# RoboMasterminds

# Course Catalog

*(as of 03/28/2024)*

| Program | Grade Levels | Brief Description | Robotics/Science Concepts Covered |
|---|---|---|---|
| Great Adventures (6 contact hours) | K-2 | Using Legos, students will design adventure scenarios such as a boat trip, an arctic ride, and a car to explore a dark cave. Students will use block coding to program a sequence of adventure events. | Coding basics (sequences, simple loops, testing and debugging) and decomposing problems; Newton's Laws of Motion; input/output |
| Solar Cars (3 contact hours) | 2-5 | Students will use their knowledge of solar energy to build and race their student-created solar cars. They will collect and analyze data using distances traveled to determine ideal gear ratios. | Renewable and nonrenewable energy; solar energy; collecting and analyzing data; measuring distances; gears and ratios |
| Crazy Carnival Games (6 contact hours) | 3-5 | Using Legos, students will build miniature versions of classic carnival games, such as mini-golf, bowling, pinball, and more. They will program their games in block code. | Energy; energy transfer; collision; Newton's Laws of Motion, robotics |
| Happy Traveler (6 contact hours) | 3-5 | Using Legos, students will build methods of transportation found around the world (ex: river ferry, taxi, helicopter, swamp boat, cable car, bus). They will design block code to set their creations in motion. | Computer science; coding (sequences, loops, decomposing problems, debugging, improving programs) |
| Quirky Creations (6 contact hours) | 3-5 | Using Legos, students will design and build machines to solve common problems at school. They will program in block code to control their machines. | Engineering design process; constraints; Newton's Laws of Motion; collision |
| All About Circuits (6 contact hours) | 3-5 | Students will learn basic circuits by building several examples. They will learn about conductors and insulators, and test everyday objects for their conductivity. Students will create their own guitar out of cardboard and play music from an existing Scratch program. They will also design their own input device. | Input/output; coding basics; simple circuits; polarity; conductivity; insulators/conductors |
| Video Game Basics (6 contact hours) | 3-5 | Students will learn the basics of the Scratch coding platform to design and program a chase game, and create their own controller for their game! | Coding basics; simple circuits; input/output |
| Video Game Design (8 contact hours) | 6-8 | Students will use Scratch coding platform to design their own chase, maze, or platformer game and create their own controller for their game. | Coding; minimum value product; video game physics |
| 3D Design and Modeling (8 contact hours) | 6-8 | Students use Autodesk TinkerCad program to design 3D objects, with the opportunity to print their designs on a 3D printer. | Computer-aided design; measurement; 3D printing; engineering design process |
| SumoBots (4 days) | 9-11 | Students will design, build, and program SumoBots that navigate and battle in a fun competition format with other robot teams. SumoBots are small autonomous robots that use sensors to detect each other. In "battle", they "fight" to push the opponent robot out of a competition ring. | Engineering design process; building robots; programming robots; coding (test and refine programs) |
| Computer Science Principles (4 days) | 9-12 | Students will investigate computer science principles, develop basic algorithms, learn Python programming language, and explore how computing and technology can impact the world. | Programming languages (Python); algorithms and data structures; problem-solving and analytical thinking |
| Underwater Robotics (8 days) | 9-12 | Students will learn how to design and build a remotely operated underwater vehicle. They will compete in an end of camp challenge | Focus on engineering design process, engineering notebooks, buoyancy, 3D modeling. Students will learn workshop safety skills, soldering, drilling, and cutting. |
| Autonomous Ground Vehicles (8 days) | 9-12 | Students will learn how to design, build, and program an autonomous ground vehicle. They will compete in an end of camp challenge. | Basics of building and programming autonomous robots using sensors; coding (test and refine programs); engineering design process |
| Coming Soon August 2024 CyberSecurity | 9-12 | Students will engage in hands-on learning, where participants will explore the fundamentals of cybersecurity and engage in real-world simulations, master cutting-edge tools, and collaborate with Cyber experts to develop practical skills in protecting digital systems. | Foundations and threats; credential harvesting; phishing; law and ethics; reconnaissance introduction; Google dorking; network and system threats |
| Coming Soon Fall 2024 Competition Ready | 6-8 | Students will work in small groups to build and program an autonomous robot using sensors. They will test and refine their programs to solve competition tasks. | Basics of building and programming autonomous robots using sensors; coding (test and refine programs); engineering design process |
| Coming Soon Fall 2024 Kickstart a Business | 6-8 | Students will build elements used in businesses (ex: safe-deposit box, automated shipping helper, tracking devices, delivery cart) and create programs to operate the elements. | Coding (decomposing problems; pseudocode; sequences; recognizing patterns; debugging; conditions; compound conditions); Newton's Laws of Motion |