BASIS High School | Phoenix, AZ

T E → A L S → ⊠

computer science in every high school

tealsk12.org

Rev 2018

Academy for Precision Learning | Seattle, WA

Why TEALS?

TEALS can help your high school build and grow its computer science (CS) program with support from industry professionals.

Since 2009, Technology Education And Literacy in Schools (TEALS) has helped high schools across the U.S. build and grow sustainable computer science programs.

This guide will help you understand how our innovative program helps bring rigorous computer science courses to schools by partnering classroom teachers and CS industry professionals.

TEALS works with schools, students, and industry volunteers to close the computer science gap:
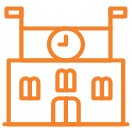
SCHOOLS AND TEACHERS
We help partner high schools build teacher capacity and student interest in computer science to build a CS program that is sustainable.

STUDENTS
TEALS classes represent students of all demographics and backgrounds with a specific focus on engaging women and underrepresented minorities.

Computer science concepts and programming skills are relevant in every academic discipline from math and science to music and the arts.

We teach CS students computational thinking, problem solving, programming, and computer science concepts that are applicable in whatever field they enter. We help students become informed citizens with a clear understanding of how modern technology works and its impacts on society.

INDUSTRY PARTNERS
TEALS creates a culture of volunteerism in the tech industry so that classrooms are appropriately connected to real world knowledge and skills.

How can TEALS help my school?

Volunteer Industry Professionals in the Classroom

working together with teachers to build CS teacher capacity and increase access to quality CS courses in high schools

A Clear Pathway for Students

to study CS in school, get excited about possibilities tech can play in their future, and learn how to take the next step

Curricula and Resources

developed by educators and computer science professionals and designed specifically with high school students in mind

A Community for Teachers

to build their CS teaching capacity through ongoing training, industry professional mentoring, and peer support


As a high school teacher with a software engineering background, I saw colleagues struggle to start teaching computer science (CS) while trying to learn the content at the same time. After returning to a software engineer role, I started TEALS because I wanted to ensure that teachers had access not only to professional development and curriculum materials, but also to people like my new colleagues – tech industry experts – who could come into their classrooms and help them every step of the way. TEALS creates teaching teams where industry professionals work together with teachers to build content expertise and confidence in CS. Through these small, local, public-private partnerships, schools build CS teacher capacity and thriving CS programs, and connect CS classrooms to the real world.

We believe that computer science is foundational for all students. Since TEALS launched in 2009, it has become more important than ever before that all students develop computational thinking skills relevant to a wide range of future careers, and become informed citizens in our digital world. We thank you for considering TEALS. Together - schools, teachers, students, volunteers, and TEALS staff - we will ensure that every student across the country has the same opportunity and access to quality and rigorous computer science courses.
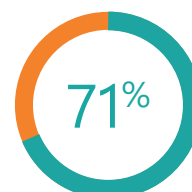
Kevin Wang, TEALS founder

TEALS prepares students for future careers
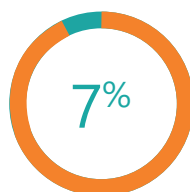
7%
of STEM graduates are in Computer Science

yet only...

71%
of all new jobs in STEM are in computing

TEALS offers three different support models

Goal	Build Help a classroom teacher master computer science content and increase Computer Science (CS) teaching capacity. Work toward CS program growth.	
Support Model	**Co-Teaching** Volunteer Teaching & Lab Support	**Lab Support** Lab Support only
Teacher Experience with Computer Science All models require teachers to have two years of professional teaching experience.	New to CS (two years or less)	2+ years of CS experience* or demonstrated mastery of almost all CS course content
Curricula Supported	TEALS-created curricula	TEALS-created curricula, TEALS-approved partner curricula
TEALS Volunteer Role All volunteers have professional or academic CS backgrounds. Their role is to provide CS expertise and support the classroom teacher in learning and/or teaching course content.	TEALS volunteers provide most CS classroom instruction. Volunteers also assist with labs & assignment grading	Volunteers support classroom teacher and students during instruction, lab assistance, help with grading assignments
Teacher Role The classroom teacher is responsible for the students and the classroom management. Teachers coordinate the volunteer team.	Classroom teacher learns CS and gradually leads lessons with support and guidance from volunteers	Classroom teacher leads 85%+ of in-class lessons and grading
# of Volunteers	2-4	1-2
Individual Volunteer Frequency	1-2 volunteers/class period, 4-5x/week	1 volunteer/class period, 2-5x/week
School Cost	$5,000	Expense reimbursement
Class Meeting Time	Concludes by 9:30am	Concludes by 9:30am
Swag	Raffle Kits, t-shirts, Xbox/laptop grand raffle prize, CS Fair or Field Trip invite	Raffle Kits, t-shirts, CS Fair or Field Trip invite

* Teachers may also enter Lab Support only model based on successful completion of a TEALS-approved professional development workshop

Goal	**Grow** Grow computer science program, increase enrollment, improve student engagement, and create new CS sections
Support Model	**Classroom Enrichment**
Teacher Experience with Computer Science All models require teachers to have two years of professional teaching experience.	2+ years with CS experience or demonstrated mastery of CS course content and able to quickly help students debug assignments and projects
Curricula Supported	TEALS created curricula, TEALS-approved partner curricula, approved school created curricula
TEALS Volunteer Role All volunteers have professional or academic CS backgrounds. Their role is to provide CS expertise and support the classroom teacher in learning and/or teaching course content.	Range from assisting with lab/assignments/grading 2-4 times a week to consulting visits with the teacher in or out of class, as defined by the classroom teacher, subject to volunteer availability
Teacher Role The classroom teacher is responsible for the students and the classroom management. Teachers coordinate the volunteer team.	Classroom teacher leads class 100% of the time and asks for volunteer help when desired
# of Volunteers	1-2
Individual Volunteer Frequency	Range from 1-2x a week to once per month/class period
School Cost	Expense Reimbursement
Class Meeting Time	Based on teacher need and volunteer availability
Swag	CS Fair or Field Trip invite

Curriculum

Introduction to Computer Science

A creative and engaging start to learning

The **Introduction to Computer Science** curriculum is based on the University of California at Berkeley CS 10 course, "Beauty and Joy of Computing" (BJC).

TEALS has worked closely with the UC Berkeley's CS department to adapt BJC to be flexible and approachable for a wide range of high school students from diverse backgrounds. The course has been successfully implemented in hundreds of high schools nationwide.

Introduction to Computer Science is an engaging course that explores a variety of basic computational thinking and programming concepts through a project-based learning environment. Every unit culminates in a comprehensive project and roughly 75% of student time is spent building projects and practicing the skills they are learning.

Fredrick Douglas Academy | New York, NY

Visual and approachable
Intro to CS uses Snap!, an approachable visual block-based programming language with a robust tool set, perfect for introducing students to coding for the first time.

Flexible implementations
The Intro to CS course can be offered as a semester-long course offered twice in a single school year or as a year-long course with an expanded curriculum. The year-long class transitions to text-based programming using the beginner-friendly Python language in the second semester.

All TEALS curricula options include:

- Daily lesson plans
- Student lab handouts
- Project specifications and grading rubrics
- Access to nationwide community of tech volunteers and teachers learning CS

All TEALS curricula are available for free, non-commerical use. The next few pages will outline our various curricula options.

Snap! image courtesy of http://snap.berkeley.edu/
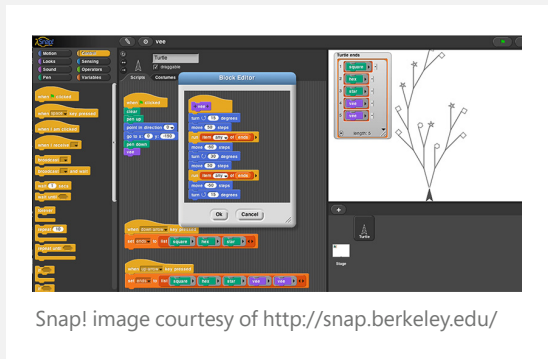
Semester 1: Snap! Introduction to Programming Concepts	
Unit	**Project**
1: Snap! Basics	Animated nursery rhyme
2: Variables and customization	Pong
3: Loops	Mario-like platform game
4: Lists	Hangman
5: Cloning	Space Invaders
6: Final project	Student designed final projects

Semester 2 Python: An Introduction to Text-Based Programming	
Unit	**Project**
1: Introduction to Python	Mad Libs
2: Data types	Text-based adventure game
3: Functions	Oregon Trail
4: Loops	Tic-tac-toe
5: Sounds in Python	EarSketch: music-based project
6: Dictionaries	Guess Who?
7: Objects	Python Pokémon
8: Final project	Student designed final project

AP Computer Science A

Challenging & rewarding experience

AP Computer Science A is equivalent to a first-semester, college-level course in computer science for CS majors. The course introduces students to computer science using the industry-standard Java programming language and presents fundamental topics that include problem solving, algorithms, and abstraction.

TEALS curriculum approach

The TEALS AP CS A curriculum is based on the University of Washington's CSE 142 course and was adapted in partnership with the UW's CS department for high school students. AP CS A, much like the intro course, has been successfully implemented in hundreds of high schools nationwide. AP CS A introduces students to the importance of resilience and project planning through the implementation of several large-scale and complex projects. The daily student-centered lesson plans emphasize practice through working on problems, group activities, labs, and projects that help integrate the learning objectives.

Approachable, project-based curriculum

The TEALS AP CS A curriculum materials were written for and tested in diverse classrooms. This curriculum has been utilized in classrooms with students on Individualized Education Programs, English language learners, gifted and talented students, and students who are otherwise outside the average.

Boston Latin Academy | Boston, MA

TEALS: AP CS A Overview	
Unit	**Project**
1: Intro to Java and static methods	Family letters & the house that Jack built
2: For loops and data types	Hourglass
3: Conditionals, while loops, string parsing	FracCalc
4: Arrays and arraylists	AP magpie activity
5: Objects	AP picture lab
6: Inheritance, polymorphism, interfaces	Text excel, shapes, sports manager
7: Searching and sorting	AP elevens activity
8: Recursion	Tower of Hanoi, MergeSort
9: AP review	Barron AP review
10: After the AP exam	AI, Space battle arena, TEALS Minecraft modding

Mark Kondo
Partner teacher at Quincy High School | Quincy, WA

AP CS Principles

The AP Computer Science Principles course centers on computational thinking practice and seven big ideas. The end of year AP assessment is a mix of multiple choice questions and two performance tasks created during the school year. All AP CS Principles classes will cover the same content but differ in how they approach teaching the content. Here is a breakdown of the common computations thinking practices and seven big ideas each course must cover:

Computational Thinking Practices	Big Ideas
Connecting computing	Creativity
Creating computational artifacts	Abstraction
Abstracting	Data and Information
Analyzing problems and artifacts	Algorithms
Communicating	Programming
Collaborating	The Internet
	Global Impact

BASIS High School | Phoenix, AZ

TEALS has partnered with the following CS Principles providers and provides TEALS lab support for these classes. You will need to apply to TEALS separately from the curricular partner.

Partner	Location	Language
Berkeley BJC	National	Snap!
Code.org	National	App Lab
National Math and Science Initiative	National	Uses Code.org
Project Lead the Way	National	Python
Cleveland State University	Ohio	Alice
Mobile CSP	San Francisco	App Inventor
University of Rhode Island	Rhode Island	JavaScript

*Please visit **tealsk12.org/schools** for the most up-to-date list of approved curricula and partners.*

Austin Achieve Public School | Austin, TX

Advanced Topics and Projects in Computer Science

Advanced Topics and Projects is a course for students who have successfully completed AP Computer Science A, and received a 4 or 5 on the exam. TEALS can support this program in schools that have multiple sections of Introduction to CS and AP CS already established.

The course is flexible and project-based, with a concentration in data structures and other CS topics guided by industry volunteers and culminating in a major capstone project. TEALS volunteers provide mentoring and technical guidance. Past student projects have included a phone-based student voting system and advanced app development with projects submitted to the Congressional App Challenge.

Woodinville High School | Woodinville, WA

> "Working alongside professionals gives students that added insight into what does it mean to be a software engineer. I know that TEALS is going to be changing students' lives."

Maggie T, Teacher

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BASIS High School | Chandler, AZ

Comparing AP CS A and AP CSP

The College Board offers two AP Computer Science courses: AP Computer Science A (AP CS A) and the AP Computer Science Principles (AP CSP). Both courses are rigorous and focus on computational and critical thinking as well as general problem solving.

The two courses are complementary and schools are encouraged to offer both. Students can take the courses in any order, though TEALS advises students to take AP CSP first, if available. In short, AP CS A is the more traditional college level CS course aimed at CS majors, while AP CSP is the course that is closer to a collegiate survey CS course.

Unlike Calculus AB and BC, for example, AP CSP is **not** a subset of AP CS A. Teacher preparation for both courses is intensive. AP CSP requires broader knowledge in seven computer science disciplines, whereas AP CS A requires deeper knowledge of Java concepts and implementation.

	AP Computer Science A	AP Computer Science Principles
Course content	Curriculum is focused on object-oriented programming and problem solving Java is the designated programming language	Curriculum is built around fundamentals of computing including problem solving, working with data, understanding the Internet, global impact, and programming
Course intent	Encourages skill development among students considering a career in computer science or other STEM fields	Encourages a broader participation in the study of computer science and other STEM fields, including AP Computer Science A
Assessment experience	Multiple-choice and free-response questions (written exam)	Multiple-choice questions (written exam); two performance tasks students complete in class, during the course to demonstrate the skills they have developed
TEALS support model	TEALS offers three levels of support: Co-teaching, Lab Support, and Classroom Enrichment	TEALS offers Lab Support and Classroom Enrichment
Curriculum provider	TEALS offers full AP CS A curriculum materials	TEALS-supported partner organizations' curricula. Classroom teacher attends professional development offered by partner organization prior to beginning TEALS partnership
AP CS exam	Both courses successfully prepare students to take AP Computer Science exam	

Boston Latin Academy | Boston, MA

Our impact

Teachers

350 high schools

29 states+DC

9 out of 10 teachers report increased CS teaching capacity, thanks to TEALS*

97% teach on their own within 2 years*

> All of the TEALS training resources...are **helpful for communicating what other teachers have done successfully** or struggled with.
>
> **Ada,** partner classroom teacher with 12 years of experience teaching social studies and computer science

Industry Volunteers

1,050 volunteers in 2017

88% of students report volunteers were helpful in teaching CS**

> The TEALS experience ranks among the **top 3 or 4 in my career.** The volunteers came into the classroom with **respect** for what I knew about teaching and meeting the needs of students, while **they brought content expertise.**
>
> **Doug,** veteran teacher with 35 years of experience teaching math

650k volunteer hours

equivalent to

$156m in value provided to schools

Student Success

12,000 students taught in the 2017-18 school year

9 in 10 students learned **new** programming skills**

50% of students are more likely to pursue a CS career because of TEALS**

TEALS students scored **5% higher** than the national average on the 2016 AP CS exam

3 out of 4
students have recommended TEALS CS courses to their classmates

94%
of students said their programming skills improved because of the TEALS CS course

TEALS' Impact on Students

TEALS is dedicated to empowering students to use computer science to impact the world. In TEALS classes students are introduced to computational thinking, problem solving, and programming skills that are important to every industry. To help students take the next step, TEALS has developed a variety of resources that provide insight on college and career pathways in computer science fields, support a community of learning by connecting current and former TEALS students, build awareness and excitement around computer science, and promote opportunities for students to apply their computational skills and gain professional experience.

Learn more about these exciting resources at **tealsk12.org/students**

How do I bring TEALS to my school?

Step 1:
Review the various TEALS volunteer support models and curricula options.

Step 2:
Submit your application at **tealsk12.org/schools**

Step 3:
A TEALS Regional Manager will reach out to you to discuss the right curricula and support model for your school.

If your school is accepted, you'll be asked to sign a partnership agreement and prepare for the school year as outlined in the implementation guide.

TEALS CS Fair | New York, NY

Program timeline

OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT
School application period											
	School interviews & partnership acceptance										
		Joint volunteer recruitment									
				Volunteer interviews							
						Summer training					
							Start of school				

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