and distinctive college application essay. Compelling college essays combine deep introspection with engaging storytelling and strong writing skills — they are completely different from the typical high school academic essay. Students will learn how to brainstorm a unique topic, find relevant personal anecdotes, map out a writing plan, master powerful literary and creative writing techniques, and finally edit and polish their successful college admissions essays.

## **AP/IB ENGLISH FOUNDATION**

This course provides the essential English foundation in order for students to succeed in Advanced Placement and International Baccalaureate classes and programs. Diagnostics in grammar and syntax are administered and weaknesses addressed. Students then build up an understanding of the methods involved in literary criticism, powers of expression in written communication, and a grasp of detailed analysis of the written text. The course also focuses on some of the more problematic texts for students e.g. 19<sup>th</sup> and early 20<sup>th</sup> century writings, political essays, and challenging historical passages.

## **8 WEEK SUMMER SCIENCE & MATH CLASSES**

### **DESCRIPTIONS**

#### **INTRODUCTION TO CHEMISTRY (Middle School)**

This course is an introduction to the study of chemistry. It emphasizes the study of composition, properties and changes associated with matter. Topics include measurement, classification and structure of matter, atomic theory, molecules, periodicity, chemical bonding, formula writing, nomenclature and chemical equations.

#### **AP/IB CHEMISTRY FOUNDATION (High School)**

This course is designed to allow students to practice for the complex thinking skills which will be required in AP or IB Chemistry. Students will develop skills that will allow them to succeed in further chemistry courses. Skills will include attention to atomic modeling, strategic use of mathematics, and emphasis on analytical reading and writing. The topics are structure and properties of matter, chemical bonding and interactions, chemical quantities, and chemical transformations.

#### **HONORS PHYSICS PREVIEW (Middle School)**

**This is a survey course for Mechanics, which is the first part of the Honors Physics class offered in the fall. Emphasis is on the most important topics which form a foundation for understanding the entire Honors Physics course, concentrating on the most challenging aspects of Mechanics for students new to Physics. Particular topics include, but are not limited to, the following:**

- **Language of the description of linear motion. Vector vs scalar quantities. Displacement, velocity & acceleration vectors along with their relationships to the scalar quantities distance, path length & speed.**
- **Newton's 3 laws of motion and their applications. How acceleration is possible in the context of Newton's 3rd law - the "horse and buggy" problem. Static vs kinetic friction.**
- **Question of action of forces over displacements in space (work) & time (impulse). Kinetic & potential energy. Momentum. Working-energy theorem. Conservation laws of momentum, mechanical energy and total energy.**
- **Rotational motion. Torque and angular momentum.**
- **Newton's law of universal gravitation. Projectile & satellite orbital motion. Kepler's laws of planetary motion.**

### **AP/IB PHYSICS PREVIEW (High School)**

**This preview course focuses on Mechanics in preparation for the AP Physics 1 and Physics IB curriculum offered in the fall. Emphasis is on the most important topics which form a foundation for understanding the entire AP/IB Physics course, with a concentration on the most troublesome aspects of Mechanics for students new to college-level physics. Particular topics include, but are not limited to, the following:**

- **Vector quantities (displacement, velocity, & acceleration) versus scalar quantities (distance, path length & speed), including their average and instantaneous value.**
- **Graphs of physical quantities and their interpretations in terms of their slopes as rates of change & areas under the graphs. Consistency of graphs of displacement, velocity, and acceleration.**

- **Projectile (2-D) motion of point masses. Independence of horizontal and vertical motions. Effects of fluid resistance (air drag) and terminal velocity.**
- **Newton's 3 laws of motion and their applications. Forces and free body diagrams. Inclined plane and elevator problems. Static and dynamic equilibrium.**
- **Quantification of action of forces over displacements in space (work) & time (impulse). Kinetic & potential energy. Momentum, collisions, and explosions. Work-energy theorem. Conservation laws of momentum, mechanical energy, and total energy.**
- **Circular motion and universal gravitation. Centripetal acceleration and force. Rotor ride, banked turn, and vertical non-uniform circular motion problems. Torque and angular momentum. Newton's law of universal gravitation and circular orbits.**
- **Model-driven physics. The planetary model of the atom and its limitations. Brief description of quantum mechanical atomic theory.**

### **AP/IB CALCULUS PREVIEW (High School)**

**This course previews the development of differential and integral calculus in preparation for the AP Calculus AB/BC and Calculus section of the IB curriculum offered in the fall. Emphasis is on the fundamentals which form a foundation for understanding Calculus, with a concentration on the most troublesome aspects for students new to college-level mathematics. Particular topics include, but are not limited to, the following:**

- **Informal treatment of limits, including techniques of their evaluation.**
- **Average and instantaneous rates of change of a function with respect to its argument. Difference quotient and the definition of the derivative. Equation of tangent lines.**

- Introduction to differentiation. Power law. Derivatives of polynomial, trigonometric, exponential, and logarithmic functions.
- Chain rule for derivatives of composite functions, product rule, and quotient rule. Second and higher-order derivatives. Extrema and points of inflection. Graphical interpretation and relations between  $f$ ,  $f'$ , and  $f''$ .
- Anti-differentiation and introduction to integration. Indefinite integrals of polynomial, trigonometric, and exponential functions. Substitution techniques of integration.
- The area under curves and definite integrals. Introduction to Riemann sums. Applications to kinematics. Introduction to volume integrals.

### **FRONTLINE BIOLOGY (Middle School)**

Frontline Biology is a fun and exciting 8-week class, with one session per week, one hour per session. In each session, Dr. Lin will introduce important concepts in Biology and connect them with the most advanced scientific researches at the frontline of Biology. This summer class prepares students for the Honors Biology class or the AP Biology class in the fall. All the original lesson slides are created and copyrighted by Dr. Lin.

### **AP/IB BIOLOGY FOUNDATION (High School)**

This course provides thorough preparation for the high school AP Biology course or the IB Biology course. It is equivalent to the Honors Biology course offered at Cambridge Institute, but condensed to 6 weeks and covering only the topics that will be on the AP Biology test. This course is suitable for students who have not taken the Honors



**Biology class but who would like to take either the AP Biology course or the IB Biology course in the fall.**

### **INTRODUCTION TO BIOLOGY OLYMPIADS (High School)**

**This class prepares students for the Intermediate Biology Olympiad at Cambridge Institute. It covers important topics one needs to know for the various Biology Olympiads (Medicine Olympiad, USA, British and Canadian Biology Olympiads) at the AP Biology level. This course is suitable for students who have taken Honors Biology and intend to take the Intermediate Biology Olympiad in the fall.**

### **LABORATORY SKILLS FOR BIOLOGY**

**Explore concepts of Biology with labs that you can perform from items in your kitchen. Using items readily available around your house, you will design and carry out a wide variety of laboratory experiments demonstrating the major themes of biology. Students will design procedures, collect and analyze data, and draw conclusions while learning the science behind each experiment.**

**Appropriate Biology Labs for At Home Students (brainstorming list)**

#### **High School Biology**

- 1. Banana DNA extraction**
- 2. Cabbage juice pH indicators**
- 3. Whole egg osmosis**
- 4. Potato and Iodine Diffusion**
- 5. Organic macromolecule identification using indicators (iodine and brown paper)**
- 6. Celery Transpiration**
- 7. Environmental variables and seed germination**
- 8. Asexual plant propagation**
- 9. The biochemistry of bread - cellular respiration**

## **AP Biology**

- 1. Animal behavior using pill bugs (or fruit flies)**
- 2. Hardy Wienberg modeling**
- 3. Potato or baby carrot osmosis (requires digital scale)**
- 4. Biochemistry of fermentation - making yogurt**
- 5. Floating Disc Assay (requires a syringe with no needle)**
- 6. Extract your own DNA using gatorade**
- 7. Paper Electrophoresis ( together with paper chromatography of leaf pigments)**
- 8. Probability and genetics using cards, dice and coins**

## **Cambridge Competition Math Classes**

**Cambridge Competition Math (CCM) classes are a series of special design math classes for students in Elementary School, Junior High School and High School, who like challenges and want to take advantage of their brain power with logic and mathematical reasoning for problem solving. The classes are meant to:**

- Teaching creative problem solving and the art of problem solving.**
- Emphasizing mathematics fundamentals.**
- Focusing on mathematics methods.**
- Building the foundation for math competition (MOEMS, USAMTS, MATHCOUNTS, AMC, AIME, and USAMO).**

**Each class systematically teaches students problem solving with mathematics skills and strategies through solving challenge math competition problems. The reference class level topics are:**

- **CMB - Arithmetic Basics for lower grade (1-4) Elementary School students (Counting, Number Sense, Place Values, Math Operations, Pattern Recognition, Model and Number Sentences).**
- **CM1 - Fundamentals of Problem Solving for upper grade (4-6) Elementary School students (Pattern Recognition, Model and Number Sentences, Counting, and Number Theorem)**
- **CM2 - Intermediates of Problem Solving for Junior High School (6-8) students (Algebra, Counting and Probability, Number Theorem, and Geometry)**
- **CM3 - Advances of Problem Solving for High School (8-10) students (Algebra, Geometry, Counting, Statistics and Probability, Number Theorem, Functions, Equations and Inequality, Set and Graph, etc.)**