

Intro to Computer Science Scope and Sequence

Intro to Computer Science is an online, interactive course for middle school students providing coverage of both programming and digital literacy concepts found in state and national middle school standards. The course includes interactive lessons, application exercises, adaptive keyboarding lessons, and an interactive development environment to teach key programming concepts in Python. The development environment includes small coding challenges, debugging practice and short quizzes to test understanding. Programming lessons end with a coding exercise in which students create their own project applying the skills learned. In addition to basic coding principles, students learn how to animate objects, play sounds and use mouse and keyboard input. The curriculum includes detailed lesson plans and other support materials to ensure teachers can teach coding concepts even if they have no previous experience with coding themselves.

This course is divided into 6 mini-units that cover core digital literacy skills and 4 longer units focused on developing programming skills. The digital literacy units may be taken together at the beginning or interspersed through the programming units and can be taken in any order. The longer programming units should be taken in order.

Digital Literacy Mini-Units

Computer Fundamentals

This mini-unit contains items that develop basic digital literacy in computer hardware and software.

TITLE	DESCRIPTION	KEY TOPICS	TIME (MINUTES)
Computer Fundamentals: Operating Systems and Browsing	In this interactive digital lesson, the learners receive direct instruction and practice in the area of operating systems and browsing as they gain knowledge about computer and mobile device operating systems, graphical user interfaces, icons, apps, and how to find files and folders.	operating systems user interface files/folders	25
Software Fundamentals: Software, Buttons, and Controls	This interactive digital lesson provides direct instruction and practice related to various types of software. The learners will gain knowledge about types of software, how to select the appropriate software to complete a task, and how to use the buttons and controls found in software.	software common software controls	25
Input, Output, and Files	In this lesson, teachers use the discussion points to help students understand the concepts of computer fundamentals such as input, output, and processing devices, analog vs. digital information, storage devices, and file formats.	input output data storage	30
Hardware Fundamentals: Mobile Devices are Technology To Go	In this interactive lesson, students receive direct instruction and practice with mobile devices (smartphones and tablets) that have built-in browsers, apps, and connect to a wireless computer or cell phone network. Students are introduced to in-app purchases and ad-supported apps, limiting push notifications, and reviewing the terms, privacy policies, and practices of all apps.	mobile devices	15
Hardware and Software Fundamentals: Networking	During this interactive digital lesson, the learners will receive direct instruction and practice related to the basic components and functions of a network as they gain knowledge about file sharing and storage, compatibility, and ethical use of networks.	networks file sharing	25

TITLE	DESCRIPTION	KEY TOPICS	TIME (MINUTES)
Network Compatibility	In this lesson, teachers use the discussion points to help students understand the concepts of LANs and WANs, cross-platform connectivity, file format issues, and using help menus.	LAN WAN file format	30
Hardware and Software Fundamentals: Computing in the Cloud	In this interactive digital lesson, the learners receive direct instruction and practice with cloud computing as they explore what cloud computing is and understand that cloud services can automatically synchronize and save data across multiple devices.	cloud computing	15

Keyboarding and Word Processing

This mini-unit contains items that develop basic digital literacy in keyboarding and word processing.

TITLE	DESCRIPTION	KEY TOPICS	TIME (MINUTES)
Keyboarding: Keyboard Layout and Keyboarding Procedures	In this interactive digital lesson, the learners receive direct instruction and practice in the layout of the keyboard, correct keyboarding procedures, proper posture and technique, and are introduced to digital keyboarding standards as they work to increase their accuracy and speed.	touch keyboarding	25
Adaptive Keyboarding: Urban Keyboarding Explorer	This interactive app uses diagnostic exercises to provide learners with individualized touch-typing practice to address areas of weakness and help improve accuracy and speed at any skill level. Learners receive badges for specific achievements during their keyboarding adventure.	touch keyboarding	15
Word Processing: Overview of Basic Skills	In this interactive digital lesson, the learners organize a script as they receive direct instruction and practice with word processing skills. They will locate and open recent documents, copy, cut, paste, save, print, and use the bold, italic, and underline buttons to emphasize text.	basic word processing	15
Word Processing: Creating Professional Documents	The learners will receive direct instruction and practice using proofreading and organization tools to make professional documents. They will check for and correct spelling, grammar, and punctuation errors, include page numbers and bullets, and utilize auto-correct in this engaging and interactive digital lesson.	basic document formatting	15
Word Processing: Visual Design	Through direct instruction and practice in this engaging and interactive digital lesson, the learners will use color, vertical alignment, page layout, indents, margins, borders, and orientation in the design of websites, magazines, book covers, and logos to impact a reader's interpretation of information.	page layout visual document design	15
Tools of the Trade	In this lesson, students will pay attention to specific text and image formatting techniques as they create hypothetical welcome packets designed to provide valuable information to visitors of their town.	page layout document design	90

Computational Thinking

This mini-unit contains items that develop computational thinking skills.

TITLE	DESCRIPTION	KEY TOPICS	TIME (MINUTES)
Computational Thinking: Algorithmic Problem Solving	The learners receive direct instruction and practice with algorithmic problem solving and computational thinking. They will identify algorithms, inputs and outputs, construct problem statements, and use sample cases, abstraction, and decomposition to analyze problems in this interactive digital lesson.	algorithmic problem solving inputs/outputs decomposition abstraction	15
Exploring the World Through a Disability	This activity allows students to learn about algorithms by experiencing what life could be like with a disability. Students will create their own algorithms and research adaptive technology that people with disabilities must utilize in order to complete everyday tasks.	algorithms	60
Computational Thinking: Models and Simulations	The learners analyze and evaluate algorithmic processes through modeling and flowcharts, and use simulations as tools to test different variables and conditions as they receive direct instruction and practice with the modeling process and computational thinking in this interactive digital lesson.	modeling flowcharts simulations	15
The Perfect Park	In this application exercise, the student takes on the role of an architect. The student is presented with the task of creating a community's ideal park with a budget of \$750,000. The student is provided with a list of the community's requirements and budget and the student creates an illustrated model of the community park. The student utilizes a data model by creating a spreadsheet of the park costs. Finally, the student creates a flowchart that decomposes the task of seeking community approval for the park.	modeling	120
Computational Thinking: Implement and Test	The learners receive direct instruction and practice with algorithms, the testing process, and computational thinking as they find ways to simplify and clarify the algorithmic process, develop testing methods for algorithms, find errors, and improve the efficiency of algorithms in this interactive digital lesson.	algorithms testing	15
Egg-cellent Egg Drop	The implementation and testing component of computational thinking challenges students to be innovative and reflective of their work. In this exercise, students will utilize the "Use-Modify-Create" method to create a safe landing for their egg drop.	use-modify-create	90
Algorithmic Problem Solving Unit Quiz	This quiz gives students an opportunity to demonstrate their understanding of algorithms and modeling. Students will know what an algorithm is and what information is needed in order to create and test an algorithm. Students will understand and use important vocabulary used in algorithms and computer programming.	(quiz)	15

Internet Usage and Online Communication

This mini-unit contains items that develop basic digital literacy in Internet usage and online communication.

TITLE	DESCRIPTION	KEY TOPICS	TIME (MINUTES)
Online Safety: Dealing with Cyberbullying	The learners receive direct instruction and practice dealing with cyberbullying as they understand how to treat everyone with respect, avoid gossip, and the effects of cyberbullying. Learners are introduced to privacy settings and blocking messages as a way to respond to cyberbullies, and to whom to reach out for help in this interactive digital lesson.	cyberbullying	15
Internet Usage: Ethical Use of Digital Resources	The learners receive direct instruction and practice identifying reliable, valid online information, accurately citing resources, identifying sources within the public domain or covered by creative commons, and requesting permission to create a derivative work in this interactive digital lesson.	copyright information validity citing sources	15
Internet Usage: Navigating the World Wide Web	During this interactive digital lesson, the learners will receive direct instruction and practice navigating a website's URL, bookmarking a website for faster future access, and troubleshooting page errors and Internet connectivity issues as they use webpages.	navigating websites URL	15
Internet Usage: Being a Global Citizen with Mapping Tools	The learners receive direct instruction and practice in mapping technology such as using interactive online maps for driving and public transportation directions, satellite, street view, and GPS technology for navigation, and how maps can help solve logistical problems in this interactive digital lesson.	mapping tools	15
Booking Brian's Vacation	In this lesson, students (acting as travel agents) will research travel times and locations for when their friend, Brian. Students will not only use various mapping applications to calculate the costs associated with Brian's visit, but will utilize their knowledge of writing informational texts to create an itinerary for their time together.	online tools	60
Online Communication: Sharing Safely Online	The learners will receive direct instruction and practice with Internet safety as they use smart practices for public online communication tools like blogs, forums, and media sharing sites, and understand the permanent nature of publishing information online in this interactive digital lesson.	Internet safety	15
Online Communications: Communicating with Instant Messaging	The learners will receive direct instruction and practice collaborating via instant messaging (IM) as they communicate clearly, safely, and successfully online, use proper netiquette and responsible Internet safety practices during this interactive digital lesson.	netiquette	15
Online Communications: Reading and Writing Blogs	In this interactive digital lesson, the learners will receive direct instruction and practice using critical thinking skills as they use Web logs to communicate ideas effectively, read and write blogs, and practice responsible use of blog information and software.	blogs	18
Online Communication: Communicating with Podcasts	In this interactive digital lesson, the learners will receive direct instruction and practice planning, producing, and promoting podcasts as they recognize ethos, pathos, and logos in speech, effectively communicate ideas to an audience, and use podcasts to produce other creative works.	podcasts	15

Presentations

This mini-unit contains items that develop basic digital literacy in presentation software.

TITLE	DESCRIPTION	KEY TOPICS	TIME (MINUTES)
Presentations: Basic Slide Show Elements	During this interactive digital lesson, the learners will receive direct instruction and practice using basic presentation software tools and elements, such as text and graphics, to design an eye-catching and easy-to-read presentation.	presentation software	15
Presentations: Consistency and Visual Design	In this interactive digital lesson, the learners will receive direct instruction and practice using a variety of presentation tools with consistent design elements and themes to ensure a slide show presentation looks professional and conveys information in a focused and interesting way.	designing a presentation	15
Presentations: Motion Design	During this interactive digital lesson, the learners will receive direct instruction and practice with advanced features and tools in presentation software to gain a better understanding of how and when to use transitions and animations, add notes to slides, and use slide show preview.	animations transitions	15
Supergeek	Students investigate troubleshooting strategies and practice following steps to troubleshoot common problems with technology. They summarize what they have learned in a digital product to help younger students address computer problems.	presentation software	35

Spreadsheets and Databases

This mini-unit contains items that develop basic digital literacy in spreadsheets and databases.

TITLE	DESCRIPTION	KEY TOPICS	TIME (MINUTES)
Spreadsheets: Parts and Navigation	The learners will receive direct instruction and practice with components and navigation of a spreadsheet as they navigate cells, rows, and columns, enter, select, and organize data, and select groups of cells and entire rows and columns in a spreadsheet in this interactive digital lesson.	spreadsheet software cells, rows, columns	15
Spreadsheets: Analyzing Data	This interactive digital lesson provides direct instruction and practice using spreadsheet software to analyze data. The learners will create, label, and modify pie charts, bar graphs, and line graphs to effectively read, interpret, and communicate information.	charts graphs	15
Spreadsheets: Formulas	The learners will receive direct instruction and practice identifying a cell's row and column location, entering mathematical formulas in cells, and copying and pasting formulas across multiple cells in spreadsheets in this interactive digital lesson.	formulas in spreadsheets	15
Spreadsheets: Sharing and Filtering	The learners receive direct instruction and practice organizing and analyzing spreadsheet data as they add and remove filters, save and store spreadsheets, use wrap text, scroll and freeze panes, and collaborate and share through cloud computing and web-based software in this interactive digital lesson.	filtering spreadsheets sharing documents	15

TITLE	DESCRIPTION	KEY TOPICS	TIME (MINUTES)
Planning a Project	Students create rubrics to evaluate a product and the process used to complete the product.	project planning	60
Databases: Creating and Maintaining a Database	In this engaging and interactive digital lesson, the learners will receive direct instruction and practice in planning, creating, and maintaining a database as they define fields and types, add and edit data and properties, and filter records using Boolean logic.	databases	25

Python Programming Units

Intro to Codesters

Intro to Codesters is five lessons long and provides a brief overview of the coding environment in which students will be working.

CURRICULUM TITLE	DESCRIPTION	KEY TOPICS	TIME (MINUTES)
Building Your First Program	In this introductory lesson, students will learn to use the Codesters environment to create their first program by creating a scene with a background, sprite, text, movement, and interactivity.	backgrounds sprites click events debugging	90
Codesters in Space	In this lesson, students will learn to use the (X,Y) Coordinate Plane to move a sprite around a stage that uses the background as context for creating a short animated scene.	placing objects parameters debugging	90
Shapes and Drawings	In this lesson, students will learn to change the variable names and parameters of shape objects to create a picture of a house.	variables parameters	90
Chat with Your Sprite	In this lesson, students will create an interactive program that uses user input to control elements of the program. The sprite will appear to have a dialogue with the user.	using text user input variables conditionals	90
Recycling Loop	In this lesson, students will use loops, lists and variables to understand looping behavior.	variables lists loops	90

Intro to Python - Part 1

Intro to Python Part 1 contains 20 lessons and begins to cover more programming concepts in the Python language. It covers topics such as variables, loops, if statements, lists, functions and events.

CURRICULUM TITLE	DESCRIPTION	KEY TOPICS	TIME (MINUTES)
Dance Steps	In this initial lesson, students will begin to understand order in programming and learn to troubleshoot when the instructions within a program are out of order.	sequencing debugging	90
Robot Design	In this lesson, students will understand that parameters define shapes and they will learn to define a shape using parameters.	parameters strings integers	90
Dialogue	In this lesson, students will learn how to use dot notation to organize the actions of multiple sprites.	dot notation sequencing	90
Roll the Dice	In this lesson, students will learn how to create and apply a variable to their program.	variables	90
Star Variables	In this lesson, students will create and utilize variables to make a program more efficient.	variables data types	90
My Friends	In this lesson, students will combine two values of the same data type to communicate a story.	variables string concatenation	90
Math and Computation	In this lesson, students will learn to create a calculator to determine the area of a shape.	variables math operators converting data types	90
Bonus Lesson	In this lesson, students will show mastery of early programming standards.	(review)	90
Spiral	In this lesson, students will learn to use a <i>for</i> loop to repeat commands.	<i>for</i> loops loop ranges	90
Variables and Loops	In this lesson, students will create and store temporary values as they change it through iterations in a loop.	<i>for</i> loops iterating variables	90
User Input	In this lesson, students will collect and store user input to be used in a story.	user input string concatenation	90
Intro to If Statements	In this lesson, students will use <i>if</i> statements to generate a story based on user input.	user input <i>if</i> statements	90
Tim the Wizard	In this lesson, students will learn to randomize a response to user questions using <i>if</i> statements and random number generation.	user input <i>if</i> statements random number generator	90
Begin Rock, Paper, Scissors	In this lesson, students will create a program that accepts and displays user input, and shows a randomly generated computer response.	user input <i>if</i> statements random number generator	90

CURRICULUM TITLE	DESCRIPTION	KEY TOPICS	TIME (MINUTES)
Who Won Rock, Paper Scissors?	In this lesson, students will compare user answers to randomly generated computer answers and have their programs determine a win, loss, or tie from these comparisons.	comparing user input testing code	90
Lists	In this lesson, students will create and structure lists using list operations and getters.	lists	90
Guess the Number	In this lesson, students will construct a guessing game by building a <i>for</i> loop with a counter in range.	<i>for</i> loops counters ranges break	90
Password	In this lesson, students will learn to create a guessing game by building a loop that accesses each value in a list.	initializing variables looping through a list	90
Midterm: Which Sprite	Students will learn to create a quiz program by synthesizing and applying the programming concepts mastered during Intro to Python Part 1.	creating models (review)	90
Midterm: Create Your Own Quiz	In this lesson, students will plan and build a unique quiz program synthesizing the programming concepts mastered during Intro to Python part 1.	(review)	90

Intro to Python - Part 2

Intro to Python Part 2 contains 20 lessons and continues where Part 1 left off. It covers functions, indexes, events, data types, program design and game mechanics.

CURRICULUM TITLE	DESCRIPTION	KEY TOPICS	TIME (MINUTES)
Changing Scenes	In this lesson, students will learn to write and call simple functions without parameters.	writing functions calling functions	90
Dance Moves	In this lesson, students will write functions and call them while paying attention to the order in which functions are called.	writing functions calling functions	90
All Mixed Up	In this lesson, students will use indexes to reference lists and reorganize lists.	lists indexes	90
Party Invitations	In this lesson, students will create functions with parameters and use them to create a format for a party invitation.	functions with parameters	90
Secret Code	In this lesson, students will create an encoder that takes in messages and outputs a coded message.	manipulating lists	90
Around the Solar System	In this lesson, students will calculate the weight of objects as a percentage of their weight on earth using returns and functions with parameters.	floats functions with return values	90
Dance Off	In this lesson, students will use events to create a player-controlled dance routine.	creating events and event handlers	90

CURRICULUM TITLE	DESCRIPTION	KEY TOPICS	TIME (MINUTES)
Astronaut Rescue	In this lesson, students will use collision events to define game play. They will use event handlers to call specific sprites and assign them different roles in collisions.	collisions event handlers	90
Save the Moon!	In this lesson, students will learn that an interval event is called not by a user action, but by a specific amount of time passing.	global variables interval events keeping score	90
Whack-a-Shark	In this lesson, students will use interval events, random choice, and click events to create a Whack-a-Mole style game.	random number generator win conditions	90
Dino Dodge	In this lesson, students will create a game that uses a mouse move and interval event to control game play. They will use collisions and changing variable values to determine game length. Students set physics values to control movement of particular objects on the stage.	game physics timers	90
Refactoring	In this lesson, students will learn to revise code and make use of new structures like functions and loops.	refactoring code	90
Turtle Traffic	In this lesson, students will learn to write functions for use in events.	functions	90
Zombie Kitten Attack!	In this lesson, students will learn to create a side-scroller game where the user controls the background movement to give the appearance of constant movement.	stage physics loops	90
Rocky Road	In this lesson, students will create a game that uses probability to generate hazards and goals. They will use interval events and falling objects to give the appearance of motion.	game physics probability of events	90
Final Project - Day 1	This is the first in a five-lesson final project in which students will design, build, test and refine a game or an interactive story. In this part, students will reflect on the concepts learned previously and brainstorm ideas for a final project in small groups.	final project: brainstorm	90
Final Project - Day 2	In this second lesson for the final project, students will create a paper prototype of their idea for a final project and gather feedback on it.	final project: paper prototype	90
Final Project - Day 3	In this third lesson for the final project, students will begin to create their game or interactive story in the CodeSters environment.	final project: first draft	90
Final Project - Day 4	In this fourth lesson for the final project, students will continue working on their game or interactive story. They will spend time testing their solution, reviewing another student's project, and providing feedback on the other student's project.	final project: final build and testing	90
Final Project - Day 5	In this final lesson for the final project, students will present their game or interactive story to the class. They will also reflect on what they have learned throughout the class and project.	final project: present, play, and reflect	90

Intro to Game Design

Intro to Game Design has 10 lessons and helps students apply the skills learned in Intro to Python Part 1 to create a different type of game in each lesson. Intro to Game Design covers topics such as taking turns, moving objects, collisions, random numbers, avoiding hazards, and getting points.

CURRICULUM TITLE	DESCRIPTION	KEY TOPICS	TIME (MINUTES)
Adventures of Star Hedgehog	In this lesson, students will use event keys, collision events, a global timer and a scoreboard to create a game where a character collects goal objects.	key events variable scope collision events timer and scoring	90
Earth Day	In this lesson, students will use lists and random choice commands to create sprites with random images to use as goals and hazards in their game.	lists of strings random number generator game hazards	90
Feed the Fish	In this lesson, students will use the physics toolkit to create a falling-object type of game.	game physics leaving the stage	90
Flappy Dino	In this lesson, students will use the physics toolkit, interval-event, and random number generators to create a flappy-bird style, perpetual motion game.	game physics	90
Alien Scroller	In this lesson, students will create an extra-long stage background to create a side scrolling type of game.	scrolling stage goals and hazards win conditions	90
Brick Breaker	In this lesson, students will recreate the classic brick-breaker-style game using physics, random speed settings, and a collision event.	nested loops collision events	90
Basketball	In this lesson, students will create a pull-and-shoot style game using stage physics and event keys.	+= iteration key events	90
Pictionary	In this lesson, students will create a Pictionary-style drawing game for two players.	mouse events lists drawing	90
Sprite Volleyball	In this lesson, students will create a two-player volleyball/pong-style game that uses key events, stage physics and boundaries as hazards.	two-player games	90
Codebreaker	In this lesson, students will create their own version of a Mastermind-style board game.	nested loops while loops defining functions	90