

Engineering Explorations Course Outline

This course provides students with experiences in engineering, robotics, coding, and game-based learning. *FIRST* revolves around a defined set of Core Values and gives students authentic, real-world learning experiences. Working as part of a team, students use what they learn in *FIRST* to research and design an innovative solution to a real-world problem. At the same time, teams build their own game-ready robot to show off at an event at the end of the course. Students practice 21st century skills like technical writing, presentation skills, communication, project management, collaboration, and teamwork.

Unit	Learning Objectives	Time
Welcome to <i>FIRST</i>	<ul style="list-style-type: none"> a) Explore what it means to be a part of <i>FIRST</i>. b) Research and think about ways robots can improve people's lives. c) Explore a variety of career options such as middle skill careers and those that require college degrees. d) Use basic materials to solve engineering challenges. 	10 hours
Build a Robot	<ul style="list-style-type: none"> a) Design and build a robot chassis that can complete a game-based challenge while researching ways in which robotics is used in your community. b) Get to know your kit of parts. c) Explore real-world chassis designs. d) Introduce movement, control, and power. 	15 hours
Make it Move	<ul style="list-style-type: none"> a) Configure and program a robot to perform driver-controlled movements. b) Develop and troubleshoot driver-controlled programs. c) Collect data about your robot using telemetry. 	25 hours
Programming Autonomous Robots	<ul style="list-style-type: none"> a) Develop and troubleshoot autonomous programs and sensors. b) Explore the differences between driver-controlled and autonomous modes. c) Explore sensor configuration and functions. 	20 hours
Introduction to Servo Motors	<ul style="list-style-type: none"> a) Explore how servo motors can improve robot movements. b) Compare servo and standard motors. c) Program and test a servo using autonomous and driver-controlled modes. 	5 hours
Building and Programming Manipulators	<ul style="list-style-type: none"> a) Build and program an arm and manipulator that works in autonomous and driver-controlled modes. b) Research basic arm and manipulator designs. c) Program and test a robotic manipulator in autonomous and driver-controlled modes. 	5 hours
Endgame	<ul style="list-style-type: none"> a) As a team, present the final innovative solution and showcase your robot in the <i>FIRST</i> robot game. b) Present your innovative robotics solution. c) Demonstrate your robot by participating in the <i>FIRST</i> robot game. 	10 hours