

2024 – Lake Superior College – Advanced GenCyber Camp

**Welcome** to the 2024 Lake Superior College Advanced Gencyber Summer camp! In this module, we will be working with Arduino’s! Arduino is an open source hardware and software platform that allow to make interactive projects! People have created everything from water leak sensors, smart robots, to even mosquito targeting lasers! There are tons of fun things that you can do with the Arduino kit and plenty of things that you can build!

Today we’re going to do some entry level labs.

## Module 1: Hello Arduino

**Wiring**

No external wiring is needed.

**Code**

void setup() {

pinMode(LED\_BUILTIN, OUTPUT);

}

void loop() {

digitalWrite(LED\_BUILTIN, HIGH);

delay(1000);

digitalWrite(LED\_BUILTIN, LOW);

delay(1000);

}

Try changing the values of the delay? What happens when you lower the value? What happens when you increase the value?

Module 2: Light an LED

**Wiring**

* Connect the cathode (shorter leg) of the LED to GND on the Arduino.
* Connect the anode (longer leg) of the LED to pin 13 on the Arduino.

**Code**

void setup() {

pinMode(13, OUTPUT);

}

void loop() {

digitalWrite(13, HIGH);

delay(1000);

digitalWrite(13, LOW);

delay(1000);

}

Module 3: LED with Button

**Wiring**

* Wire a pushbutton with one pin connected to pin 2 and the other pin to GND.
* Pull-up resistor setup: Activate internal pull-up resistor in the Arduino by setting pinMode(2, INPUT\_PULLUP);
* LED as in Module 2.

**Code**

void setup() {

pinMode(9, OUTPUT);

pinMode(2, INPUT\_PULLUP);

}

void loop() {

int buttonState = digitalRead(2);

if (buttonState == LOW) {

digitalWrite(9, HIGH);

} else {

digitalWrite(9, LOW);

}

}

How is this working? What happens if you flip the button states? Play around with the code a bit to see what you can do!

Module 4: Play a Tone

**Wiring**

* Connect one pin of the piezo buzzer to pin 8 and the other to GND.

**Code**

void setup() {

pinMode(8, OUTPUT);

}

void loop() {

tone(8, 440); // Play a 440 Hz tone

delay(1000);

noTone(8);

delay(1000);

}

What happens if you change the frequency? Or the delay? Play around and have fun with the beeps!

Module 5: RGB LED Control

**Wiring**

* Connect the common cathode of the RGB LED to GND.
* Connect the red, blue, and green anodes to pins 13, 12, and 11 respectively.

**Code**

void setup() {

  pinMode(11, OUTPUT);

  pinMode(12, OUTPUT);

  pinMode(13, OUTPUT);

}

void loop() {

  digitalWrite(11, HIGH);   // Red

  delay(1000);

  digitalWrite(11, LOW);

  digitalWrite(12, HIGH);  // Green

  delay(1000);

  digitalWrite(12, LOW);

  digitalWrite(13, HIGH);  // Blue

  delay(1000);

  digitalWrite(13, LOW);

}

Are you having trouble getting it to work? Be sure to check out the Arduino documentation in the GitHub repository. Page 47 might help!

Once you get it working properly, play around with switching the wires, what works and what doesn’t? Can you change the code to make a cool pattern? Can you integrate this with a light? Try something!

Module 6: Potentiometer Basics

**Wiring**

* Connect one side of the potentiometer to 5V and the other side to GND.
* Connect the middle pin of the potentiometer to A0.

**Code**

void setup() {

  pinMode(A0, INPUT); // Set A0 as input for potentiometer

  pinMode(9, OUTPUT); // Set pin 9 as output for LED

}

void loop() {

  int sensorValue = analogRead(A0); // Read the potentiometer value

  int brightness = map(sensorValue, 0, 1023, 0, 255); // Map the potentiometer value to PWM range

  analogWrite(9, brightness); // Set the brightness of the LED

  delay(10);

}

Does this work how you thought it would? What else could you control other than a light? Get creative and try it out!

This teaches you some of the basics. How to read inputs, how to program outputs, etc. Not quite sure how to use a component? Check out some other built-in example modules to learn more! [Built-in Examples | Arduino Documentation](https://docs.arduino.cc/built-in-examples/)

Looking for a bonus project? There are many things that you can do with Arduino’s! For example, I have some sitting in my server rack at home monitoring and reporting the temperature. If you’re looking for something fun to do, you can program the Arduino using an LCD screen to display the temperature and humidity. Wondering how? Look it up online! There are many tutorials. Maybe you can even have it play a warning beep if it gets too hot!