

Arduino Materials List

The following materials are needed to complete the *Physical Computing with Arduino* CodeHS course. Students can work in groups (2-3) or individually through the course. Having groups larger than 3 students is not recommended.

Item (with link)	Amount (per group)	Descriptions/Notes
Arduino Uno with USB cable	1	This microcontroller is used in every project. There are many knock-off Arduino boards that have the same capabilities as the original (ELEGOO is a great choice.)
External Battery Connector	1	An external battery will allow programs to run on the Arduino while unplugged from the computer. You'll also need a 9V battery to connect to each Arduino. Though the Arduino can be run using computer power, there are many scenarios where students will want to run their programs without being tethered to the computer.
Breadboard	1	This component is used in every project. There are many companies and amounts to choose from, though we suggest having an 830-point board for each group of students.
Alligator Clip Jumper Wires	1-3	To connect components to one another before introducing how to use a breadboard, alligator clip jumper wires are recommended. This is a good way to scaffold the content for students before diving into using breadboards.
Alligator clip to Male Jumper Wires	1-3	To connect components to the Arduino before introducing how to use a breadboard, alligator clip to male jumper wires are recommended. This is a good way to scaffold the content for students before diving into using breadboards.
LEDs	10-15	LEDs are used in many projects throughout this course. A variety of colors is suggested. Pay attention to the voltage for each color when selecting resistors.
Resistors	10-20	Resistors are used in almost every project in the course to limit the amount of current flowing through various components. Due to the long, skinny legs of resistors, students may struggle getting them into the breadboard. For this reason, it might be helpful to have a pair of wire cutters on hand. It is helpful to have an assortment of resistor strengths on hand.
Male-to-Male Wires	15-30	Wires are used in every project to connect components from the breadboard to the Arduino and to one another. Though there are many different types available, we highly suggest male to male jumper wire with plastic ends. Using wire that has simply been stripped at the ends can cause a lot of frustration for students and leads to broken wires getting stuck in the breadboard.

Potentiometers	1-2	The resistance value of the potentiometer does not make much of a difference in our programs.
Micro Servo Motors	2-4	Servo motors are used in a variety of projects and are helpful to have on hand when students reach the advanced micro:bit module. They are pretty inexpensive and can be bought in bulk.
Buttons	2-5	There are many types of buttons available. Be sure to purchase buttons that have 4 connection points. The link provided here includes colored caps that can be helpful in differentiating one button from another as students begin to create programs with multiple buttons.
Ultrasonic Range Finder	1	Be sure to purchase an HC-SR04 ultrasonic range finder as this is the type that will be utilized throughout the course and requires the least amount of power to function.
Photoresistors	1	Photoresistors are an extremely inexpensive sensor that is studied in the course. Since these components are very tiny, it is helpful to have a few extra on hand for those that break or go missing.
TMP36 Temperature Sensor or Thermistor	1	Students will explore temperature using either a TMP36 temperature sensor or a thermistor in lesson 2.4. Since these components are very tiny, it is helpful to have a few extra on hand for those that break or go missing. For the thermistors, be sure to purchase an NTC type sensor and note the resistance of the sensor purchased, as the resistor used when plugging the sensor the Arduino must be comparable in resistance.
DC Hobby Motors	2-4	DC motors are used throughout the course. It is recommended to also have propellers on hand so students can physically see speed differences as the motor moves. You can find many motor kits that include many different motors and propellers, but many of these require you to solder the wires on to the motor yourself. Be sure to purchase a set where motors have wires already attached if you are unable to solder.
L293D Motor Driver	1	To safely and successfully control motors in this course, we will use a motor driver. There are many different kinds available but if you want students to be able to directly follow along with the course, this is the motor driver you'll need.
16x2 LCD Screen	1	LCD screens are a great way to provide textual information to a user and are used in the final module of the course. These components should be between \$5 and \$10 but it is difficult to find individual ones that have pre-soldered connections. Be sure to check that the module is pre-soldered if you do not have access to solder the connections yourself.

Note: In module 3, students will explore additional external sensors on their own. The cost for these additional sensors should be built into the class budget. There are [many sensor](#) kits available (as well as [Arduino kits](#) that provide many of the materials on this list), but if you want to purchase them separately, you may need to solder parts to each sensor. Here are some ideas for sensors: [Temperature & Humidity Sensor Module](#), [3-Axis Accelerometer](#), [Tilt](#), [Avoidance](#), & [Tracking](#).