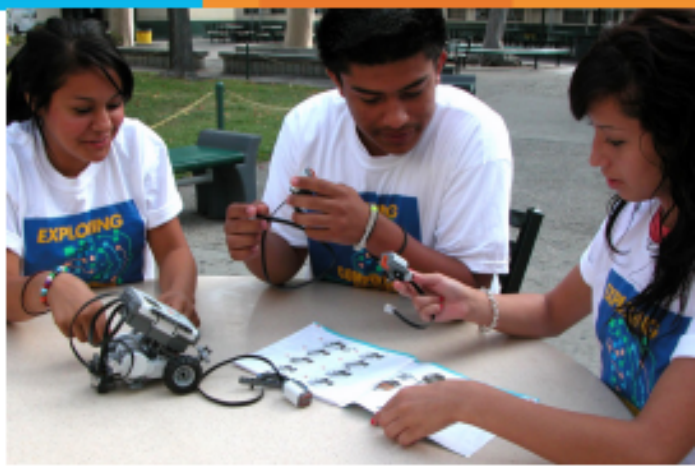
What is Exploring Computer Science?



Computing is involved in nearly every field of study, career and industry today. Exploring Computer Science (ECS) is a high school course that provides students with an introduction to the world of computer science. ECS is a college prep (A-G) and Career Technical Education approved course.

The course consists of 6 units which are approximately 6 weeks each. Assignments and instruction are inquiry and equity based and designed to be socially relevant and meaningful for diverse students. Units utilize a variety of tools/platforms, and culminate with creative final projects around the following topics:

Unit 1 **Human Computer Interaction**

Students are introduced to the concepts of computer and computing while investigating the major components of computers and the suitability of these components for particular applications.

Unit 2 **Problem Solving**

Students become "computational thinkers" by applying a variety of problem-solving techniques as they create solutions to problems in a variety of contexts.

Unit 3 **Web Design**

Students are prepared to take the role of a developer by expanding their knowledge of programming and Web page design and applying it to the creation of Web pages, programs, and documentation for users and equipment.

Unit 4 **Introduction to Programming**

Students are introduced to some basic issues associated with program design and development. Students design programming solutions to a variety of computational problems including animated stories, video games and community based projects.

Unit 5 **Computing and Data Analysis**

Students explore how computing facilitates new methods of managing and interpreting data. Students use computers to translate, process and visualize data in order to find patterns and test hypotheses.

Unit 6 **Robotics**

Students apply previous concepts to the study of robotics and work in small groups to build and program a robot to perform a required task.

For more information, see our website at *www.exploringcs.org.*

ECS Exploring Computer Science

EXPLORINGCS.ORG

Exploring Computer Science

AT A GLANCE

www.exploringcs.org

THE EXPLORING COMPUTER SCIENCE PROGRAM

ECS is a K-12/University national program committed to democratizing computer science knowledge by increasing learnin opportunities at the high school level for all students, with a specific focus on access for traditionally underrepresente students.

CRITICAL COMPONENTS OF THE ECS PROGRAM

To carry out the mission of broadening participation in computing the ECS program has focused on the following essential areas Curriculum, Professional Development, Assessment, and Policy. At the heart of our work is a commitment to Equity. For the 2012-1 school year, 43% of students taking ECS are girls and 90% are students of color.

CURRICULUM

- Introductory year-long high school computer science class focused on foundational computer science concepts and computational practices
- Instructional units: Human Computer Interaction, Problem Solving, Web Design, Introduction to Programming, Computing and Data Analysis, and Robotics
- Daily instructional lesson plans for teachers + supplemental extension resources
- An inquiry-based approach to teaching and learning frames the instructional design of the curriculum
- Culturally relevant lessons designed to be inclusive for all learners
- Modular design allows for substitution of topics for the final two units
- Mapped to national academic standards(NGSS & CCS) , national computing standards (CSTA & ISTE) and California and Illinois state standards(Math/ELA/CTE)
- ECS and CS Principles courses are conceptually and pedagogically aligned and supported by the CS10K project (NSF)

PROFESSIONAL DEVELOPMENT

- Two year model: Summer week long institutes + quarterly PDs throughout the year
- Three focus areas of PD: equity, inquiry, and CS content
- Designed around educational research findings that describe characteristics of effective STEM professional development
- Connected directly to supporting ECS course implementation
- ECS Teacher-Learner-Observer Model: teachers co-plan and co-teach ECS lessons, followed by lesson debrief discussion to discuss lesson strengths and areas for growth
- *Stuck in the Shallow End* research shapes discussions on equity and belief systems in computing classrooms and how this relates to equitable teaching practices in ECS
- Teacher leadership development opportunities provided
- Guiding philosophy: Teacher learning is a process over time

ASSESSMENT

SRI International is currently working with the ECS team to develop assessment measures that are aligned to the ECS course and Computational Thinking Practices. Field testing will take place during the 2013-2014 school year.

POLICY

- Working with local educational leaders to facilitate the offering of ECS in their school settings
- ECS granted status as college preparatory course and CTE in California (Approved as a "g" elective with Career Technical Education credit by the University of California Office of the President)
- Pre-service computing methodology course developed for mathematics and science teachers at UCLA
- Dissemination of materials to policy-makers to support increased access to CS knowledge for all students

ECS is made possible through National Science Foundation suppor