2020 COURSE DESCRIPTIONS
Summer Leapfrog - Spark Program
PreK - Grade 5, One Week Courses
Half-day morning, Half-day afternoon, and All-day courses available

The CTD Summer Program application opens in December, 2020.

Leapfrog – Spark provides summer classes for students who have an early interest in learning. Each week-long class offers students a chance to create, build, imagine, and be academically challenged in ways that they may never have experienced in other settings. We recommend that your child choose classes that spark interest and excitement.

<table>
<thead>
<tr>
<th>Program Dates</th>
<th>Tuition</th>
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<tbody>
<tr>
<td>July 6-10</td>
<td>Half-day: $345 for the first course, $310 for each additional course</td>
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<tr>
<td>July 13-17</td>
<td>All-day: $670 for the first course, $570 for each additional course</td>
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<tr>
<td>July 20-24</td>
<td>Open enrollment courses: $275</td>
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<tr>
<td>July 27-31</td>
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<tr>
<th>Locations</th>
<th>Times</th>
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<tbody>
<tr>
<td>Courses are offered in</td>
<td>A.M. 9 a.m. - 12 noon</td>
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<tr>
<td>Chicago</td>
<td>P.M. 1 p.m.- 4 p.m.</td>
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<tr>
<td>Skokie</td>
<td>All-Day 9 a.m.- 4 p.m.</td>
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<tr>
<td>Naperville</td>
<td>For students who stay for a full day, a one-hour supervised lunch period is included. (Students bring their own sack lunch.)</td>
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<tr>
<td>Lake Forest</td>
<td>Before Care &amp; After Care are available.</td>
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Before Care and After Care at all Leapfrog – Spark Sites
- Before Care: 8am – 9am
- After Care: 4pm – 5pm
- (No extra fee)

Leapfrog – Spark Application: Visit My.CTD.Northwestern.edu to begin your application.
For more information, please visit the website or contact CTD-admissions@northwestern.edu

Why should academically advanced students attend Leapfrog – Spark this summer? They’ll have …
- Small class sizes
- Interesting course topics
- A community of like-minded children
- Hands-on learning experiences
- Above-grade-level challenges
- Full day programming options from 8am to 5pm
PreK to Grade 3 / Half Day Courses
(grade level on January 1, 2020)

Half-Day Morning and Afternoon Courses
A.M. 9 a.m. – 12 noon
P.M. 1 p.m. – 4 p.m.

PreK (Half Day)
OPEN ENROLLMENT COURSES FOR PREK
No eligibility requirements for these four courses (Science Focus)

Rainforest Expedition (PreK) Open Enrollment
Some of the world’s most amazing animals and plants live in the Amazon rainforest. Children learn about the different levels of the rainforest, including the floor and canopy, as they explore the diversity of life in this vast ecosystem. Through hands-on activities, dramatic play, and picture books, students build critical thinking skills as they discuss similarities, differences and connections between their everyday environment and the lush rainforest.
SUBJECT AREA: Open Enrollment; Science Focus

Science & Water (PreK) Open Enrollment
Students have a soakin’ good time exploring the concepts behind density, flow, and displacement while working and playing with water. Students learn about the different phases of water and discover how water behaves in a variety of conditions. Students develop their creative and critical thinking as they engage in problem solving, and scientific inquiry.
SUBJECT AREA: Open Enrollment; Science Focus

Real World Science (PreK) Open Enrollment
Students explore like scientists as they use observation skills, dramatic play, and their curiosity to learn about the physical and natural world. They explore concepts such as how magnets work, what plants need to live, and how animals protect themselves. By asking questions, making predictions, and identifying characteristics of things in their world, students advance their analytical thinking.
SUBJECT AREA: Open Enrollment; Science Focus

Science of Matter (PreK) Open Enrollment
Matter is all around us in the form of solids, liquids, and gases. Young scientists work with classmates to investigate these properties in the world around them. They extend their critical thinking skills as students get messy in multi-sensory explorations, ask questions, and engage in dramatic play to discover the states of matter and the role matter plays in their everyday lives.
SUBJECT AREA: Open Enrollment; Science Focus

PreK – Kindergarten (Half Day)
ENGLISH & LANGUAGE ARTS

Puppet Productions (PreK – K)
Puppets help us become better storytellers. Young storytellers learn about character, story sequence, and the structure of puppet plays. Through storytelling, role-playing, and vocabulary activities, students extend their organizational and language skills as they create and share stories.
SUBJECT AREA: English & Language Arts

Stories of Ocean Explorers (PreK- K)
As young oceanographers, students learn about marine life and biodiversity. They learn how and why scientists study ocean life, and investigate ways to help preserve ocean habitats. Students’ early reading and writing skills are deepened as they dive into a variety of texts about ocean life and create their own stories set under the waves.
SUBJECT AREA: English & Language Arts

Pirates & Treasures (PreK- K)
By reading and listening to fiction and nonfiction picture books, students discover both facts and tales of pirates and treasures. They use maps and hunt for clues. Students study the historical forces that surrounded pirating in different parts of the world during different time periods. They develop their writing skills and learn to organize their ideas through creative storytelling of pirate adventures.
SUBJECT AREA: English & Language Arts
CTD Course Catalog | Summer Chicago Area Sites 2020

MATH

Top Secret Numbers (PreK – K)
How many different ways can a mathematician write or show three? A numeral is just one symbol that represents a certain quantity. Math becomes even more intriguing as students practice identifying and using symbol systems to create math problems, patterns and codes. Students develop their mathematical reasoning ability through fun activities with numbers as symbols.
SUBJECT AREA: Math

Kitchen Math (PreK – K)
Measuring, timing, comparing, and computing are on the menu as students use numbers to do the work of cooks and bakers. Students develop their mathematical thinking including computation and fractions to execute recipes and equations.
SUBJECT AREA: Math

Mini Mathletes (PreK – K)
Mathematical thinking involves recognizing patterns, identifying sequences, and deductive reasoning. Through playful, group problem-solving challenges, students apply new skills and use tools such as number lines and functions to build their mathematical muscles.
SUBJECT AREA: Math

Puzzle Party (PreK – K)
Puzzles, tangrams, mazes, and riddles challenge students to use patterns and find solutions using computation, logic and deduction. New strategies develop mathematical reasoning as students search for solutions.
SUBJECT AREA: Math

Grocery Store Business Basics (PreK – K)
Whether you’re shopping or keeping shop, the grocery store adds up to a great place to learn about running a business while boosting math skills. Critical thinking and dramatic play pair up to advance mathematical thinking skills while students stock inventory, set prices and make sales.
SUBJECT AREA: Math

SCIENCE

Big Cats (PreK – K)
As young zoologists, students explore the captivating world of lions, tigers, and other big cats. Students “travel” across the globe to observe and discuss how these astounding animals interact with their habitat and each other. As students are introduced to these marvelous mammals, they gain an appreciation of wildlife conservation and develop analytical and reasoning skills.
SUBJECT AREA: Science

Building Bridges (PreK – K)
Truss, arch, suspension, and more — young engineers learn about bridge structures and study famous examples from around the world. Students develop design thinking skills to create their own bridge models based on the principles of physics. They will learn about scientific inquiry as they test their bridges for strength.
SUBJECT AREA: Science

Spills & Messes (PreK – K)
Pour, stir, and spill! Students create their own crazy concoctions, observe the amazing (sometimes messy) results, and document their discoveries and conclusions. Aspiring scientists develop their reasoning skills through exploration of the properties of liquids, solids and gases, including differences in shape and boundaries.
SUBJECT AREA: Science

Doctors & Dentists (PreK – K)
How do doctors and dentists help us stay healthy? As a fascinating introduction to human biology, students learn about the human body through the lens of the health care profession. Students learn scientific vocabulary and information about the body’s systems and develop reasoning skills as they connect their experiences at the doctor’s office with their new knowledge of biology.
SUBJECT AREA: Science

Zoo Vets (PreK – K)
Junior veterinarians investigate life sciences by focusing on zoo animals. They then apply what they learn as they classify animals and compare animals’ characteristics. Students delve into what animals need to survive and how zoo vets help them, for example by creating the right kinds of zoo habitats and providing a healthy diet. Students develop their reasoning skills to think like zoo vets in this course.
SUBJECT AREA: Science

TECHNOLOGY, COMPUTER SCIENCE & ENGINEERING

Robot Road Trip (PreK – K)
Anyone can make a robot move, but programming a device to travel from point A to point B takes spatial reasoning, mapping, and coding skills. In this course, students build those skills as they learn to program tangible tech devices like Bee-Bot robots to perform increasingly complex challenges.
SUBJECT AREA: Technology, Computer Science & Engineering
Coding Pattern Power (PreK – K)
Students create patterns using tangible tools (such as beads and string), audio tools (such as notes in a song), and virtual tools (such as coding apps on a touchscreen). As students are challenged to take what they learn in one domain and represent those concepts in another domain, their work becomes more complex, detailed, and creative. Pattern play leads to a deeper understanding of coding concepts and develops computational thinking.
SUBJECT AREA: Technology, Computer Science & Engineering

Kindergarten - Grade 1 (Half Day)
OPEN ENROLLMENT COURSES FOR K-1
No eligibility requirements for these two courses. (Science Focus)

Experiments with Liquids (K - 1) Open Enrollment
What can we learn about the world by experimenting with liquids? Young scientists identify characteristics of liquids, make predictions and observe demonstrations to learn more about weather, plants, and other aspects of life on Earth. Students work in small groups, extending critical thinking skills as they explore materials, talk about cause & effect and sequence, and write or illustrate their ideas.
SUBJECT AREA: Open Enrollment; Science Focus

Engineering Challenges (K - 1) Open Enrollment
Young engineers learn about structures such as bridges and buildings and discuss what kinds of problems these and other structures solve. After experimenting with materials, they develop design thinking skills as they create their own models. Then they use a process of scientific inquiry to test their structures for strength and durability based on introductory physics concepts.
SUBJECT AREA: Open Enrollment; Science Focus

ENGLISH & LANGUAGE ARTS

Stories of Antarctic Explorers (K – 1)
Students read and learn about the biodiversity of Antarctica and the animals living there, such as penguins and seals. They imagine and create their own research station at the South Pole and use creative writing skills such as character development and descriptive words to write guidebooks, articles, or stories about Antarctica. This course develops vocabulary and language skills.
SUBJECT AREA: English & Language Arts

Magical & Fantastical Storytelling (K – 1)
Magical forests and enchanted gardens—what would it be like to create our own magical place? Students read fairy tales and legends about magical places and magical characters, such as tree fairies, giants, and even wizards. And then the real magic begins, when students create their own fantastical stories using their imaginations, imagery and sensory words. This course develops creative writing skills such as the use of imagery and detail.
SUBJECT AREA: English & Language Arts

Heroes and Villains (K – 1)
Is the Big Bad Wolf really a villain? What traits make one character a hero and another a villain? Students read stories and focus on the characters they enjoyed most. They identify plot devices and the importance of well-developed characters. Students develop creative writing skills through role-play, writing, illustrations, and dictation, and create stories about their own hero or villain.
SUBJECT AREA: English & Language Arts

MATH

Bank on It (K – 1)
"A penny saved is a penny earned." — Benjamin Franklin. As bankers and customers, students learn how banks work, including savings and interest. Students practice real-world skills as they create their own bank, set up different types of accounts, deposit and withdraw money, and compute balances. This course develops mathematical reasoning skills such as estimation and identifying multiple approaches to solving a problem.
SUBJECT AREA: Math

Extreme Code Breaking (K – 1)
Breaking a code often involves identifying a pattern. Morse code, for example, is a pattern of dots and dashes. Students identify patterns of numbers, words, letters and symbols to understand codes. Then they apply what they have learned to create and crack a variety of increasingly complex codes. Whether they’re coded in words, numbers, symbols or sounds, no secrets are safe from extreme code breakers as they unlock the next level of computational thinking and reasoning skills in this course.
SUBJECT AREA: Math

Geometry of Buildings & Blueprints (K – 1)
A blueprint is a drawing that shows the design of a building or an outdoor area. Using blocks and other construction materials, students create models of structures and spaces. Student build spatial reasoning skills and computational fluency through activities such as
measuring angles, computing area and perimeter and using math functions to create scale drawings of their creations.

SUBJECT AREA: Math

Games for Brains (K – 1)
Smart strategy relies on solid math skills, including multi-step computation and quick estimation. Determining the best strategy might depend on multiple shifting factors unique to the game and its players, but the thinking skills used can be applied in a wide variety of settings. In this course, students work together, cultivating spatial reasoning and computational thinking skills to solve challenging math problems and play complex games.

SUBJECT AREA: Math

Measurement Math (K – 1)
Measurement is a dependable partner for problem solving. Whether it’s calculating how long until lunchtime, how deep the pool is, or how cold it has to be to freeze a popsicle, students will learn the best measurement units and tools for the task. Students solve problems involving estimation and accurate measurement of distance, volume, time and temperature, increasing their critical thinking and computational skills.

SUBJECT AREA: Math

Blood & Bones (K – 1)
Young biologists investigate the systems of cells circulating within the human body. Activities range from creating models of cells and organs to demonstrating the effects of exercise on circulation. This course develops scientific inquiry skills as students make connections between their experiences and new knowledge of the skeletal and circulatory systems.

SUBJECT AREA: Science

Awesome Explosions & Collisions (K – 1)
What can be learned from collisions and explosions? Hands-on science experiments allow students to bump, crash and jolt a wide variety of materials. Students learn how explosive phenomena such as impact craters, the Big Bang, and plate tectonics reveal a wealth of scientific knowledge about our world. This course develops analytical thinking.

SUBJECT AREA: Science

Fast & Faster: Speed & Motion (K – 1)
Do you have the need for speed? Engineers use physics and technology to design machines that go incredibly fast. In this course, students put their pedal to the metal, learning the science behind what propels cars, planes and other machines to move at extraordinary speeds. Through collaborative project work, including building and other hands-on activities, students learn basic physics principles about motion and velocity extending scientific knowledge and developing reasoning skills.

SUBJECT AREA: Science

Digging Canals & Tunnels (K – 1)
From the canals of Italy, Egypt and Panama to local tunnels for cars, water, and power lines, aspiring engineers consider the development of these critical transportation systems. Activities strengthen design thinking skills and foster collaboration as students apply what they’ve learned to construct models and discuss their planning process with peers and instructors.

SUBJECT AREA: Science

TECHNOLOGY, COMPUTER SCIENCE & ENGINEERING

Robots on the Grid (K – 1)
How do driverless cars know where to go? The cars are programmed to navigate a map that has been divided into evenly-spaced parallel lines to form a grid. In this course, students develop both coding and spatial reasoning skills as they program friendly robots like Primo Cubetto to navigate maps and grids.

SUBJECT AREA: Technology, Computer Science & Engineering

Coding Super Sequence (K – 1)
First, next, last. If, then, when. Every day we create sequences with our words and gestures. Computer programmers create sequences with code. In this course, students learn to code using apps such as Lightbot, Cargobot, and Spritebox, then extend their learning beyond the screen with sequencing games that reveal the structure of codes. As students are challenged to take what they learned in one domain and represent those concepts in another domain, they advance their thinking and creativity to produce more complex and detailed work.

SUBJECT AREA: Technology, Computer Science & Engineering

Grades 1 – 2 (Half Day)

ENGLISH & LANGUAGE ARTS

Hero Quests from Castles to the Death Star (1 – 2)
Across the ages, people have created and shared stories about bravery, adventure, and overcoming challenges. Ulysses, Luke Skywalker, and Rey are well-known examples of heroes who faced the challenges of an
amazing journey. But what hero stories are yet to be told? Students identify important elements of the hero archetype and then extend their own creativity and storytelling skills when they write a hero story of their own from history, from their imagination, or maybe even a hero story about themselves.

SUBJECT AREA: English & Language Arts

Comic Book Characters (1 – 2)
“Drawing is a form of writing.” –Art Spiegelman
Graphic novels and comic books cover topics from superheroes to historical events, capturing complex ideas through a unique combination of text and illustrations. As students learn the elements of graphic novels and comics, they focus on character and plot. Challenged to create an original story or recount an historical event, students build their skills as a writer to organize and express their own ideas with words and images.

SUBJECT AREA: English & Language Arts

MATH

Business Start Up (1 – 2)
What does it take to turn a profit? To answer that question, students create a business and set up a budget for their new enterprise. They will consider supply and demand and calculate their costs. As business owners, students will need to be creative problem-solvers, learning business vocabulary and computation skills in order to create and balance a business budget.

SUBJECT AREA: Math

Math for Spies (1 – 2)
A good spy should be sneaky and an expert mathematician. In this course, aspiring spies use math to create secret codes, plot the coordinates of enemy hideouts, and discover, through logical reasoning, the identities of other spies. Students in this course uncover the reason why spies are sometimes called ‘analysts’ as they develop analytical thinking with each mission.

SUBJECT AREA: Math

Math in the Animal World (1 – 2)
Would a sprinting cheetah beat a speeding porpoise in a race? How far do geese migrate each year? Young mathematicians use numbers to tackle story problems, carry out simple experiments and describe characteristics and behavior in the fascinating world of animals. Learning about differences between animal species and the things our favorite animals can do is a great way to build analytical and computational skills through data comparisons, single-digit multiplication and algebraic equations.

SUBJECT AREA: Math

Prediction & Probability (1 – 2)
Students’ analytical skills are challenged and expanded as they make predictions based on calculations of probability. Using the math and the language of probability, students deepen their understanding when they move from problem solving to crafting their own word problems, games of chance and brainteasers.

SUBJECT AREA: Math

SCIENCE

Animal Adaptations (1 – 2)
A walking leaf is an insect that looks just like a leaf. A bird may settle nearby and not even know this insect is there. This insect's physical features allow it to “hide in plain sight” from birds and other predators. In this course, young zoologists investigate amazing animals from around the world, each with astounding physical traits and behaviors that help them survive in their environments. Through research and hands-on activities, students learn about animal classification, a variety of habitats, and the survival methods of animals that live in them. Students are challenged to advance their critical thinking skills as they consider the implications of environmental changes for future generations of species.

SUBJECT AREA: Science

Raising Skyscrapers (1 – 2)
How do you build a 200-story building so it won’t topple? How does wind influence an architect’s design? Student architects explore these challenges and others as they uncover the engineering and physics behind tall towers and stupendous skyscrapers. Foundational knowledge of physics becomes firmer and design thinking skills soar with each iteration as students raise skyscrapers in this course.

SUBJECT AREA: Science

Grossology: The Human Body (1 – 2)
The human body conducts fascinating and sometimes repulsive bodily functions, but all serve a valuable purpose. From spit and vomit to sweat and snot, curious students expand their critical thinking skills as they engage in experiments and activities to learn about systems of the human body and their role in indicating illness and maintaining health.

SUBJECT AREA: Science

Creatures of the Deep (1 – 2)
Some of the creepiest and most amazing creatures live in the ocean. A giant Pacific octopus can weigh about 110 pounds and can measure 16 feet in length. Its eight arms are very powerful, and it has three hearts and nine brains.
How do these arms, hearts, and brains help the octopus survive in the depths of the ocean? Students advance analytical and systems thinking in order to make connections among fascinating facts to help them understand ecosystems and how marine animals have adapted to their habitat. 

**SUBJECT AREA:** Science

**Gears & Gadgets (1 – 2)**

Taking apart a clock or a wind-up toy reveals fascinating information about how simple machines work. Students learn about mechanical engineering and introductory physics by taking apart and analyzing a variety of devices. They extend analytical thinking through study and observation of simple machines such as levers, pulleys, screws and springs and through the application of physics concepts such as force, motion, and the structure and function of batteries. 

**SUBJECT AREA:** Science

**Sports Medicine (1 – 2)**

Sports medicine involves the prevention and treatment of injuries, nutrition and hydration for performance and training techniques that prepare bodies and minds to be at their healthiest. Students gain insights into human biology as they learn about human musculoskeletal anatomy. They advance their creativity and critical thinking skills as they analyze illustrations, create models, and write recommendations for staying safe and strong in the gym and on the field. 

**SUBJECT AREA:** Science

**TECHNOLOGY, COMPUTER SCIENCE & ENGINEERING**

**Robots in Sync (1 – 2)**

Programming one robot is fun, but programming a fleet of robots to perform in synchronized motion takes coding to a whole new level. Students boost their spatial reasoning skills as they collaborate to create synchronized patterns, stories, and choreography using pairs, triads, and small groups of robot mice and other devices.

**SUBJECT AREA:** Technology, Computer Science & Engineering

**Coding Algorithm Adventure (1 – 2)**

An algorithm is a step-by-step process to complete a task. Students use coding apps like Scratch Jr and Cato’s Hike to program their own algorithms. Away from the screen, collaborative projects, such as following a recipe or pitching a tent, challenge students to create algorithms in many different symbolic languages. As students are challenged to take what they learned in one domain and represent those concepts in another domain, they expand their computational thinking skills and produce work that is more complex, detailed, and creative.

**SUBJECT AREA:** Technology, Computer Science & Engineering

**Grades 2 – 3 (Half Day)**

**ENGLISH & LANGUAGE ARTS**

**Life on Mars (2 – 3)**

Scientists have predicted that one day, a space colony will be established on Mars. Students take on the roles of astronauts preparing to build and live in a space colony on Mars. Students read fiction and nonfiction about the Red Planet. They extend creative writing skills and design thinking skills in researching, imagining and writing about planets, space travel, and establishing a colony in a strange new world.

**SUBJECT AREA:** English & Language Arts

**Scene Writing Workshop (2 – 3)**

When you think about your favorite movie or play, what comes to mind? It’s probably the scenes you just couldn’t look away from. Students expand their own skill at literary analysis to understand how screenwriters and playwrights use the rules and techniques of dramatic writing to achieve those riveting results. From dialogue to stage direction, students sharpen their writing skills for effective scene writing. Students study inspiring scenes from movies or plays and then lean into their own creativity and focus, applying improvisation techniques to write and revise their own pieces to be recorded or performed.

**SUBJECT AREA:** English & Language Arts

**World Mythologies (2 – 3)**

According to Chinese myths, how were clouds created? What’s the story behind the half-man, half-lion in Indian mythology? Who was Orpheus in Greek mythology, and what was important about his journey to the underworld? Students develop literary analysis skills as they read and discuss various myths, focusing on symbols, themes, and the purposes myths have served across cultures. Students advance their creative writings skills by writing their own myths to explain events and natural phenomena through the actions of gods, goddesses, and other mythological characters.

**SUBJECT AREA:** English & Language Arts

**MATH**

**The Stock Market (2 – 3)**

What is the stock market? What exactly are people buying and selling in that market? Students explore these
questions and more as they learn about stock shares, dividends, stockbrokers, stockholders and stock exchanges. Students invest to grow their computational and critical thinking skills as they 'play the market' in this course.

**SUBJECT AREA: Math**

**Brain Twisters: Multiplication & Fractions (2 – 3)**
Sometimes solving a math problem is like untangling a knot - you may need to try more than one approach to achieve success. Students translate their understanding of 'parts of a whole' and 'grouping like objects' into expanded mathematical thinking skills that allow them to unravel multifaceted problems using multiplication, rates and ratios.

**SUBJECT AREA: Math**

**Intro to Cryptography (2 – 3)**
Encryption protects our secret information. It’s a part of our everyday lives, even when we don’t see it. This course introduces students to cryptography and challenges them to use mathematical algorithms to encrypt and decrypt messages. In this course, students develop the mathematical and critical thinking skills to keep a step ahead of hackers.

**SUBJECT AREA: Math**

**Math Manipulators (2 – 3)**
Complex number problems may seem unmanageable at first, but math provides rules and techniques that help to break down big problems into manageable parts and accessible forms. Students use number operations in combination to solve problems involving multiplication and fractions. Students add new math vocabulary and learn multiple forms of expressing numbers, including decimals and mixed numbers. Using games and visual representations to meet problem solving challenges, students build their mathematical thinking skills in this course.

**SUBJECT AREA: Math**

**SCIENCE**

**Brain Surgery (2 – 3)**
Young neurologists go inside the brain to analyze its systems and understand its connection to the rest of the body. Among other activities, students map the brain, experiment with senses and the brain, and use interactive web tools to investigate this amazing and complex organ. This course ‘stretches’ students brains as they advance their systems thinking skills to understand the nervous system as a whole.

**SUBJECT AREA: Science**

**Biomimicry Challenges (2 – 3)**
Biomimicry occurs when people use ideas found in nature to create solutions. Scientists at CalTech noticed the way schools of fish forcefully moved water with their fins. Based on the movements of the water, these scientists created a system of air flow to build better wind farms. Student scientists, engineers, and designers identify an everyday problem and then take cues from nature to design a solution. Through research, low-tech prototyping, and a group-based review process, students challenge their creativity and bolster their design thinking skills in order to solve problems in this course.

**SUBJECT AREA: Science**

**Designing Sailing Ships (2 – 3)**
Following in the footsteps of naval architects, young designers examine the different types of ships and the different methods of assembling them, building their analytical thinking skills. Then they extend design thinking skills as they plan and create models of ships complete with keels, hulls, and masts.

**SUBJECT AREA: Science**

**Immunology (2 – 3)**
Are you allergic? If not, then you probably know someone who is. In the U.S., over fifty million people suffer from all types of allergies. Allergic reactions might be caused by food, medicine, plants, or even our favorite pets. That’s why there are scientists and doctors who specialize in immunology, or how our bodies work to stay healthy, even if we’re allergic. Students will learn about the immune system, advancing their knowledge of biology as well as their analytical thinking skills through experimentation and research into how immunologists diagnose, prevent and treat allergic reactions.

**SUBJECT AREA: Science**

**Rocket Science (2 – 3)**
How do rockets blast off? Why do balloons fly in circles if you let the air out? Young rocket scientists investigate Newton’s laws of motion through demonstrations, online simulations and experiments. Adding physics concepts such as *inertia, force, direction, and friction* to their science knowledge base, students work in small groups to build and launch their own simple rockets. This course expands analytical thinking skills.

**SUBJECT AREA: Science**

**TECHNOLOGY, COMPUTER SCIENCE & ENGINEERING**

**Robot Navigation (2 – 3)**
This course combines a variety of navigational challenges including programming on a grid, synchronization of
movements, avoiding obstacles, and predicting traffic patterns. Students work with tech tools such as Hexbugs, Blue-bots, and Sphero robots to create programming projects and detailed maps that develop spatial reasoning skills.

**SUBJECT AREA:** Technology, Computer Science & Engineering

**Coding Build it, Break it (2 – 3)**
Computational thinking requires decomposition, the ability to take an idea and break it down into smaller parts for deeper understanding and analysis. In this course, students create coding projects using Hopscotch and then explain their thinking to other programmers by taking apart their code. Tangible materials like 3D puzzles challenge students to demonstrate their learning using novel tools. As students take what they learned through hands-on activities and represent those concepts in code, their understanding deepens and computational thinking skills are strengthened.

**SUBJECT AREA:** Technology, Computer Science & Engineering

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**All-Day Courses, Grade 1 to Grade 5**
(grade level on January 1, 2020)

**All-Day**
9 a.m. – 4 p.m.

**Grades 1 – 2 (All Day)**

**Music, Math & Composition (1 – 2)**
Math and music are connected, from how notes are organized in measures and beats to the use of fractions, patterns and ratios. Students explore how sound wavelengths of exact ratios played together, make harmonies like octaves, fifths and thirds. And they’ll extend their mathematical thinking skills by applying them to the challenge of creating their own musical notation system.

**SUBJECT AREA:** Math

**Coding Robots: Speaking their Languages (1 – 2)**
Robots can carry out amazing and complex tasks, but only with instructions they can ‘understand.’ Students in this course will get an introduction to computer science and learn to speak to Finch robots in the visual programming languages Snap! and Scratch. Coding challenges with sensors, lights, sound and motion advance computational thinking as new programming skills take flight.

**SUBJECT AREA:** Technology, Computer Science and Engineering

**Tech Animation with Scratch (1 – 2)**
In this hands-on course, students learn fundamental computer animation using the Scratch programming language. Students gain skills in basic drawing tools, simple animation, graphic morphing, and graphic layering, evaluating the best techniques to achieve their goals. With strengthened critical thinking skills and new coding skills, students create an animation program as a culminating project. After completing this course, students are prepared for more advanced animation and program design work.

**SUBJECT AREA:** Technology, Computer Science and Engineering

**Grades 2 – 3 (All Day)**

**LEGO® Metropolis: Urban Design & Architecture (2 – 3)**
Imagine a whole city made out of LEGO® bricks! Urban design and architecture concepts come to life when students collaborate to plan and create buildings, roads, and city infrastructures using LEGO®s bricks created specially to allow for architecturally-focused construction. Course activities enhance students’ spatial-relational thinking skills with activities such as producing blueprints and maps. Students also challenge and strengthen their critical and design thinking skills as they consider how to meet a community’s needs based on principles of urban planning and design engineering.

**SUBJECT AREA:** Science

**Wilderness Challenge: Math and Science Outdoors (2 – 3)**
Basic needs like water, shelter, and food are opportunities for turning math and science concepts into practical knowledge. Students evaluate, analyze, and estimate what is necessary for survival and are put to work building a shelter, purifying water, and cooking food with basic provisions and what they can find outdoors. This hands-on course combines classroom time and outdoor learning to build science knowledge and strengthen mathematical thinking skills. Please wear sturdy shoes and clothes that can get dirty.

**SUBJECT AREA:** Science

**Digital Game Design (2 – 3)**
Students become creators of digital content rather than just digital consumers when they design and code their own video games. They develop programming skills and
design thinking skills as they use tools such as Scratch and Gamestar Mechanic to design, test, and play their own digital games. They also beta test and provide feedback to the other aspiring game designers in their class.

**SUBJECT AREA: Technology, Computer Science and Engineering**

**Robotics Challenges with LEGO® WeDo 2.0 (2 – 3)**
Through a variety of robotics challenges, students learn about block programming. They build robots from LEGO® WeDo 2.0 kits, assuring their design of the physical robot supports their programming. Each new robot mission advances students’ computational thinking skills as well as design engineering skills. They'll be ready for EV3 kits and other robotics systems after completing this course.

**SUBJECT AREA: Technology, Computer Science and Engineering**

**My Robot Arm: Adaptive Tech with LEGO® WeDo 2.0 (2 – 3)**
At the age of 14, Easton LaChappelle invented a prosthetic arm using LEGO® bricks, fishing wire, and a 3D printer, significantly improving on existing technologies. In this course, students construct and program robotic arms using LEGO® WeDo 2.0 kits and engage in open-ended projects inspired by the maker movement and young inventors. Students with previous WeDo experience are challenged to develop their own projects. Responding to specific constraints and goals, students reach for stronger computational thinking skills as well as design engineering skills in this course.

**SUBJECT AREA: Technology, Computer Science and Engineering**

**Grades 3 – 4 (All Day)**

**Pen to Podium: Expert Writing & Speaking (3 – 4)**
Would you use the same approach to recommend a movie to a friend and to conduct a classroom debate about the environment? A well-constructed essay doesn’t always translate to great oratory. Each must be carefully crafted to have the greatest impact. Students will expand their writing and public speaking skills as they identify and try out rhetorical techniques for producing effective written pieces and delivering excellent speeches, including selecting language for its appeal to the ear, heart, and mind.

**SUBJECT AREA: English and Language Arts**

**Survivor Math (3 – 4)**
Applying math skills is the key to survival in this creative problem-solving course. Students role-play a variety of exciting scenarios, such as being marooned on a desert island, trapped in a space station or stranded in a deadly snowstorm. Students analyze what the situation calls for and then apply formulas and concepts from geometry, algebra and probability, extending their mathematical thinking skills and saving the day in this course.

**SUBJECT AREA: Math**

**3D Cell Biology (3 – 4)**
Cells are often described as “the building blocks of life.” In this introductory biology course, students use LEGO® bricks and other 3D construction tools to learn about the structure of various living cells and of DNA molecules. Students examine cell structures, observe virtual cell reproduction, and the laws of genetic inheritance, building up their systems thinking skills and knowledge of microbiology.

**SUBJECT AREA: Science**

**How Things Work: Electronics (3 – 4)**
In this inquiry-based course, students learn the physics underlying electronics by toggling between making basic devices and taking apart consumer electronics such as televisions, computers, and cell phones. Through research, experimentation, and discussion, students examine the development and use of electronic items, including how they might be improved in the future. This course develops analytical thinking and design engineering skills.

**SUBJECT AREA: Science**

**Design Engineering Chicago (3 – 4)**
Chicago was built on marshy, mushy land. How have urban planners and engineers solved the problems this created for the “City by the Lake”? Students learn how Chicago has engineered solutions throughout its history. Students use a wide variety of materials to create models of Chicago civil engineering and architectural landmarks, such as buildings, tunnels, canals, bridges, and highways. Classroom challenges in this course develop design engineering skills.

**SUBJECT AREA: Science**

**Web Design (3 – 4)**
In this course, students will use a web design tool kit while planning and designing for the screen. Focusing on a topic of high interest for their web page, student web designers will learn how HTML and CSS are used and extend their design and programming skills by creating webpages using fun and powerful software, which may include Photoshop, Flash, Adobe Dreamweaver, and Notepad++.

**SUBJECT AREA: Technology, Computer Science and Engineering**
Robotics Lab: Recording & Sharing EV3 Experiments (3 – 4)
By building and programming robots using LEGO® EV3 robotics kits, students develop engineering and computer science knowledge and skills. Recording and documenting robotics projects with words and images develops introductory scientific research skills. This course is the whole package: hands-on experience with technology and preparation for scientific research and traditional lab experiments.
SUBJECT AREA: Technology, Computer Science and Engineering

Introduction to A.I.: EV3 Sensors & More (3 – 4)
By building and programming LEGO® Mindstorms EV3 robots, students develop engineering and computer science knowledge. This course focuses on the EV3 sensors and the ways the robots respond to their environment. Hands-on experience with sensors leads to a discussion of artificial intelligence (A.I.) and the traits of “intelligent machines.” Students with previous EV3 experience are challenged to apply and expand their engineering and coding skills to address new ideas and projects and to extend critical and computational thinking skills.
SUBJECT AREA: Technology, Computer Science and Engineering

Grades 4 – 5 (All Day)
Rollercoaster Physics (4 – 5)
Maybe it’s the Kingda-ka roller coaster’s 456-foot climb or its ability to travel at 128mph in 3.5 seconds that excites riders. Students in this class learn the science behind how rollercoasters make riders feel light in the air one moment and then pushed down into their seat the next. Students buckle up for a fast-paced adventure with the laws of physics as they investigate topics such as inertia and centripetal acceleration. They also roll out strengthened analytical thinking and design engineering skills in this course.
SUBJECT AREA: Science

Making Machines Move: Robotics with Microcontrollers (4 – 5)
A working robot is the result of programming expertise and an effective design engineering process. Through their input/output ports, microcontrollers actuate motors, lights, sensors and sounds. Students in this course get hands-on experience working on a robotics team to design, build and program robots using visual programming languages and Hummingbird Bit microcontrollers. Students advance their design and computational thinking skills and a produce wide variety of unique robots in this course.
SUBJECT AREA: Technology, Computer Science and Engineering

Structural Engineering: Physics and Design (4 – 5)
Look around you — anywhere that you see human communities, you’ll see structural engineering. Bridges, houses, skyscrapers, and concert stages all rely on the sturdiness of the materials and design of the structure. A skyscraper has to support the forces or loads that it’s likely to experience, including its own weight, and all the furniture and people inside. It also has to stand strong against the forces of wind, snow, and maybe even an earthquake. Students investigate how different materials and designs affect the strength of a structure. They also strengthen their own design thinking skills along with their physics knowledge through research and small-scale modeling to solve a variety of engineering challenges in this course.
SUBJECT AREA: Science

Business Behavior: Intro to Behavioral Economics (4 – 5)
How can getting something for free end up costing you? Why do people typically want to pay later, even when it means they will pay more? Behavioral economics explains these and many other examples of the times when our choices are not based on rational calculations of dollars and cents. Students learn principles of behavioral economics, including those put forth by Nobel laureates, and apply them to business scenarios. In this course, students advance their critical reading and analytical skills as they read texts by behavioral economists and try their hands at experimental design for social science.
SUBJECT AREA: Arts, Social Sciences & Humanities