Winter 2020 Advanced Enrichment Programs

Age 4 - Grade 8

Saturday and Sunday courses at Center for Talent Development (CTD) are challenging and enriching opportunities for academically talented students. Our courses in English & Language arts, mathematics, science, design & engineering, and computer science & technology engage students during eight consecutive Saturdays (all sites) OR eight consecutive Sundays (Evanston only) in the winter. Students with demonstrated strengths in verbal/reading and/or math, depending on course, may apply. See www.ctd.northwestern.edu/weekend for eligibility details.

Dates: Saturdays: January 18 – March 7; Sundays: January 19 – March 8
Locations: Please view the winter course chart on the Saturday and Sunday web page to see what courses are offered near you. We offer courses in Chicago, Evanston, Naperville, Northbrook and Palatine.
Times: Morning courses (9 a.m. - 11:30 a.m.); Saturday afternoon courses (noon - 2:30 p.m.)
Tuition: $430
Application: visit my.ctd.northwestern.edu to begin your application

Age 4
No test scores are required for Age 4 classes.

DinoMite Dig (Age 4)
How does understanding dinosaurs help us understand birds and reptiles?
Young scientists discover how paleontologists unearth answers by digging in the dirt. Work with fossils, bones and other materials, and learn what dinosaurs looked like, how they moved, what they ate, their living conditions and other fascinating facts. Activities span across disciplines, including language arts, geography, math and science.
SUBJECT AREA: Science

PreK - Kindergarten

Builders Paradise (PreK-K)
What do engineers do?
Young builders challenge their critical thinking skills by building structures that dare the laws of gravity. Explore what shapes and materials are stronger than others and compare the stability of completed structures. Students imagine, plan, create and improve their own designs and discover why a structure continues to stand or collapse.
SUBJECT AREAS: Science, Engineering & Design

Geometry Jumpstart (PreK-K)
Where do we see shapes in buildings and the objects we use?
Through hands-on building, stories, movement, and song, young mathematicians discover geometric concepts found in nature and the built environment. Students learn the shapes, properties, and language of geometry, identify symmetries and patterns in two and three dimensions, and make shapes, patterns and structures out of a variety of materials.
SUBJECT AREA: Math

Kindergarten - Grade 1

Tangible Programming: Coding with Your Hands (K-1)
How do you control a robot without written code?
Students develop coding and spatial reasoning skills while using colorful, interactive block commands and hands-on tools. Gain practice with testing and debugging original programs while engaging with various robots like Primo Cubetto or Botley. Fundamental computer science concepts such as symbols and algorithms are explored through dramatic play, construction, engineering and storytelling.
SUBJECT AREA: Computer Science & Technology

Digital Animation & Coding Workshop (K-1)
What is an algorithm? How do we use them?
Design and build animated stories, games and more using graphical block-based apps like Scratch Jr® and Hopscotch. Develop the vocabulary, critical thinking and problem-solving skills needed for future graphical programming courses such as Scratch and interact with technology in an active way.
SUBJECT AREAS: Computer Science & Technology, English & Language Arts

Math is a Blast: Problem Solving Through Play (K-1)
How is math used in the world around us?
Through interactive games, secret codes, graphing activities, and hands-on collaborative projects, be propelled into the wondrous world of mathematics. Challenge yourself and others by creating your own games, puzzles, codes and stories about mathematical principles such as proportion, area, patterns, perimeter, and fractions.
SUBJECT AREA: Math

Mysteries of the Deep (K-1)
How do living creatures in both saltwater and freshwater contribute to our ecosystem?
What allows clownfish to live among stinging anemones? Where do ocean animals go during a hurricane? Is there life in the deep Marianas Trench? Marine biologists-in-training discover the fascinating world of aquatic life while solving the great mysteries of the deep. Through hands-on projects and lively discussions,
students learn about the amazingly diverse life inhabiting our freshwater lakes and salty oceans and the inner workings of our ecosystem.

SUBJECT AREA: Science

Grades 1 – 2

Active Architects: Design & Build (Gr. 1-2)
How do building materials inform design?
Future designers, builders and architects are introduced to architectural vocabulary, architectural tools, and visual/spatial thinking. Design your own original buildings and build 2D and 3D models in various formats and with varied materials. Investigate art, architecture, science, and math in this interdisciplinary course.

SUBJECT AREA: Computer Science & Technology, Engineering & Design

Young Author’s Workshop (Gr. 1-2)
How do great authors and storytellers hold the reader’s interest?
Budding authors develop original narratives and performances in this active class. By experiencing award-winning children’s literature and analyzing images and videos of skilled storytellers and actors in action, students create their own unique works. Independent and collaborative exercises focus on dramatic play, creative writing, storytelling and performance. Join other aspiring young writers to produce original stories and share them for an audience using a writer’s workshop format to practice strengthening your writing through peer feedback.

SUBJECT AREA: English & Language Arts, Humanities

Solution Sleuths: Experts in Problem Solving (Gr. 1-2)
What strategies are effective for a given problem?
A fire engine travels five miles to a fire at a speed of 50mph. Its tank holds 500 gallons of water, but it’s been leaking throughout the journey at a rate of 50 gallons per hour. How much water is left in the tank when it arrives at the fire? Grapple with mind boggles and brainteasers to determine the best solutions to real-life problems. Mathematical dexterity is enhanced as young learners think about, solve, and create their own complex and interesting problems while applying multiplication and division.

SUBJECT AREA: Math

Magic or Science? (Gr. 1-2)
How can you apply scientific principles to magic?
Magician or scientist? Students explore the science of magic, learning tricks based on scientific facts and discovering the principles behind these amazing effects. Performing scientific sleights of hand, students experiment with magnets, air pressure, polymers and indicators to reveal the surprise and awe of science.

SUBJECT AREA: Science

Grades 2 – 3

Animation & Game Development: Scratch (Gr. 2-3)
How can we write programs that both humans and computers can understand?
Learn how to create original animations and games using Scratch, a graphical programming language designed for students. Join a global community of Scratch programmers for ongoing collaborative learning and skill development. No formal programming experience is necessary. This course helps prepare students for text-based programming languages like Python.

SUBJECT AREA: Computer Science & Technology

Programming & Engineering with WeDo Robotics (Gr. 2-3)
How does the intended function of a robot change how it is designed?
Gain an introduction to robotics using LEGO® software along with the LEGO® WeDo building blocks, sensors and motors. Using a block-based interface, program a simple machine of your original design to follow a sequence, interact with its environment or act out a story. Develop a design thinking project to help solve a real-world problem, such as building a robotic tool to conserve water or make life easier for someone with a disease or disability. Build programming knowledge while utilizing geometric skills, logical reasoning, design technique and creative problem solving.

SUBJECT AREAS: Computer Science & Technology, Engineering & Design

The Science & History of Spy Work (Gr. 2-3)
How have science and engineering played a role in the spy world?
Students receive top secret briefings and complete missions using history, science, and technology. Through hands-on individual and small-group activities, students explore the art and skill behind encryption, cryptography, surveillance, and how to make things disappear. Students uncover the science and engineering of spy work while researching and designing nifty gizmos and gadgets that can help them discover intel, identify assets, or observe an agent while remaining unseen.

SUBJECT AREAS: Science, Humanities

Grades 3 - 4

Robotics Design: Programming & Constructing with Hummingbird® (Gr. 3-4)
How does technology across fields influence the development of robotics and their applications in our daily lives?
Using LEDs, motors and sensors, young programmers make machines, interactive robots, and kinetic sculptures out of a variety of materials. Students learn and apply coding skills using micro-controllers as they test and refine mechanical constructions, and command their robotic structures to perform tasks of their choosing. Incorporating design, art, and
engineered, students create, test and re-design original moving masterpieces while learning how to program inputs and outputs.

Note: Additional $10 materials fee.

SUBJECT AREAS: Computer Science & Technology, Engineering & Design

Critical Mathematics: From Googol to Infinity (Gr. 3-4)

*How do we represent very large and very small numbers?*

Examine the infinitely large and the incredibly small, and increase your understanding of ratio, integers, fractions, and exponents. Problem-based coursework, discourse and mathematical debate leads the learning in this course. Focusing on the Common Core Standards of Numbers & Operations and middle school goals of Ratios & Proportional Relationships and The Number System allows students to build their skills in these areas.

SUBJECT AREA: Math

Zoology: Animal Behavior & Biology (Gr. 3-4)

*How do behavioral traits help animals survive and thrive in their ecosystems?*

What behaviors do animals use to claim a territory, find food, avoid predators, find mates, and migrate? Through hands-on experiments and research, learn about the unique behavioral adaptations that animals have to their ecosystems. Track the movement of birds and animals of the land and sea and evaluate how animal migration and behavior is influenced by natural phenomena such as weather patterns, landforms, or seasonal changes.

SUBJECT AREA: Science

**Grades 4 – 5**

Inspired by Nature: Designing with LEGO® Robotics (Gr.4-5)

*How can an animal's movement influence the robot designs of tomorrow?*

How might the slowest mammal on the planet - the three-toed sloth - inspire engineers to develop an efficient weather monitoring robot? For ages, engineers and designers have found inspiration in the movement and physiology of animals. Using the LEGO® MINDSTORMS® EV3 set, follow the engineering design process from start to finish through a series of robotics projects inspired by nature. Investigate traits that give animals their amazing abilities, such as the speed of a hummingbird's wings, and apply that research to build robots that mimic what we see in nature. Hone programming skills and develop problem-solving prowess while testing your creativity.

SUBJECT AREAS: Computer Science & Technology, Design & Engineering

Crafting an Argument: The Art of Public Speaking (Gr. 4-5)

*How does presentation impact the success of arguments?*

Practice and apply elements of public speaking, including research processes, verbal and nonverbal communication strategies, data visualization, and presentation skills. Learn to form strong research-based arguments about real-world issues through comparison of argument strengths and weaknesses. Participate in a series of in-class presentations and debates about a variety of topics to make your argument irrefutable! Course will culminate in a debate.

SUBJECT AREAS: English & Language Arts, Humanities

Pre-Algebra: Geometry & Measurement (Gr. 4-5)

*What skills or tools are needed to effectively compute with numbers?*

Linked to the Common Core State Standards, this pre-algebra series incorporates three courses offered sequentially in the fall, winter, and spring. Students may participate in any or all of these courses beginning in any session. Through exploration, practice and application, students develop skills to deepen their understanding of mathematical ideas and apply them to real world settings.

SUBJECT AREA: Math

Roller Coaster Mania (Gr. 4-5)

*How do Newton's Laws relate to roller coasters?*

How does an amusement park ride make you feel lighter than air one moment and press you down into your seat the next, all while keeping you safely inside the ride? Strap yourself in for a fast-paced adventure in physics and investigate topics such as the law of inertia, centripetal acceleration, and centrifugal force as you design and build a variety of amusement park thrills.

SUBJECT AREA: Science

In the Lab: Microscopy and the Cell (Gr.4-5)

*How do scientific tools such as microscopes influence the quality of scientific observations?*

What are the single-celled organisms living in our ponds, lakes and the dirt beneath our feet? What are the microscopic parts of ourselves, and what do they look like? In this laboratory-based class, students learn how light microscopes work and how to operate them effectively while building an understanding of microscopic and cell biology. Students explore the vast world of microorganisms, strengthening their skills of observation and analysis by investigating busy microscopic worlds of life, such as a drop of pond water. Learn the different parts of plant and animal cells and how they function. Identify, observe, sketch and label individual organisms and cells while enhancing microscope skills.

Note: Additional $10 materials fee required.

SUBJECT AREA: Science

**Grades 5 - 7**

Wearable Technology: Creativity and Innovation in Computer Science (Gr. 5-7)

*How does wearable technology incorporate computer programming, electrical engineering and art?*

Wearable technology is everywhere from electronic textiles in performance art to diagnostic devices in medical clothing. Learn how this prolific medium combines hardware and software engineering as you build unique items with micro-computers, circuitry and code. Learn Computer Science fundamentals while programming devices in the text-based programming language, Arduino. Discover how the diverse community of wearable
technologists solve real-world problems with creative technology and apply those lessons to your own creative projects.
Note: Additional $30 materials fee required.
SUBJECT AREA: Computer Science & Technology

Web Design: HTML, CSS, and JavaScript (Gr. 5-7)
How do web developers design and create the content, structure, and behavior of websites?
Using a code editor, such as Atom or Visual Studio Code, students experiment with design techniques that are the foundation for a fully functional, aesthetically pleasing, and easy to use website. Add to your developer’s toolkit as you use HTML, CSS, and JavaScript to build and publish your own website. This project-based course allows for independent and collaborative creativity as students consider the role of the end user and explore ways to enhance their original creations before publishing.
SUBJECT AREA: Computer Science & Technology

Physical Science & Civil Engineering (Gr. 5-7)
How can science and engineering be used to solve society’s challenges?
Students immerse themselves in the engineering method as they define real-world problems, research and brainstorm solutions, prototype and test design solutions, and practice communicating scientific information. Apply real-world research and scientific inquiry to gain the skills necessary to be successful in advanced high school science courses. Working both individually and in groups, tackle hands-on projects which may include designing a bridge or airport, building water and sewage systems, or constructing railways.
Note: Additional $15 materials fee required.
SUBJECT AREAS: Science, Engineering & Design

Integrated Math: Sequences, Functions, Data Analysis & Modeling (Gr. 5-7)
How can we gain a better understanding of everyday situations through reasoning and mathematics?
Where and when do we actually use algebra in the world, and how is it connected to the other strands of math? By balancing and integrating mathematical techniques taken from algebra, geometry, and statistical analysis, learn how to use math as a reasoning tool outside of the classroom. With a problem-based, student-centered approach, apply quantitative thinking to real-world scenarios and engage in collaborative exploration of realistic problems with other math-minded classmates.
SUBJECT AREA: Math

Grades 6 - 8

Design Thinking: Improving the User Experience (Gr.6-8)
How can empathy lead to better prototyping?
Have you ever heard people complain about processes such as boarding an airplane efficiently, choosing a fast-moving checkout line at the store, or getting in and out of a crowded bathroom quickly during passing periods at school? How could you redesign one of those experiences to make it more positive for the user? Engineers and designers use Design Thinking to develop products that address user needs, but that same process can also be used to design and redesign user experiences. Combining empathy, ideation, prototyping and testing, students gain experience with identifying and addressing problems experienced by those around them. Students conduct interviews and research, and apply creative problem solving and determination to develop their own prototype of an improved user experience project of their choosing.
SUBJECT AREAS: English & Language Arts, Humanities

iOS App Design (Gr. 6-8)
What makes a well-designed mobile app?
You may already be an expert iOS user, but do you want to know how the apps you love are made? Brainstorm, research, design and build your own original apps for iOS devices using Apple’s Swift programming language. Evaluate and workshop your concepts with the principles of user interface design to develop apps that demonstrate clarity and simplicity.
SUBJECT AREA: Computer Science & Technology

Electronics & Programming Maker Workshop (Gr. 6-8)
How do engineering and design come together to create interactive technology projects?
Using micro-controllers, sensors and a variety of "making" components, students create products that fuse programming and electronics. Combine foundational coding skills with the engineering design process to engage in open-ended and student-driven projects that encourage independent and collaborative problem solving. Research and explore how tech and electronics products are impacting society presently and produce a capstone project that addresses a student-identified need.
Note: Additional $25 materials fee required.
SUBJECT AREA: Computer Science & Technology

Civil Discourse: Researching, Writing and Communicating Ethical Arguments (Gr. 6-8)
What tools are needed to engage in respectful debate around real life ethical issues?
How can you make your voice heard by others when discussing a hot-button topic? Learn principles and practices of communication while wrestling with age-appropriate, ethically complex questions. Explore how to use research-backed arguments to determine what to do about moral, ethical or political problems. Apply thoughtful analysis and critical thinking to engage peers in systematic, open-minded debate. In a constructive, collaborative setting, students gain confidence in supporting and explaining their beliefs using reliable sources, body language, vocal presentation, active listening skills and civil discourse.
SUBJECT AREAS: English & Language Arts, Humanities

Outbreak: Immunology & Infectious Diseases (Gr. 6-8)
How does the human body fight an infection?
This hands-on course explores the human body and the different mechanisms that allow us to fight diseases and everyday pathogens. Investigate different infectious diseases, the history of deadly outbreaks across the globe, and the diseases scientists are fighting today. The class focuses on both historical and current events while investigating what causes different
diseases, the mechanisms behind how they spread, and how the human immune system works to keep us healthy.

SUBJECT AREA: Science

Java: Advanced Game Development (Gr. 6-8)
Why is human understanding important when we write programs to be run by computers?
In this next-level programming course, take basic Java programming principles and knowledge and apply it to more advanced projects. Learn the physics required to simulate projectiles, gravity, and jumping. Develop design and management techniques to create and maintain more complex games. Use these techniques to build and maintain side-scrolling worlds.
Note: This course is intended for students who have completed prior Java programming courses. Eligibility must be confirmed before enrolling.
SUBJECT AREA: Computer Science & Technology

Creative Writing: Creating Real & Imagined Places (Gr. 6-8)
How can a location or place play the same role as a character in a story?
When we read powerful stories that resonate with us, we are often transported to distinct, believable places from the comfort of our homes. How do authors create those spaces, be they real or imagined, and how do those spaces impact the stories and characters as deeply as they do? Through research, literary analysis and writer's workshop strategies, young authors create written works of places they know well, places they wish to see, and places seen only in their own imaginations.
SUBJECT AREAS: English & Language Arts, Humanities

Lab Science: Chemistry (Gr. 6-8)
How do we use qualitative and quantitative changes to describe chemical reactions?
Chemistry focuses on the composition, structure, and properties of matter, as well as the changes undergone during chemical reactions. Develop an appreciation for chemical principles and applications while improving scientific literacy and discovering the relationships among chemistry, the other sciences, and mathematics. Lab-based experiments and problem solving provide a foundation of knowledge for future study.
NOTE: Additional $50 lab fee required.
SUBJECT AREA: Science