

# ***AP Computer Science: Principles*** **Project Overview**



# *AP Computer Science: Principles*

- **Using Computational Thinking to Model a New Course *Advanced Placement Computer Science: Principles*.**
  - NSF award: \$2,093,450 effective September 1, 2009 and expires August 31, 2012.
- **Principal Investigator: Owen Astrachan, Duke University**
- **Co – PIs:**
  - Amy Briggs, Middlebury College
  - Lien Diaz, The College Board, AP Program

# *AP CS: Principles*

- Not a replacement for the current AP CS A course
- Must be a course for which college credit and/or placement is given (AP)
- Not designed as a required course for majors
- Designed to appeal to a vastly larger and more diverse set of students

# Commission Members

- Don Allen – Troy HS, CA
- Christine Alvarado – Harvey Mudd College
- Stacey Armstrong, Cypress Woods High School, TX
- Owen Astrachan – Duke University (PI)
- Charmaine Bentley – FDR High School, TX
- Amy Briggs – Middlebury College (Co-PI)
- Rich Kick – Newbury Park HS, CA
- Mark Guzdial – Georgia Institute of Technology
- Jody Paul – Metropolitan State College of Denver
- Chris Stephenson – Executive Director, CSTA

# Advisory Group Members

- Duane Bailey – Williams College
- Tiffany Barnes – UNC Charlotte
- Gail Chapman – Director, Leadership and PD, CSTA
- Tom Cortina – Carnegie Mellon University
- Stephen Edwards – Virginia Polytechnic Institute and State University
- Dan Garcia – UC Berkeley
- Joanna Goode – University of Oregon
- Susanne Hambrusch – Purdue University
- Michelle Hutton – President, CSTA
- Deepak Kumar – Bryn Mawr College
- Jim Kurose – U Mass Amherst
- Andrea Lawrence – Spellman College
- Richard Pattis – UC Irvine
- Eric Roberts – Stanford University
- Katie Siek – U Colorado at Boulder
- Beth Simon – UC San Diego
- Larry Snyder – University of Washington
- Lynn Andrea Stein – Olin College
- Fran Trees – Drew University

# AP Computer Science: Principles

- The overarching goal of the proposed project is to develop a robust curriculum for a new Advanced Placement course—*AP Computer Science: Principles*—which will focus on computational thinking and fluency and will equate to a parallel introductory college computing experience.
- Deliverables:
  1. Development of the AP CS Principles course curriculum.
  2. Design of and preparation for two rounds of pilots.
  3. Conduct a series of pilots in both secondary and post secondary settings.
  4. Develop and pilot prototype, computer-based assessment items.

# *AP Computer Science: Principles* Commission

- Develop the Curriculum Framework (Big Ideas, Computational Thinking Practices, Claims and Evidence)
- Review project evaluation data (e.g. College Curriculum Study and course pilot data) to revise the Curriculum Framework
- Recommend prior knowledge and skills for success in the proposed course

# *AP Computer Science: Principles* Advisory Group

- Review and provide feedback on the Curriculum Framework
- Develop draft curricular requirements
- Develop an annotated course outline for pilot courses
- Recruitment for Pilots
- Piloting instructors develop sample syllabi for pilot courses



# *AP Computer Science: Principles*

## **DRAFT Big Ideas**

1. Computing is a creative human activity that engenders innovation, exploration, and knowledge creation.
2. Abstraction is the process of reducing information and detail to focus on concepts relevant to understanding and solving problems.
3. Data and information facilitate the creation of knowledge.
4. Algorithms are tools for developing and expressing solutions to computational problems and for exploring and creating data.
5. Programming results in the creation of executable artifacts.
6. Computer systems and networks enable and foster communication and innovation
7. Computing enables innovation in other fields.

# Overview of Project Evaluation

- Year 1: Develop the Curriculum Framework
  - Determine the project's success criteria
  - Refinement of external evaluation protocol, evaluative questions, evaluation plan
  - Data collection and analysis for Curriculum Framework
- Years 2-3: Course Piloting, Item Prototypes
  - Planning and data collection for piloting, item prototype development
  - Analysis of piloting results (process, outcomes, item prototypes)

# Sample of Evaluative Questions:

- How can the *AP CS Principles* Domain Model be developed so that the proposed course emphasizes the fundamental concepts of computational thinking and fluency without being programming centric while at the same time maintaining the high level of college-equivalent rigor expected for AP courses?
- To what extent will the proposed *AP CS Principles* course increase students' interest, motivation and confidence in pursuing further coursework in computer science and other STEM fields particularly among traditionally under-represented students?

# AP Computer Science: Principles

## Proposed Timeline

