



# Modifying the ECS Curriculum for Arduino

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## Motivation

The ECS (Exploring Computer Science) curriculum currently stands as a proven system for teaching introductory computer science to high school students.



However, when moving from the Mindstorms platform to the Arduino platform for Unit 6, part of the curriculum must be adapted.

## Technical Motivations

The current curriculum has students making robots using LEGO® Mindstorms. On the Arduino, these projects become impractical and expensive. Therefore, the revised curriculum uses simpler components and projects to achieve the same learning goals

## Standards

ECS has been a successful program. However, it was not built on accepted curricular standards. Teachers are used to, and expected to use standards when teaching classes. As such, we have built the modified curriculum on the Computer Science Teachers Association (CSTA) standard.



## Curriculum

	Description	Skills Focus	Assessment
Days 1 – 15, Theory	Students are introduced to the Arduino, Ardublocks, and algorithmic thinking	Learning about functions, software design, and control structures used to simplify coding	There is no direct assessment during this period as it is primarily introduction
Days 16 – 20, Project 1	Chip Tunes – Students write a melody using Ardublocks	Use of Control structures to simplify code, Writing code in groups	Complexity of resulting melody, use of loops and recursion.
Days 21 – 23, Project 2	Theremin – Students create a simple theremin using an ultrasonic sensor	Software design and development, AKA debugging algorithms	Precision, consistency, and responsiveness of the Theremin
Days 24 – 33, Project 3	Piano – Students create a 'piano' using several photo-resistors	Use of predefined functions, Writing code in groups	Quality of the Piano, simplicity of the code, and work done in group

## Focus of Curriculum

The ECS Curriculum exists as an introduction to computer science, not as an introduction to programming. Thus, the focus is less on programming skills and more on computational thinking and collaboration. The updated curriculum thus uses CSTA standards 5.3.A.CT and 5.3.A.CL, which summarize expectations for high school students in group work, as well as in implementing algorithms and basic software.

References:  
csta.acm.org  
www.exploringcs.org

## Curriculum Design

Because of the proven success of the ESC curriculum, the new curriculum for Unit 6 follows a similar structure as the original Unit 6 but with new focus given by the standards choices. Reflecting this, students will be assessed on the functionality of their projects, their software design, and their participation in their group.

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