

## Introduce Students to Computer Science in an Engaging Way

### Objective

The intention of this lesson is to introduce students to computer science in such a way that they are motivated to seek opportunities to participate through course selection, computing experiences, and plans beyond high school.

### Preparation – For you, and for the host teacher

This lesson assumes you will be the guest teacher in a math, science, or technology class. You may wish to present the lesson with a computer science teacher as your partner. Be sure to involve the host teacher. He or she can help make connections between concepts students learn in class and those presented in the special lesson.

Plan ahead so you are able to describe course offerings and other opportunities for students to learn computing outside of school. These might include camps, clubs, competitions or junior college. The computer science teacher at your school can help you prepare.

Practice the lesson and familiarize yourself with the videos and activities students will engage in. (The URLs for these activities can be found on the next page.)

- Watch the 5-minute Code.org video that students will see in advance of your visit.
- Watch the Khan Academy Welcome to Computer Science video that you will show and become familiar with the associated activity.
- View the Career Cruising and Takeaway Tech pages.



Ask the host teacher to prepare students for your visit a day or two in advance and show a short introductory video. He or she might say:

*Mr./Ms. \_\_\_\_ is coming in tomorrow to teach a lesson about computer science. He/she wants you to know what computer science is, and what kinds of education and career opportunities are available to you. Right now, this is a growth area, where there are more jobs than there are people to fill them. It's creative, and well-paying work, too, and he/she wants to make sure everyone knows about the opportunities open to them.*

Ask that the host teacher show the 5-minute introductory video from Code.org (See: [www.code.org](http://www.code.org), available in different formats.) Afterward, he or she can have students discuss what they know about computing and what they are curious to learn.

## Materials

1. Slide presentation. Download *C4C Counselor Lesson Plan Presentation* at [www.ncwit.org/c4c](http://www.ncwit.org/c4c)
2. Computer–projector setup with audio
3. White- or chalkboard
4. Computers — One to each two students
5. Web access to these pages:
  - Code.org 5-minute video (if students haven't seen it): [www.code.org](http://www.code.org) → Teach → 5-minute video
  - Khan Academy Welcome to Computer Science  
<http://www.khanacademy.org/cs/welcome-to-computer-science/882454257>
  - Career Cruising: <http://goo.gl/MInCU>
  - Takeaway Tech: [www.ncwit.org/takeaway](http://www.ncwit.org/takeaway)

## Outline

This lesson has 5 or 6 parts and takes 50–60 minutes. (Part 6 is optional)

### Contents

<b>Part 1:</b> Introduction — Learn a bit about computer science	(Lecture)	10 m	Slides 1–7
<b>Part 2:</b> See programming in action (Video) — Give it a try	(Activity)	15 m	Slides 8–9
<b>Part 3:</b> Computing is at the heart of everything	(Lecture)	5 m	Slides 10–18
<b>Part 4:</b> Paths to Careers — How people get started in CS	(Lecture)	5 m	Slides 19–24
<b>Part 5:</b> Paths to Careers	(Activity)	15 m	Slide 25
<b>Part 6:</b> Takeaway Tech Optional — send as home task	(Activity)	10 m	Slide 26

## Part 1: Introduction – Learn a bit about computer science Slides 1–7 (Lecture)

### Slide 1: Intro

Introduce yourself and thank your host teacher for inviting you.

Tell the class you are excited to have the chance to share information about an area of life and work that people don't know a lot about, but is really powerful and exciting — Computing and Computer Science.

You might ask them about this first slide — What seems “computery” about it?

They may say things like, It looks futuristic, 0's and 1's are binary code, or the image of the woman might be the basis for CGI (computer-generated imagery) for a movie. Don't go into detail, just acknowledge their statements and encourage them to keep wondering aloud about what they hear and see in the presentation.

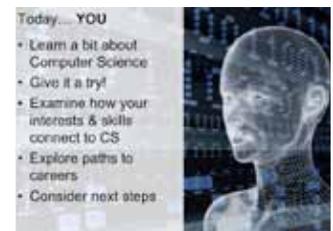
*Say: The subtitle, Invent the Future, gets across the idea that computing is the backbone of innovation. There are very few, if any, new inventions that happen without computer science. Anyone with a creative idea, anyone who wants to make a difference, should know something about computer science. As we proceed today, think about what mark you want to make on the world, and how computing might be a part of it.*



### Slide 2–3: Agenda

*Say: Here is an agenda for our hour together. [Expand on each a bit.]*

*Say: Let's dig in!*



### Slide 3: Code.org

*Say: You saw this video the other day. Who's this guy? [Right bottom corner, basketball player and coder Chris Bosh.] What do you remember about the Code.org video? What stuck with you? Turn to a neighbor and talk for a minute then we'll discuss as a group.*

Wait for one minute then reconvene. Let kids riff for a minute, comment as appropriate. *Ask: Are any of you already doing some programming? Invite kids to elaborate.*



## Slide 4: Leo Cherne Quote

*Say: Consider this quote from Leo Cherne. [Pause for students to read.]*

*Say: What does Cherne mean? Do you believe you are smarter than a computer? All it takes is learning how to code.*

The computer is incredibly fast, accurate, and stupid. Man is unbelievably slow, inaccurate, and brilliant.  
The marriage of the two is a force beyond calculation.  
-Leo Cherne

## Slide 5: Why CS

*Say: Remember this Steve Jobs quote from the Code.org video? Can you imagine how programming a computer teaches you to think? [Kids respond.]*

"Everybody in the country should learn how to program a computer... Because it teaches you how to think."  
-Steve Jobs

## Slide 6: CS Defined – 1

*Say: In a nutshell, here's a definition of CS we'll operate from today. [Read the slide.]*

What is Computer Science?

CS is **posing a problem** in such a way that a **computer** can help us **solve** it.



- Communicate
- Solve problems
- Design and imagine
- Share, store, retrieve or manipulate information

## Slide 7: CS Defined – 2

*Say: All that work goes into making technology that works for us. Read slide, "CS is designing..."*

*Then say: Think about cell phones. They are just tiny computers. Any time you change the ring tone or screen background you are running a computer program. A layer of software a programmer wrote interprets your keystrokes so the computer changes how it operates.*

*Ask: Have any of you ever wanted to make a phone work better or differently? [Pause.] A lot of computer science is about improving technology — making it faster, smaller or able to do new things. It's powerful!*

What is Computer Science?

CS is **designing** computing devices and **programming** them



## Part 2: See programming in action (web video) – Give it a try Slides 8–9 (Activity)

### Slide 8: Khan Academy – Welcome to CS

*Say:* There are lots of ways to get started with CS. We'll look at more of them later, but here's a quick look at one. Khan Academy is a website with many free, online courses you can take, including computer science. Let's watch an introductory "teaser" video for their Computer Science course.

**Note:** This slide is linked to the online video <http://www.khanacademy.org/cs/1-welcome-to-codecanvas/882454257>. Click the image and the video will start.

After the video plays encourage comments.



### Slide 9: Give Programming A Try

*Say:* The video showed a basic computer program — a few lines of code that made the spiral and its color and controlled the animation. Do any of you play the game Rome 2? Guess how many lines of code goes into it? [Let students guess.] 3 MILLION! Enough lines stacked to reach five times higher than Mt. Everest! Huge teams worked on that game, and lots of the coding is automated, but still, that's a lot of code!

Now it is your turn to see what code does by manipulating an existing program. You're going to team up and pick any of these designs that other people programmed [Indicate bottom of screen — first URL: <http://goo.gl/JRySP>] or go to the spinning galaxy that was shown in the video. [Indicate second URL: <http://goo.gl/tVCwa>] You can hit reset to return to the original. You have five minutes to fool with these programs and also browse the Khan CS course a bit if you want.

**Note:** In the middle of the 5 minutes remind kids they can browse around the CS course a bit, look at the different lessons.

After 5 minutes ask kids to close the lids on the computers. *Ask:* Was that fun? Doable? What did you think? Might you come back to it? *Ask:* Did anyone browse the course?



# Part 3: Computing is at the heart of everything

## Slides 10–18 (Lecture)

### Slide 10: Unlock Your Future

*Say:* Let's talk about WHERE Computer Science shows up in the world.

Poll the class. *Say:* Some of you might have an idea of what you want to do after school. Anyone care to share?

*Say:* If you're interested in topics like these (orange topics on screen) there are a lot of ways to get involved in computing. Let's dig in to just a few areas.



### Slide 11: Computing Connects

*Say:* You might be surprised to know only half of computing jobs are in high tech companies! You could mash up your interests in other careers with technology and work anywhere.

*Ask:* Do you see a field here that interests you? Could you imagine how technology might be important to it? [Let students reply.]

#### Computing Connects

music business manufacturing communications  
advertising engineering accounting the arts  
safety systems science  
criminal justice recreation  
veterinary medicine sports  
agriculture pharmaceuticals  
banking law automotive  
photography military  
architecture medicine entertainment design  
politics journalism transportation health care

Only 50% of tech jobs are at technology companies

### Slide 12: Computing Connects – Health Fields

*Say:* Since computing can be an applied science, it underpins innovations across whole fields. If you were interested in medicine for example, you could be part of a new innovation in health care. [Read slide.]

**Note:** The next series of slides 13–18 are very quick snapshots.

#### Computing Connects to Other Careers

For instance: Are you interested in health fields? You might want to study...

...robotics and invent digital prostheses

...computer engineering and build the next generation of laser surgical tools

...bioinformatics and design a life-saving drug



### Slide 13: Information Systems

*Say:* Computing connects people to businesses and to information and to each other! [Give students a chance to read and comment on each slide.]

Computer Science is information systems

facebook

Are you someone who:

• Understands relationships?

• Likes to do things efficiently?

• Is interested in business and connecting people?

Etsy

Zappos

MasterCard

Google

## Slide 14: Computer Engineering

*Say: Computing is part of designing new products, not just technical ones. But here's Google Glass, the first wearable computer.*

Computer Science is engineering new products

Do you want to:  
Create devices that can do the work for you?



Google Glass

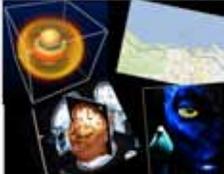
## Slide 15: Visualization and Graphics

*Say: Computing is a big part of visualization and imagery. You've seen computer-generated graphics in movies and video games. It's useful in science, too, to picture a problem or process.*

Computer Science is visualizing and creating imagery

Do you like:

- Art?
- Science?
- Game Design?
- Theater?
- Movies?



## Slide 16: Infrastructure and Networks

*Say: Computing is also the connections between computers.*

Computer Science is Infrastructure and Networks

Do you want to help:

- Keep computer systems up and running?
- Invent new ways for technologies to connect?



## Slide 17: Computer Forensics and Cyber Security

*Say: Lots of people work to keep computers safe from hackers. People also use computers to solve crimes.*

Computer Science is Computer Forensics and Cyber Security

Do you want to help:

- Solve crime?
- Keep us safe?
- Secure information?



## Slide 18: Design and Modeling

*Say: People in the arts and architecture rely on design software all the time.*

*Say: Now let's talk about how people get into computing.*

Computer Science is Design

Do you want to:

- Make models?
- Design cars, houses, fashion, anything?



## Part 4: Paths to Careers – How people get started Slides 19–24 (Lecture)

### Slide 19: Kids Get Started

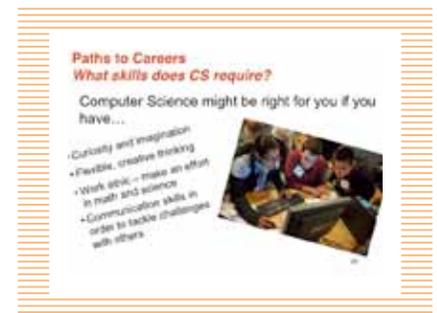
*Say: Let's talk about how people get started. It varies a lot. Do some of you have programming experience now? Some kids teach themselves, others get started with camps, clubs, classes and competitions. These girls got started in different ways and all met when they got awards for their work in computing.*



### Slide 20: CS might be right for you...

Point to the list of skills and *say: This is the skill set of people who accomplish a lot through computer science. These skills are essential to working on technical teams and to invent new ways of doing things with computers.*

*Say: Could you see yourself in computing?*



### Slide 21: First Courses

**Note:** Learn in advance what computer science offerings are available and add additional slides following this one.

Encourage students to continue taking math and science, and to try computer science in or out of school. *Say: Keep up your good work in math and science, and give CS a try. In an intro course being offered around the country, this is what students study.*

*Say: Sound interesting? What do you think?*



### Slide 22: Study Online

*Say: You don't have to wait. You might study on your own or with buddies. You could take an online course like the Khan Academy one we saw, or take this free, online game design course that MIT offers...*



## Slide 23: Sample Courses – 1

Explain to students that courses in the CS major vary from school to school but here are first year courses at three universities. First year community college courses might be similar.



## Slide 24: Sample Courses – 2

Here are additional courses. Notice there are CSI and forensics ones, software design, and artificial intelligence...



## Part 5: Paths to Careers – Slide 25 (Activity)

### Slide 25

**Note:** This Slide Supports Two Activities:

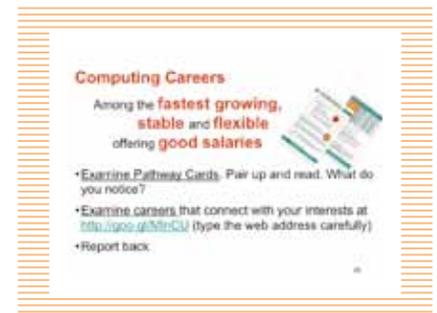
1. Examining the pathways card
2. Career cruising from URL shown.

Get ready to have kids do career cruising. **Say:** With a partner you are going to examine three "Pathway" cards. They show routes to computing by getting a 4-year university degree, military experience, or a 2-year or community college degree. Obviously some paths overlap. For instance, someone might get some computing experience in the military and then go on to get a degree.

If the Merging Pathways poster is in the room, **say:** This poster shows how the different ways connect. You might want to look at it closer later.

**Say:** You and your partner are going to examine these cards, front and back, for two or three minutes and talk them over. When you're ready, grab a laptop [tablet, computer] and CAREFULLY TYPE this web address. [On slide: <http://goo.gl/MInCU>.] It takes you to a more in-depth view of computing college majors and careers. Your job is to find one or more that interests you and that you think your classmates should know about. Be ready to report out in 10 minutes.

Reconvene after 10 minutes or so and **ask:** What did you find? What do you notice? After kids report, **say:** Do you see any patterns or trends to what you're hearing? Would you be inclined to learn more?



## Part 6: Takeaway Tech – Optional Slide 26 (Activity)

### Slide 26: Takeaway Tech

*Say:* You have options to explore, from experiences you can do right now like the programming activity we did, to camps, clubs, online courses and more. Check out this URL (click though link if time allows) for a "Takeaway Tech" page: [www.ncwit.org/takeaway](http://www.ncwit.org/takeaway) and have fun!



### Slide 27: End

*Say:* Thank you for your time. There's a big world of computing out there and it would be great if you were part of it. Who knows? You could work like these Google employees in Australia! Have fun and see where your interests take you!

