

Bay County Scientist in Residence Project  
Lesson Plan

**Session 2: Wednesday, February 22 (1-4 PM central)**

Topic: 3D Printing, Part II & Introduction to Arduino

Materials Needed: 3D Printers, PLA 1.75 mm filament, Cura or other compatible slicing software pre-loaded on laptops, Wi-Fi access.

**Learning Objectives (from grant application):**

1. Students will be able to select a model from the sharing site Thingiverse and print it on a 3D printer.
2. Students will be able to use software to create a 3D design with multiple parts, print it on a 3D printer and assemble the parts.
3. Students will be able to demonstrate how to use a 3D printer, including how to change filament reels and troubleshoot common technical problems.
4. Students will be able to discuss the legal, intellectual property, and environmental issues related to 3D printing.
5. Students will be able to demonstrate basic coding skills and will know where to find coding resources to answer questions.
6. Students will be able to explain the Hour of Code and Girls Who Code movements and how to get involved.
7. Students will be able to describe the basic functioning of an Arduino microcontroller board.
8. Students can demonstrate how to configure an Arduino to communicate with hardware.
9. Students will be able to define the terms code, Arduino, microcontroller board, robot, voltage, current, motor and sensor.
10. Students will be able to build and operate a basic robot.

**Assignments to be completed BEFORE this class:**

- Post something on the Florida Panhandle STEM Programming Facebook page. This can include photos from class, questions, observations or comments. Participants are also encouraged to post on their organization's Facebook page.
- Watch the following videos about Arduinos:
  - An Introduction to the Arduino, Make Magazine - <https://youtu.be/CqrQmQqpHXc>
  - Jeremy Blum tutorial – Getting Acquainted with Arduino - <https://youtu.be/fCxzA9 kg6s> (This video series is recommended by Jason)

**Class Outline for 3D Printing, Part II:**

- Students are invited to bring .stl files to class to be printed on the 3D printers. The class will discuss these prints.

- Students will learn about slicing software settings, and how changes impact the quality and print time of each print.
- Students will learn the parts of a 3D Printer: extruder, hot end, nozzle. The Scientist in Residence, Jason Scott, will explain how to remove and load filament, change colors, and remove clogs. In groups, participants will practice pre-heating the hot end and removing and loading filament.
- Jason will present an overview of the Arduino controlled robot vehicle we are going to assemble and program in class.

**Post-class Assignment:**

- Post something on the Florida Panhandle STEM Programming Facebook page. This can include photos from class, questions, observations or comments. Participants are also encouraged to post on their organization's Facebook page.
- View the videos posted by Jason on the Facebook page about how breadboards work.
  - <https://www.youtube.com/watch?v=fq6U5Y14oM4>
  - [https://www.youtube.com/watch?v=q\\_Q5s9AhCR0](https://www.youtube.com/watch?v=q_Q5s9AhCR0)
- Also watch this video about hobby servos, <https://youtu.be/uldEdCDBU-E>.
- If you will be bringing your own computer to the next class, please go ahead and install the Arduino IDE. Go to <https://www.arduino.cc/en/Main/Software> and choose Windows installer (or Mac if that is what you have).

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