

# Why Our Students Need The New Advanced Placement Computer Science Principles Course



Knowledge of, passion for, and skills with  
computer science will help all students  
whatever their career goals:

Physician

Artist

Software Engineer

Welder

Scientist

Entrepreneur

Musician

President

AP Computer Science Principles embraces the entire field, not simply programming

It is an AP course: designed to be accessible to every student while building knowledge and skills that are endorsed by colleges and universities

# Computational Thinking & Big Ideas

Some of the foundation of AP CS Principles:

- ↙ Communicating
- ↙ Collaborating
- ↙ Developing
- ↙ Creativity
- ↙ Algorithms
- ↙ Internet
- ↙ Impact

# Kidney Exchange Algorithms

60 Lives, 30 Kidneys, All Linked



<http://nyti.ms/Y3sHNL>



Nobel Prize Winner Al Roth of Stanford University

<http://www.bbc.co.uk/news/magazine-20004050>

# Big Data and Cancer Research



Daphne Koller of Stanford University

Cancer Team Trains Computer  
to Evaluate Breast Cancer

<http://med.stanford.edu/ism/2011/november/computer.html>

# Human Computation

Luis von Ahn solves problems by having people use computers. He leverages crowdsourcing to help translate the web into other languages and to digitize old books and newspapers.



Luis von Ahn of Carnegie Mellon University



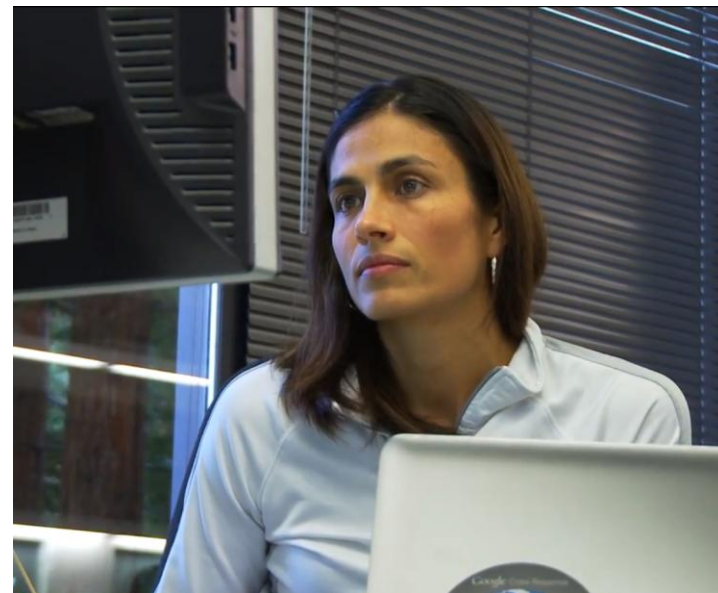
See Bits&Bytes:

<http://nsf.gov/cise/csbytes/newsletter/vol1i1.html>

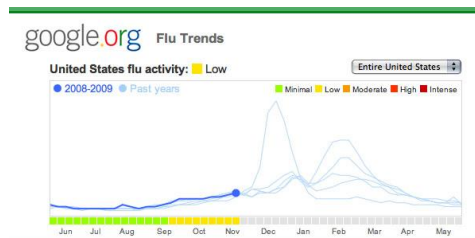
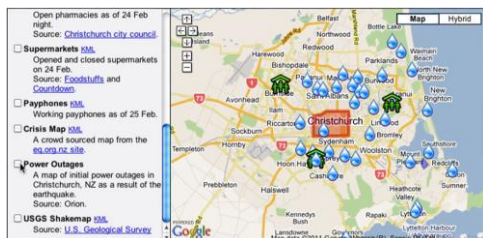
# Crisis Response

As part of Google.org's Crisis Response team, Raquel Romano builds tools to provide information to people after a disaster that is interpretable, accurate and up-to-date.

Raquel also volunteers her time on Google Flu Trends, which is used by the CDC to anticipate flu outbreaks and efficiently allocate resources.



Raquel Romano of Google



See YouTube:

<http://www.youtube.com/watch?v=YwZEDU9bka>



# Chinese Translation



Rick Rashid of Microsoft.

A new translation technique called Deep Neural Networks can take a user's spoken English word, translate it into Mandarin Chinese, and then plays the translation in the user's own voice.

Watch demonstration at:

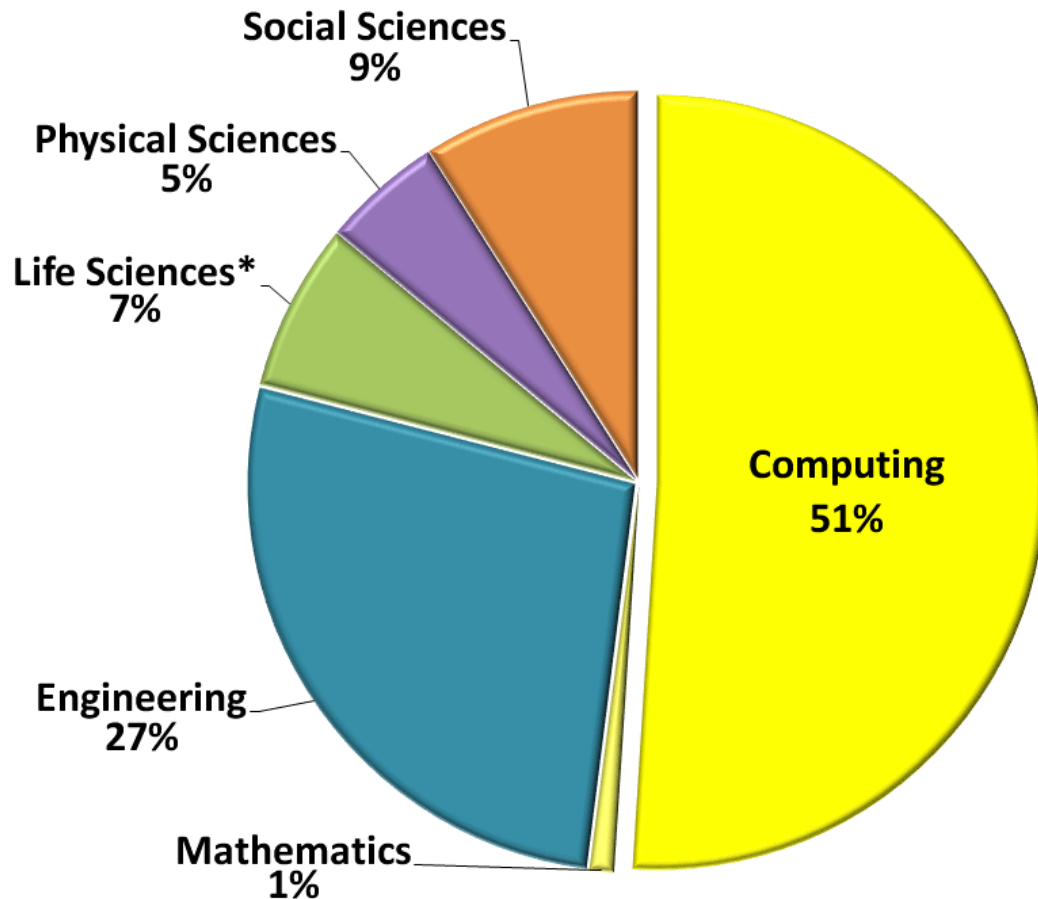
<http://research.microsoft.com/apps/video/default.aspx?id=175450>

# Knowledge and Skills

Knowledge of Computer Science is essential for a cyber-enabled and cyber-capable citizenry

Focusing student learning on using technology enables them to be consumers of technology. Teaching them how to create new technology enables them to be designers, innovators, and problem solvers.

# Where Will the STEM Jobs Be?

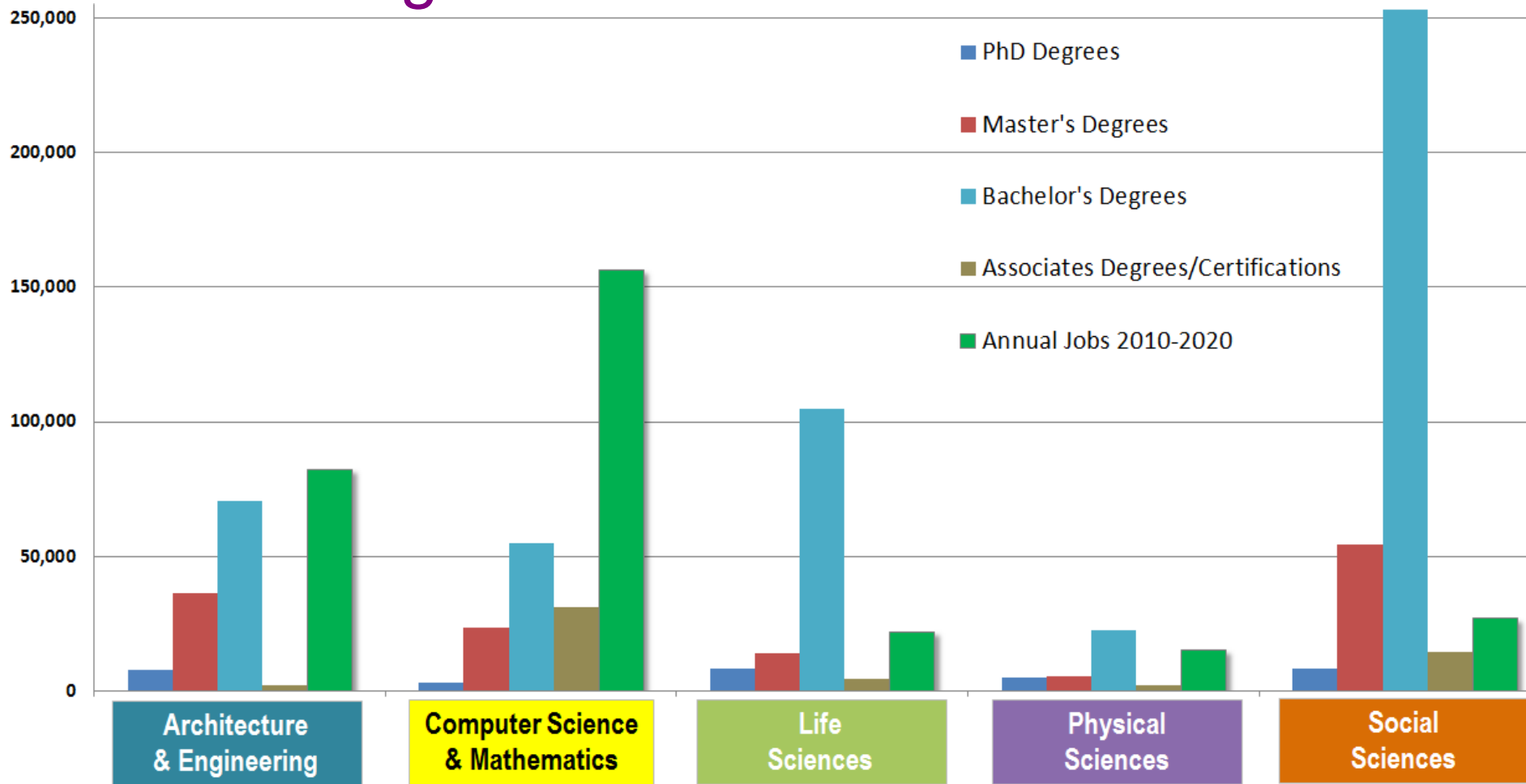


Computing and mathematics is one of the **TOP 10 fastest growing** major occupational groups 2010-2020.

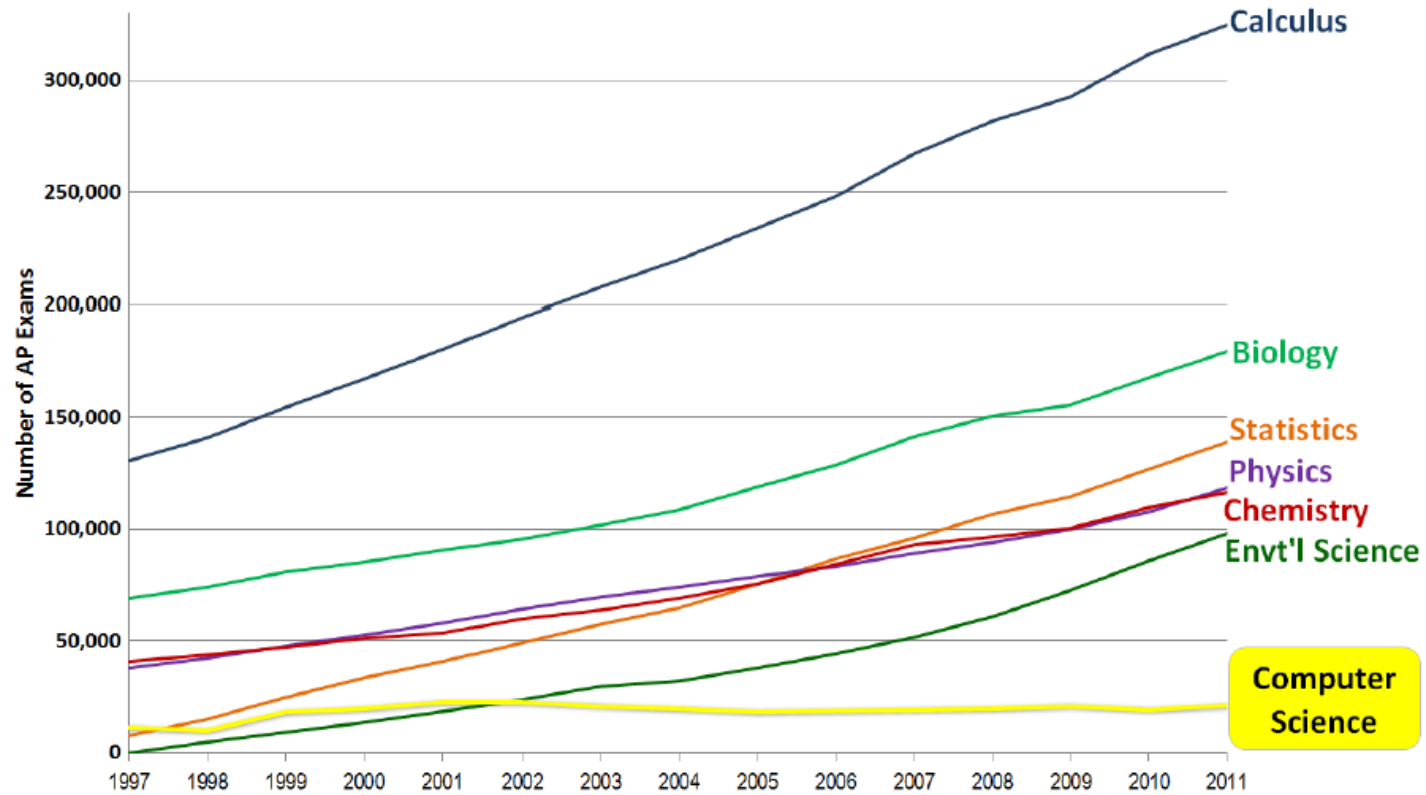
**150,000+** job openings in computing **annually**.

**1 in every 2** STEM jobs will be in computing in 2020.

# Degrees and Jobs in the US



# High School Advanced Placement Exams 1997-2011



Source: College Board, Advanced Placement (AP) Exam Data 2011, available at <http://professionals.collegeboard.com/data-reports-research/ap/data>. Calculus represents the combined data of Calculus AB and BC. Physics represents the combined data of Physics B, C:Electricity and Magnetism, and C:Mechanics. Computer Science represents combined data of Computer Science A and B.

# Knowledge, Jobs, Opportunities

The new Advanced Placement Computer Science Principles (CSP) course offers students a chance to begin to explore their interests, to achieve college credit or placement (reducing tuition costs), and prepare for the jobs of the future



CS  
PRINCIPLES

The graphic features the letters 'CS' in a large, bold, grey font at the top. Below them, the word 'PRINCIPLES' is written in a smaller, grey, all-caps font. A thin grey line connects the bottom of the 'S' in 'CS' to the top of the 'P' in 'PRINCIPLES', and another line connects the bottom of the 'S' to the top of the 'S' in 'PRINCIPLES', creating a bridge-like structure.

# What is AP Computer Science Principles?

- Will be a College Board Advanced Placement course in 2016-2017
- Designed to be rigorous, engaging, and effective in targeting all students, across all demographics
- Will have been piloted for six years before exam year, pilots started in 2010, unprecedented acceptance from both high schools and colleges/universities
- Enthusiastic support from industry and professional partners
- Portfolio assessment encourages collaboration

# Why Focus on Advanced Placement CS?

- AP has national recognition and so offers the opportunity to impact students in schools across the country
- Offering the AP CSP course will allow school administrators to raise the academic profiles of their schools
- AP CSP has a proven curriculum framework, facilitates alternate ways to implement the curriculum, AP audit process ensures reliability



# Why Focus on AP CS?

- AP CSP has no computer science pre-requisites, can lead to further study, can earn college credit and/or placement
- AP CSP helps prepare students for many (or all!) disciplines, not just those in STEM fields
- AP CSP encourages (and requires!) collaboration, emphasizes problem-solving, has the potential to excite students to apply knowledge and continue to learn

# Built on Big Ideas

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

# Focuses on Computational Thinking Practices

- ↙ Connecting computing
- ↙ Developing computational artifacts
- ↙ Abstracting
- ↙ Analyzing problems and artifacts
- ↙ Communicating
- ↙ Collaborating

# Course Pilot Timeline: Phase I

2009–2010:

Course framework developed

2010–2011:

Pilot 1 at five universities

Prototype test item development

2011–2012:

Pilot 2 at 8 universities and 10 high schools

Prototype test administration

2012–2013:

Pilot 3 at 2 universities and 4 high schools

Used performance tasks in portfolio based assessment (requiring collaboration)

# Course Pilot Timeline: Phase II

2013–2014:

40–50 pilot schools (40 high school, 10 college)  
Portfolio prototype and test administration,  
Portfolio development and refinement

2014–2016:

Continue with Phase II pilot (possibility to add more schools)  
Portfolio prototype and test administration,  
Portfolio development and refinement

2016 - 2017:

Assessment delivered

# Professional Development Timeline

There are several groups working to prepare and deliver professional development opportunities for CS Principles. Information about where to find out about these offerings is at the end of this presentation.

The College Board is working on the following timeline:

## 2013–2017:

Teacher support development  
Assessment development  
Course audit development  
PD development

## 2015–2017:

College Board PD offering

## 2016–2017:

Teacher support offering  
Course audit open

# Assessment

- May combine traditional fixed-response questions and portfolio tasks
- Administered as a computer-based assessment
- Portfolio assessment may require to students to:
  - Explore and research a specific topic related to the Internet and computing
  - Investigate and manipulate a large dataset to answer questions
  - Submit executable programs
  - Perform work in collaboration with another student
  - Submit written reflections
  - Interpret and present their ideas in a written work
  - Submit discussion of collaboration

# Solutions

- Share the information with parents: jobs, opportunities, ability to make a difference in every discipline
- Meet with policy makers and provide information to help them understand what computer science is and why it is important
- Help principals identify ways to fit the AP CSP into their school schedules (replacing an outdated tech course, allowing CS to count as a math credit, etc.)
- Enable teachers to attend the large number of professional development events focused on the AP CSP
- Use new resources to help students better understand what computer science is and why it is cool



# What You Can Do Right Now

- Apply to be a pilot school under the current NSF grant:
  - check [www.csprinciples.org](http://www.csprinciples.org)
  - <http://collegeboard.org/csprinciples>
- Offer the course in your school so that teachers and staff will be ready when the course becomes an official AP course:
  - review resources from previous and current pilot sites at:  
[www.csprinciples.org/home/resources/lessons](http://www.csprinciples.org/home/resources/lessons)
- Attend local and national professional development events:
  - [www.csprinciples.org/home/pd](http://www.csprinciples.org/home/pd)
  - [csta.acm.org/ProfessionalDevelopment/sub/TeacherWorkshops.html](http://csta.acm.org/ProfessionalDevelopment/sub/TeacherWorkshops.html)
  - [cs10kcommunity.org](http://cs10kcommunity.org)

# Information Links

## Course Information:

[www.csprinciples.org](http://www.csprinciples.org)

[www.collegeboard.com/html/computerscience](http://www.collegeboard.com/html/computerscience)

## Resources:

[www.csta.acm.org/Resources/sub/BrochuresPostersVideos.html](http://www.csta.acm.org/Resources/sub/BrochuresPostersVideos.html)

<http://www.ncwit.org/programs-campaigns/counselors-computing-c4c>

## Professional Development:

<http://cs10kcommunity.org/>

THANK YOU!

*Add contact info here*