

## Programming Digital Media -- Core

### Course Description

Programming Digital Media introduces a broad array of topics related to digital media through project-oriented programming of graphics, audio, and hardware applications. The motivation for this course is to provide a basic introduction to computer programming using subjects that are relevant or appealing to students who are new to technological fields of study, with little to no prior programming experience. The course is presented in five segments, introducing coding, covering three distinct areas in digital media, plus a final integration project of these areas. There is a strong emphasis on computer programming tasks throughout, and the hands-on exercise of digital media tools in class is required. After an introduction to coding concepts, the first media topic introduces real-time graphics rendering and user interaction. The second introduces sound design. The third introduces basic electronics and physical computing. Finally, communication mechanisms are used allowing the disparate elements of graphics, sound, and hardware to be composed into interactive projects.

### Course Objectives

- Demonstrate reasoning skills, cognitive constructive capabilities, and computational thinking
- Provide students with a solid foundation in common paradigms of computation, and integrate these skills with their own interests
- Develop competencies in Basic Programming Skills, Graphics for the Web, Sound for the Web, and Physical Computing
- Demonstrate these competencies through a final project that integrates Graphics, Sound, and Physical Computing into a deliverable artifact
- Develop interest and confidence in working with digital media and computers so that students are enabled to consider a career that utilizes creative coding

### Assessing Performance

Students are assessed by obtaining weekly grades on the following: Work Ethic, Quizzes, and Coding Challenges.

### Course Essentials

Equipment	Cost/Unit
Consumable material	\$200
Reusable material	\$800-1200 for Arduino based physical computing kits
Classroom set of computers	\$0 if you already have some, \$600-800 per computer if you need to purchase

### First Semester

<b>Unit 1: Introductory Coding Skills</b>	Beginner coding skills in JavaScript. Topics cover working in a text editor, how to utilize assets/media in a project, understanding variables/arrays, building functions, class/object-based programming, debugging, and more
<b>Unit 2: Graphics for the Web</b>	Procedural graphics and animation for interactive web graphics in P5.js. Topics cover drawing on a 2D canvas (coordinates, location, etc.), simple geometric shapes, working with images/understanding filepaths, and animating with sprite sheets

### Second Semester

<b>Unit 3: Sound for the Web</b>	Web audio for sound design and music in digital media projects using Tone.js Topics include sound files, effects, synthesizers and sequencing
<b>Unit 4: Physical Computing</b>	Designing Human-Computer Interaction with digital media projects through simple circuits and sensors using Arduino. Topics include basic circuit prototyping, analog input/output, digital input/output, and serial communication with web-based projects
<b>Unit 5: Final Integration Project</b>	Student-designed final projects. Students propose a project that will demonstrate integration of all three topics covered throughout the course – graphics, sound, and physical computing. Once approved by the instructor, students work to complete their project and present it at the conclusion of the semester.



## PROGRAMMING FOR DIGITAL MEDIA

### 1. Materials

A desktop or laptop computer, access to 1-to-1 daily, and Internet. Chromebooks will not work.

Hardware/Reusable Material	Recommended Unit	Cost/Unit
Arduino Starter Kits (Sunfounder Basic Starter Kit with Arduino Uno Board) <a href="https://www.sunfounder.com">https://www.sunfounder.com</a> (Cannot be shared between sections)	1 per student	\$50
<b>Consumable Material</b>		
Annual consumable materials to replenish Arduino supplies.	1/Classroom	\$150
<b>Software</b>		
Arduino IDE	1 per student	Free on PC

### 2. Required software, networking access, and access to LSU servers

- Teachers will need to be able to share documents via Google drive with LSU Instructors.
- Free software to install on each computer: VS Code, [Arduino IDE](#), [P5SerialControl](#), and [Arduino Create Plugin](#).
- Principals will need to communicate with the district's information technology department to ensure that there are no technological restrictions that block access to servers in the lsu.edu or lsupathways.org domains. In addition, students must be able to access the following websites:

<a href="http://p5play.molleindustria.org">p5play.molleindustria.org</a>	<a href="http://codepen.io">codepen.io</a>	<a href="http://tonejs.github.io">tonejs.github.io</a>
<a href="http://editor.p5js.org">editor.p5js.org</a>	<a href="http://create.arduino.cc">create.arduino.cc</a>	<a href="http://lunapic.com">lunapic.com</a>
<a href="http://ezgif.com/sprite-cutter">ezgif.com/sprite-cutter</a>	<a href="http://youtube.com">youtube.com</a>	<a href="http://github.com">github.com</a>
<a href="http://freesound.org">freesound.org</a>	<a href="http://p5js.org">p5js.org</a>	<a href="http://www.sprisers-resource.com">www.sprisers-resource.com</a>

### 3. Required teacher collaborations

Teachers will communicate with LSU instructors via a Google group set up for this purpose.

### 4. Required administration of course content, pre/post-test, and research instruments

All required materials and instruments will be either posted in a Google drive or their location announced via the Google group for this course.

### 5. Other

As this is a project-based learning class, we strongly suggest that each section of the course be limited to a *maximum* of 20 students.