"Computer Science Discoveries is an introductory course that empowers students to engage with computer science as a medium for creativity, communication, problem solving, and fun!"

Online Class supported by https://studio.code.org (Engineers from Amazon, Google, and Microsoft helped create these materials.)

Section: **CS 8-9/ Mrs. Sotnikova**

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**Unit 1 - Problem Solving**

Through a series of puzzles, challenges, and real world scenarios, students are introduced to a problem solving process that they will return to repeatedly throughout the course. Students then learn how computers input, output, store, and process information to help humans solve problems. The unit concludes with students designing an application that helps solve a problem of their choosing.

**Unit 2 - Web Development**

In the Web Development unit, students are empowered to create and share the content on their own web pages. They begin by thinking about the role of the web, and how it can be used as a medium for creative expression. As students develop their pages and begin to see themselves as programmers, they are encouraged think critically about the impact of sharing information online and how to be more critical content consumers. They are also introduced to problem solving as it relates to programming, as they learn valuable skills such as debugging, commenting, and structure of language. At the conclusion of the unit, students compile their work to create a personal website they can publish and share.
Unit 3 - Interactive Games and Animations

In the Interactive Games and Animations unit, students build on their coding experience as they create programmatic images, animations, interactive art, and games. Starting off with simple, primitive shapes and building up to more sophisticated sprite-based games, students become familiar with the programming concepts and the design process computer scientists use daily. They then learn how these simpler constructs can be combined to create more complex programs. In the final project, students develop a personalized, interactive program. Along the way, they practice design, testing, and iteration, as they come to see that failure and debugging are an expected and valuable part of the programming process.

Unit 4 - The Design Process

The Design Process unit transitions students from thinking about computer science as a tool to solve their own problems towards considering the broader social impacts of computing. Through a series of design challenges, students are asked to consider and understand the needs of others while developing a solution to a problem. The second half of the unit consists of an iterative team project, during which students have the opportunity to identify a need that they care about, prototype solutions both on paper and in App Lab, and test their solutions with real users to get feedback and drive further iteration.

Unit 5 - Data and Society

The Data and Society unit is about the importance of data in solving problems and highlights how computers can help in this process. The first chapter explores different systems used to represent information in a computer and the challenges and tradeoffs posed by using them. In the second chapter students learn how collections of data are used to solve problems, and how computers help to automate the steps of this process. In the final project, students gather their own data and use it to develop an automated solution to a problem.

Unit 6 - Physical Computing

In the Physical Computing unit, students further develop their programming skills, while exploring more deeply the role of hardware platforms in computing. Harkening back to the Input/Storage/Processing/Output model for a computer, students look towards modern “smart” devices to understand the ways in which non-traditional computing platforms take input and provide output in ways that couldn't be done with the traditional keyboard, mouse, and monitor.

Using App Lab and Adafruit's Circuit Playground, students develop programs that utilize the same hardware inputs and outputs that we see in many modern smart devices, and they get to see how a simple rough prototype can lead to a finished product. The unit concludes with a design challenge that asks students to use the Circuit Playground as the basis for an innovation of their own design.

Assessment will be based on:

- Project Journaling (60%)
- Tutorials (20%)
- Projects completion/presentations (20%)

- There will NOT be a final exam.
- Students may earn bonus marks through extra work.
Project Journaling

Students are required to keep a journal outlining their daily progress on their assignments for this credit. They are encouraged to also reflect on their learnings during the lessons.

- What did you learn today?
  - What evidence demonstrates what you learned?
- What troubleshooting techniques did you use when you experienced bugs?
  - Try to find answers (i.e., Google, peer) before calling the teacher over. In industry, you would have to try to problem-solve individually.
  - If you did Google a problem, what search terms did you use?
- How do specific concepts make sense to you?
- Did you accomplish something cool today?
- What are you doing next class? Where did you leave off?