

Summer@SaMi Camp Curriculum

Math Courses

Tadpoles (Grades K-1)

- Course Description
 - In Tadpoles classes, students learn the concepts of quantity, greater than and less than, along with mastering counting to 100, including by 2s, 5s, and 10s, and reading and writing up to 10. They will learn not to confuse order with quantity. They will also learn to recognize the basic geometric shapes and understand greater and less than in terms of geometric shapes, quantities, size and other comparisons.
- Topics
 - Monday: Counting.
 - Tuesday: Addition and subtraction.
 - Wednesday: Comparing.
 - Thursday: Measurement.
 - Friday: Fraction.

Whirlpool (Grades 2-3)

- Course Description
 - Whirlpool classes develop an understanding of and fluency with addition and subtraction under 1000 and algebraic thinking in problem solving. They will learn measurements of time, weight, temperature, and money. They will also learn how to read tables and graphs to do data analysis and probability.
- Topics
 - Monday: Addition and Subtraction.
 - Tuesday: Expression and Measurement.
 - Wednesday: Odds and Evens.
 - Thursday: Algorithm.
 - Friday: Problem Solving.

Andromeda (Grades 4-5)

- Course Description
 - The Andromeda classes explain and demonstrate number theory and systems by looking for a pattern. They use logic to solve problems. They expose students to basic geometry concepts including angles and triangles.
- Topics
 - Monday: The Four Operations.
 - Tuesday: Number Theory.
 - Wednesday: Logic.
 - Thursday: Reminder.
 - Friday: Angles and Triangles.

Pre-algebra (Grades 5-8)

- Course Description
 - A five-day crash course to prepare students for pre-algebra. SaMi tutors will teach students about problem solving, logic, integers, and decimals.
- Topics
 - Monday: Multiplication and Division.
 - Tuesday: Logic.
 - Wednesday: Fraction.
 - Thursday: Factors and Integers.
 - Friday: Decimals.

Algebra I (Grades 6-12)

- Course Description
 - In Algebra I, students will learn concepts in Algebra, Numbers, and Geometry, and will begin an introduction into statistics.
- Prerequisite: Pre-algebra.
- Topics
 - Monday: Integers.
 - Tuesday: Expression and Equation.
 - Wednesday: Statistics, GFC, LCM.
 - Thursday: Fraction, Ratio, Rate.
 - Friday: Decimal, Percent, Exponent.

Algebra II (Grades 6-12)

- Course Description
 - Algebra II will allow students to learn topics such as Numbers, Algebra, Geometry, and Probability.
- Prerequisite: Algebra I.
- Topics
 - Monday: Numbers (real number system, complex number system, prime numbers, zero factor theorem, domain).
 - Tuesday: Algebra (polynomials, factoring, quadratics, discriminant, exponents and logarithms).
 - Wednesday: Geometry (Graphing, conic sections, area/volume, trigonometry, vector addition).
 - Thursday: Probability and intro to Counting.
 - Friday: Test and (Virtual) Party.

Calculus (Grades 6-12)

- Course Description
 - This Calculus crash course focuses on the key topics you really need to know for Calculus. It will help you become more pragmatic in your approach to study this subject.
- Prerequisite: Algebra II.
- Topics
 - Monday: Limits.
 - Tuesday: Derivatives.
 - Wednesday: Applications of the Derivative.
 - Thursday: Integration.
 - Friday: Applications of Integration.

Math Competition Courses

MAA Pre-AMC (Grades 5-8)

- Course Description
 - This course will prepare students for the American Mathematics Competitions (AMC) by the Mathematical Association of American (MAA).
- Prerequisite: Pre-algebra or an equivalence.
- Topics
 - Monday: Algebra.
 - Tuesday: Number Theory.
 - Wednesday: Counting and Probability.
 - Thursday: Geometry.
 - Friday: Competition and Award Ceremony.

MAA AMC 8 (Grades 6-8)

- Course Description
 - This course will prepare students for the American Mathematics Competitions 8 (AMC 8) by the Mathematical Association of American (MAA).
- Prerequisite: Pre-algebra or an equivalence.
- Topics
 - Monday: Algebra.
 - Tuesday: Number Theory.
 - Wednesday: Counting and Probability.
 - Thursday: Geometry.
 - Friday: Competition and Award Ceremony.

Computer Science Courses

Python for Kids (Grades 3-5)

- Course Description
 - Python for Kids is a playful introduction to programming. Students will get the opportunity to create something from nothing, use logic to turn programming constructs into a form that a computer can run, and, when things don't work quite as well as expected, use problem solving to figure out what has gone wrong. This course is a fun, sometimes challenging, and occasionally frustrating activity. The skills learned from it can be useful both in school and in extracurricular activities.
- Prerequisite
 - Students are expected to have 15+ wpm (word per minute) typing speed. They can test their typing speed at <https://www.typingtest.com/>.
 - Students need to use their own computers.
- Topics
 - Monday: Get Started.
 - Tuesday: Things in Python (strings, lists, tuples, and maps).
 - Wednesday: Drawing with the Turtle.
 - Thursday: Control Statements (ifs).
 - Friday: Going Loopy.

C++ for Beginners (Grades 6-12)

- Course Description
 - Students will be exposed to the principles of programming and the C++ programming language. C++ is known to be a very powerful and efficient language. It is often used to develop game engines, games and desktop apps. It is also a language used in the USA Computing Olympiad.
- Prerequisite
 - Students are expected to have 30+ wpm (word per minute) typing speed. They can test their typing speed at <https://www.typingtest.com/>.
 - Students need to use their own computers.
- Topics
 - Monday: Get Started (comments, I/O, keywords, data types, variables, operators).
 - Tuesday: Statements (conditional operators, if, for, while do-while, break, continue).
 - Wednesday: Array (create an array, passing array in function).
 - Thursday: String.
 - Friday: Class and Object.

Java for Beginners (Grades 6-12)

- Course Description
 - Java is a cross-platform, high-level language. Students will learn Java fundamentals. Throughout this course, we will instill the basics of programming concepts that are generic and apply well to a range of object-oriented programming languages.
- Notes to Students
 - Students are expected to have 30+ wpm (word per minute) typing speed. They can test their typing speed at <https://www.typingtest.com/>.
 - Students need to use their own computers.
- Topics
 - Monday: Your First Java Program.
 - Tuesday: Data Types and Variables.
 - Wednesday: Objects and Classes.
 - Thursday: Decision-Making and Loop.
 - Friday: File and Exception Handling.

Java Coding Camp (Grades 6-12)

- Course Description
 - This is an intensive coding camp in Java. Students will be given a variety of problems and need to program their solutions in a limited time. The level is similar to AP Computer Science A.
- Prerequisite
 - Java for Beginners or an equivalence.
 - Students need to use their own computers.
- Topics
 - Monday-Friday: Coding Problem Sets.

C++ Coding Camp (Grades 6-12)

- Course Description
 - This is an intensive coding camp in C++. Students will be given a variety of problems and need to program their solutions in a limited time. The level is similar to AP Computer Science A.
- Notes to Students
 - C++ for Beginners or an equivalence.
 - Students need to use their own computers.
- Topics
 - Monday-Friday: Coding Problem Sets.

Bytes of AI (Grades 9-12)

- Course Description
 - Students will learn what AI and Machine Learning are, the benefits and risks of AI and Machine Learning to the world and to themselves, and how to solve real world problems by AI and Machine Learning.
- Notes to Students
 - Students will get hands-on experience on programming AI in Python. No AI or computer science experience necessary.
 - This course will be taught by a college professor specialized in AI. Students need to use their own computers.
- Topics
 - Monday: Installation and Python Crash Course.
 - Tuesday: Array Manipulation.
 - Wednesday: Arithmetic and Linear Algebra Operations.
 - Thursday: Neural Networks.
 - Friday: A Real World Project.

Science Courses

Introduction to Biology (Grades 6-8)

- Course Description
 - Students will be exposed to the fundamentals of biology.
 - No pre-requisite in biology is necessary.
- Topics
 - Monday: Macromolecules and cell structure/function.
 - Macromolecules.
 - Organelles.
 - Photosynthesis/cellular respiration.
 - Tuesday: Genetics.
 - DNA/RNA.
 - Mitosis and meiosis.
 - Mendelian genetics.
 - Wednesday: Animals.
 - Body systems (nervous, endocrine, digestive, etc.).
 - Bones and muscles.
 - Thursday: Plants.
 - Parts of a plant.
 - Transportation in plants.
 - Plant reproduction
 - Friday: Diversity of Life.
 - Theory of evolution.
 - Diversity of life (taxonomies).
 - Ecosystems.

Introduction to Chemistry (Grades 6-8)

- Course Description
 - Students will be exposed to the fundamentals of chemistry.
 - No pre-requisite in chemistry is necessary.
- Topics
 - Monday: Matter, energy, and measurement.
 - Solids, liquids, and gases; density; state changes.
 - Significant figures.
 - Solutions and mixtures; solubility.
 - Tuesday: Atoms and the periodic table.
 - Structure of an atom (protons, electrons, neutrons), its history, and drawing atoms.
 - History of the periodic table.
 - Structure of the periodic table (mass numbers, atomic masses, groups, etc.)
 - Wednesday: Molecular bonding.
 - Types of bonds.
 - Naming molecules.
 - Ions and isotopes.
 - Lewis dot structure.
 - Thursday: Chemical reactions and stoichiometry.
 - Types of reactions.
 - Balancing chemical reactions.
 - Molar mass.
 - Friday: thermochemistry.
 - First law of thermodynamics
 - Enthalpy.
 - Calorimetry.

Introduction to Physics (Grades 6-8)

- Course Description
 - Students will be exposed to the fundamentals of physics.
 - No pre-requisite in physics is necessary.
- Topics
 - Monday: Kinematics.
 - 1D kinematics.
 - Vectors.
 - 2D kinematics.
 - Tuesday: Dynamics.
 - Intro to forces, types of forces (contact vs non-contact), and examples of forces (gravity, friction, spring, drag, etc.)
 - Systems; Newton's three laws and examples of each.
 - Using free body diagrams to apply Newton's second law.
 - Wednesday: Circular motion and gravitation.
 - Uniform circular motion (including centripetal acceleration and centripetal force).
 - Newtonian gravity.
 - Circular orbits.
 - Thursday: Work and energy.
 - Work and power.
 - Kinetic vs potential energy (and types of potential energy).
 - Conservation of energy, energy diagrams.
 - Friday: Momentum.
 - Momentum and impulse.
 - Conservation of momentum.
 - Collisions (elastic and inelastic) and explosions.