CS O Courses

Computer Science Courses

- CS 1
  - First CS course at the college level (designed for CS majors)
  - AP CS
- CS 0
  - Before the first CS course
  - Proposed AP CS Principles
- Useful, but not central to CS
  - typing (“keyboarding”), using Microsoft Office, or designing graphics
  - Using/driving a car vs. designing a car (maybe a self-driving car!)

CS 0

- CS Principles
  - Started with support from National Science Foundation (NSF)
- ECS (Exploring CS)
  - Started in Los Angeles (LA) Unified School District
- Other “programming-centric” courses, but not at the AP CS level

Terminology (just in case)

- Computer hardware
  - Tangible electronic components

- Computer software
  - (Intangible) instructions for the hardware
  - Written by humans in a "programming language" (e.g. C, C++, Java)

  - Programming refers to writing software/programs

CS Principles

- An alternative first CS course in college (for any majors)
- Being designed in collaboration with College Board
  - AP CS Principles
  - Being led by a commission of 10 teachers and professors
- csprinciples.org

Timeline (from CE 21 meeting)

- 2009-10
  - Big Ideas, Practices, Claims/Evidence [relatively high-level concepts]
- 2010-11
  - Pilot I: 5 colleges
- 2011-12
  - Pilot II: 10+ colleges, 10+ high schools
- 2012-13
  - Pilot III
- 2013-
  - Develop concrete AP course and exam, professional development
- 2015-16 (?)
  - First AP course and exam

Attestation

- http://www.csprinciples.org/home/about-the-project/attestation
- By May 2011, 82 colleges have attested to "my college's intent for use of the proposed AP Computer Science Principles Exam by awarding college credit and/or placement within our program." They include:
  - Carnegie Mellon
  - Georgia Tech
  - Princeton
  - Stanford
  - UC Berkeley
  - and Florida Tech ☺
- More than College Board required at that time

Big Ideas in CS Principles (from College Board)

- **Creativity**: Computing is a creative activity.
- **Abstraction**: Abstraction reduces information and detail to facilitate focus on relevant concepts.
- **Data**: Data and information facilitate the creation of knowledge.
- **Algorithms**: Algorithms are used to develop and express solutions to computational problems.
- **Programming**: Programming enables problem solving, human expression, and creation of knowledge.
- **Internet**: The Internet pervades modern computing.
- **Impact**: Computing has global impacts.

Still flexible for now

- The Big Ideas are quite general
- The pilot sites show how those Big Ideas can be taught
- You could be a pioneer for the next AP course/exam!

Pilot Sites

- http://www.csprinciples.org/home/pilot-sites

Beauty and Joy of Computing

UC BERKELEY

CS Principles Pilot at UC Berkeley

- Beauty and Joy of Computing (BJC)
  - bjc.berkeley.edu
  - Rigorous CS concepts are covered
  - One approach to teaching CS Principles
  - Professional development for teachers (more later)

CS 10 offered at Berkeley

- inst.eecs.berkeley.edu/~cs10
- Lectures: video's are posted
- Textbook: "Blown to Bits" and reading materials are online
- Software: BYOB (a more sophisticated version of Scratch)
- All resources are free!

BJC: Professional Development (Summer 2012 & 13)

- ~20 teachers, university hub, CSTA chapter
- 1 week in-person: tools and hard programming ideas
- 4 weeks of online course: CS 10
- 1 week in-person: exam, HS adaptation
- Monthly support: via local CSTA chapter

- Completing 6 weeks: $1,000 stipend and 200 hours of continuing education credit
- Additional $1,000 for teaching the course

Exploring CS (ECS)

LA UNIFIED DISTRICT

Exploring CS (ECS)

- http://www.exploringcs.org/

- Started in 2008 in Los Angeles Unified School District (LAUSD) to improve diversity in CS
- 300+ students in 2008-09 to 2,100+ in 2011-12

- “implementation plans and/or discussions are underway in Oakland, San Diego, San Jose, Oregon, Chicago, and Georgia.”

ECS Curriculum

- 288-page curriculum
  - http://exploringcs.org/wp-content/uploads/2010/08/ExploringComputerScience-v3.pdf
- lesson plans, exercises, scoring rubric

ECS: Scope and Sequence

- **Human Computer Interaction:** major components of the computer
- **Problem Solving**: basic steps in algorithmic problem-solving
- **Web Design**: creation of Web pages, programs, and documentation for users and equipment.
- **Programming:** design algorithms and programming solutions
- **Computing and Data Analysis**: managing and interpreting data
- **Robotics:** build and program a robot to perform a required task

ECS: Professional Development

- http://www.exploringcs.org/teacher-support
- Beginning ECS Teachers participate in a week-long summer Institute prior to implementation to introduce the instructional philosophy of curriculum, units 1-3 and the first part of unit 4.
- Quarterly Saturday workshops during academic year to focus on Units 4, 5, & 6.
- ECS Coaches who visit teachers' classrooms and provide individualized support.
- Advanced ECS teachers week-long summer Institute with deepened focus on inquiry-based instruction, culturally relevant pedagogy, assessment, and equity.

CS Principles vs Exploring CS

- Goal
  - CSP: a college-level course intended to be an AP course
  - ECS: a high-school course to improve diversity & participation in CS
  - Both can be used as pre-AP CS
- Adoption
  - CSP: 10+ pilot schools nationwide
  - ECS: 20+ schools in LA
- Curriculum
  - CSP: general goals, details are under development and piloting
  - ECS: 280+ pages with lesson plans
- Initial Progress
  - CSP: slower--stakeholders nationwide to agree (faster once it's AP)
  - ECS: faster—schools in one district (slowly spreading to others)

Other Programming-centric courses

Introduction to Programming (in Brevard)

- West Shore (Maria Hedrick)
  - Speaking later in the day
- Bayside
- Edgewood
- … ?
- Florida Virtual School

Computer Programming I @ Florida Virtual School

- http://www.flvs.net/areas/flvscourses/Pages/Course%20Catalog/CourseListing.aspx?CourseID=755

- Python--controlling the motion and sensory capabilities of a robot.
- Java--manipulating graphics, images, and audio.

- Prerequisites: Algebra I, Geometry

Important Note

- A full CS course would be nice
- If not, incorporating some CS materials into existing courses might be appropriate

Questions?