

# Certificate in Innovative Making

## Hardware Design Basics Workshop

**Monday and Wednesday, 4:00PM - 5:30PM**

**Location: The Internet**

**Office Hours: [Calendly](#)**

### Instructors

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### Teaching Assistant

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### Course Description

This hands-on course introduces hardware design and programming to a general audience. Students will cover the knowledge needed to craft interactive experiences using microcontrollers, electronics, and programming. Students will experiment with circuitry, breadboarding, and designing for the Arduino while developing small-sized simple circuits. No prior hardware experience is required.

### Learning Goals

- Understand the basic concepts behind hardware design and development.
- Design, program, and implement a small hardware project on readily available technology.
- Design experiences that leverage the unique affordances of specific hardware components.

### Required Materials (provided)

- *Arduino MKR Kit*

### Assignment due dates/rubric

- Weekly exercises will be due, when assigned, the following **Monday**.
  - Exercises are graded on a Pass/Fail basis.
- The final project is due **Week 5**.

### Grade Distribution

- 100% weekly work
  - Divided equally from weeks 1-5. Graded Pass/Fail.

<h3>Schedule</h3>
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### **Week 1. Blinky**

Explore basic concepts behind simple electronics components and breadboarding. Set up the Arduino IDE and familiarize yourself with it. Build the Arduino Blinky circuit, then modify the circuit to make it your own.

**Assignment:** Build the Arduino Blinky example. Modify the Blinky example by adding a new input (for instance, capacitive touch).

**Reading (suggested):** Resource Guide Plan (D2L), Idea Realization Lab tour [video](#), [How Tinkering and “Problem Making” Are Shaking Up Higher Education](#).

### **Week 2. Puzzle Box**

Learn about buzzers, RGB LEDs, potentiometers, LCD screens, and servo motors. Discuss additional components in the Arduino MKR kit and how they might be utilized in the future. Learn about the Idea Realization Lab remote services and how you might utilize them for your projects.

**Assignment.** Build the Puzzle Box using the example found [online](#). Modify the Puzzle Box using additional inputs/outputs found in the MKR kit and/or in the Blynk application.

**Reading (suggested):** Arduino Blynk App Reference Doc (on D2L), Servo Library Reference Doc (D2L).

### **Week 3. The Nerd**

Learn about phototransistors, batteries, storing data in flash memory, and managing battery life through low power mode. Discuss the final project proposal and brainstorm ideas for final projects. Q&A session about DePaul’s new Industrial Design program.

**Assignment.** Build The Nerd using the example found [online](#). Modify The Nerd using additional inputs/outputs, or other concepts you’ve learned so far in the course (for instance, using Blynk).

**Reading (suggested):** Reality Editor [video](#).

### **Week 4. Plant Communicator**

Learn about temperature sensors, moisture sensors (and building your own sensors), using “if this then that” logical services, and sending HTTP requests.

**Assignment.** 1) Build the Plant Communicator using the example found [online](#). Modify the Plant Communicator using additional inputs/outputs, or other concepts you’ve learned so far in the course (for instance, using Blynk). 2) Submit your final project proposal.

**Reading (suggested):** Creating Conference Badges [video](#).

### **Week 5. Personal Project**

Early in the week, we will showcase our “works-in progress.” Following that, students will finalize and submit their final projects for review.

**Assignment.** Design, develop, and submit your final project. Project must have, at a minimum, two inputs and two outputs, and create a feeling of surprise and delight.

**Reading (suggested):** [What's the Value of Hackable Hardware, Anyway?](#)