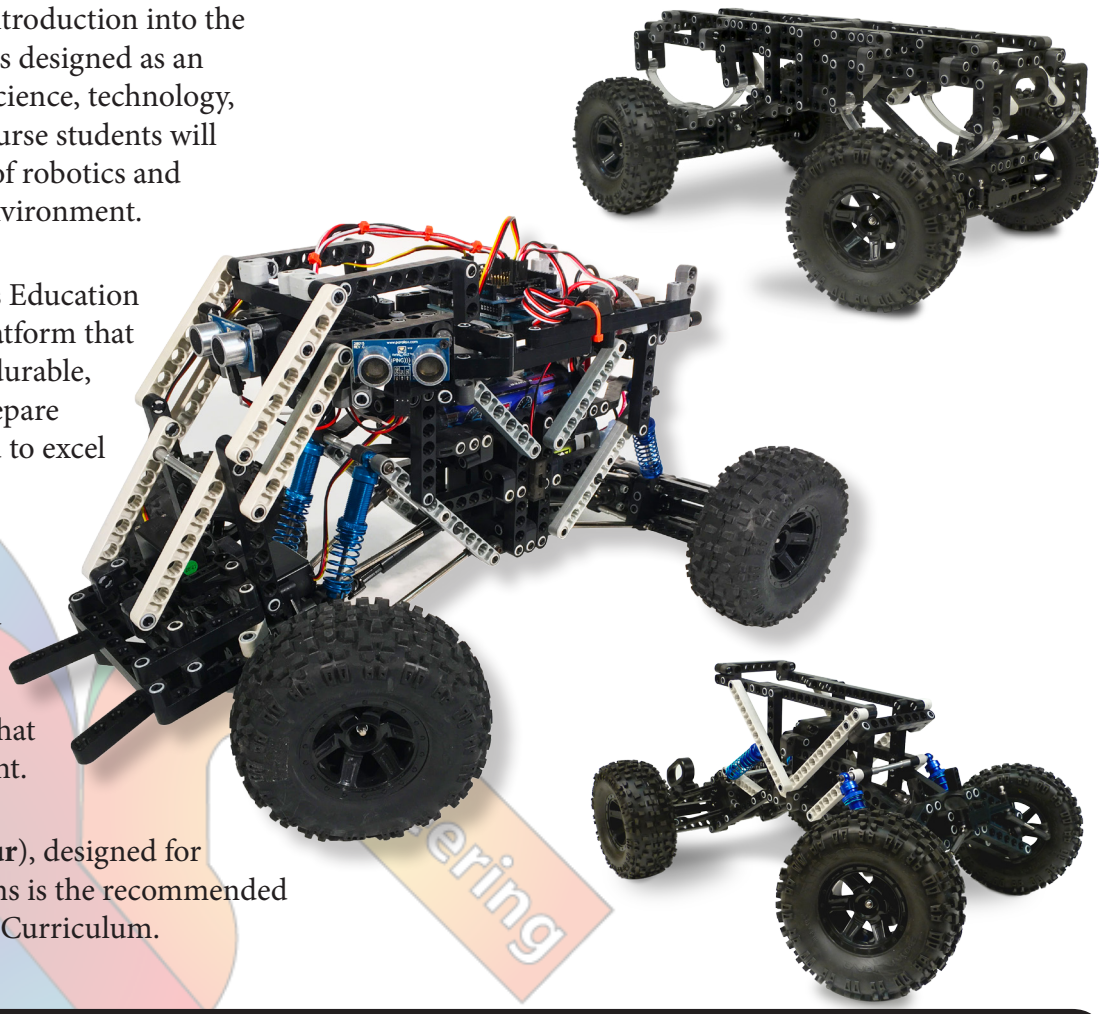
FOUNDATIONS TO ROBOTICS | INTRODUCTION TO STEM ROBOTICS

MINDS-i STEM INTEGRATED ROBOTICS: **FOUNDATIONS LAB – 4x4**

The Foundations Lab 4x4 is an introduction into the world of STEM and Robotics. It is designed as an interactive approach to applied science, technology, engineering and math. In this course students will become familiar with the basics of robotics and programming in a team based environment.



STEM as a System

MINDS-i is rocking the Robotics Education world with a high-technology platform that is simple to use, extraordinarily durable, infinitely modifiable, and will prepare students with the skills they need to excel in the 21st century.

Continuous Learning and Improvement

We inspire a rigorous college and career relevant experience through STEM Robotics in the everyday classroom in a format that can impact each and every student.

Course Design

Each lab is one semester (**90 Hour**), designed for three to five students. Foundations is the recommended prerequisite to the Drones Lab + Curriculum.

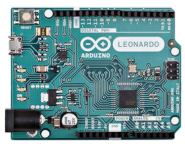
Gear Reducer

Tachometer

Multimeter

Torque meter

RC Control



Controller

Catapult

Allegheny Educational Systems, Inc.

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Tarentum, PA 15084
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MINDS-i®

MCK-FDLB-4X4

Curriculum Outline - 90 Hour

Unit 1: Introduction to MINDS-i
- 1.1 Introduction to MINDS-i
- 1.2 Student Performance Development Process
- 1.3 What is a Robot?

Unit 2: Continuous Learning & Improvement
- 2.1 Model for Inquiry
- 2.2 The Importance of Data
- 2.3 Parts & Purposes
- 2.4 Simple Machines

Unit 3: Variable of Force & Motion
- 3.1 Force & Motion
- 3.2 Parts & Purposes
- 3.3 Gear Ratios; Speed & Torque
- 3.4 Friction
- 3.5 Inertia

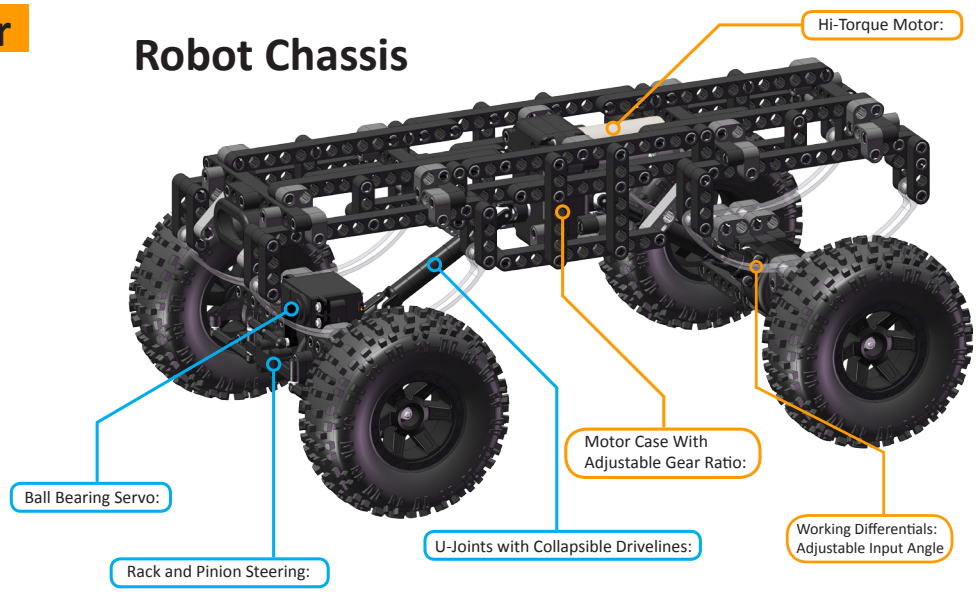
Unit 4: Software Programming; Sensors & Servos
- 4.1 Why Programming?
- 4.2 Parts & Purposes
- 4.3 Testing the Micro-controller
- 4.4 Creating the Breadboard; Servo
- 4.5 Adding to the Breadboard; Esc
- 4.6 Adding to the Breadboard; Radio Transmitter
- 4.7 Adding to the Breadboard; Ultrasound Sensor
- 4.8 Adding to the Breadboard; QTI Sensor
- 4.9 Core Syntax

Unit 5: Autonomous Robotics
- 5.1 What Makes a Robot Autonomous
- 5.2 Basic Control Structures
- 5.3 Autonomous Obstacle Avoidance
- 5.4 Line Following

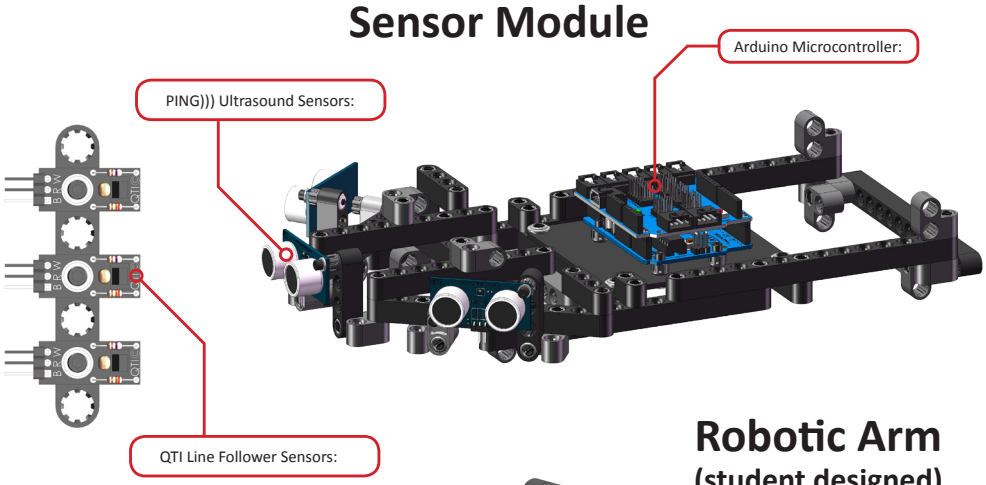
Unit 6: Mechanical & Structural Engineering
- 6.1 Levers, Cams & Span
- 6.2 Structural Design
- 6.3 Robot Arm & End of Arm Tool

Unit 7: Culminating Project
- 7.1 Preparing for the Challenge
- 7.2 Cleanup / Organizing

Robot Chassis

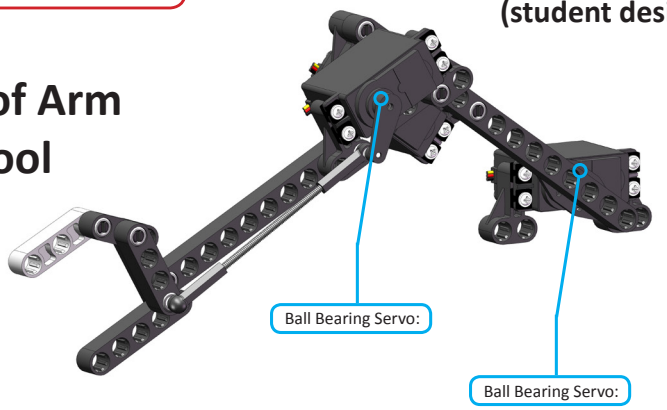


Sensor Module



Robotic Arm (student designed)

End of Arm Tool



STEM Integrated Robotics Foundations covers a multitude of engineering concepts including
- Programming
- Physics
- Mechanical Systems
- Electrical and Electronic Systems
- Hands on Activities and Capstone Projects in each Semester

Arduino Programming Software & Leonardo Hardware

- 20 digital I/O pins
- 7 PWM channels
- 12 analog Input channels (with ADC)
- Serial & I2C communication ports
- 32 KB flash memory & 16 MHz
- Full set of sample code in library
- Windows 10, OS X & Linux Ready
- Digital ports can operate servos, motors and sensors