

# TechNovators

TechNovators courses are designed to be used in out-of-school time environments like camps, clubs, afterschool programs, summer enrichment and other similar uses. Each course is up to 25 hours and explores themes like, website development, game development, App Development, VR and even AI.

Each course is centered around a series of guided projects that students work through to learn new digital skills. Once the guided projects are completed, students can customize their projects and share them as a portfolio of work. Along the way students will learn additional skills in design thinking, computational thinking and digital citizenship.



Tech Ready



Tech Connected



Tech Novators






Tech Future






## TechNovators Course Descriptions






Course Name	Description
<b>First Steps in Coding</b> Beginner	<p>Gain an understanding of HTML, CSS and JavaScript and get a solid head start in website development!</p> <p>Using real-world technology, students will create websites and web-based applications. They will build their own coding posters, trivia games and personalized websites.</p> <p> <b>Explore</b> coding concepts that are needed for basic web development and uncover the different elements of a simple web page.</p> <p> <b>Learn</b> the fundamental languages HTML, CSS &amp; JavaScript used to develop web pages and websites. By using a simple structure for a web page, learn how to take an idea online.</p> <p> <b>Create</b> a variety of simple projects, including a personal portfolio of posters, websites &amp; trivia games. Each of the projects, once finished, can be shared online with friends.</p>

Project	Description	Duration
Eye Chart	Learn how to create your own eye chart using HTML and CSS!	2 hours
Online Poster	Learn how to create a digital poster using HTML and CSS. Customize the poster with your own images, and text.	3 hours
Pattern Art with Code	Learn more about HTML structure and CSS properties to create a colorful art pattern.	3 hours
My First Website	Create a single-page website about your hobbies and interests using HTML and CSS.	5 hours
Chatbot Conversation	Learn how to use JavaScript to program a chatbot that can have a dynamic conversation with users.	5 hours
Trivia Quiz	Create a trivia quiz game using JavaScript. Learn about conditional statements and add your own quiz questions.	5 hours
Debug my Website	Use debugging skills and computational thinking to identify and correct code errors in HTML and CSS.	1 hour
Debug my Trivia Quiz	Use debugging skills and computational thinking to identify and correct code errors in JavaScript.	1 hour

Course Name	Description						
<b>First Steps in Game Development</b> Beginner	<p>This course is the perfect introductory experience for learning digital skills in the world of gaming and programming.</p> <p>Students will learn how to plan, design and develop their very first web based game using HTML, CSS and JavaScript. They will pick up valuable skills along the way such as planning, designing game assets and creating digital special effects.</p> <div> <b>Explore</b> the magical world of code by making several unique mini-games and see how games are designed for online play.</div> <div> <b>Learn</b> fundamental skills in HTML, CSS and JavaScript to develop web-games and learn to animate characters and creatures for in-game elements.</div> <div> <b>Create</b> 5 different mini-games that have characters and game elements that can be customized.</div> <table><tr><th>Project</th><th>Description</th><th>Duration</th></tr><tr><td>Witch Room</td><td>Learn how to use HTML, CSS, and JavaScript to create an “item collection” game.</td><td>6 hours</td></tr></table>	Project	Description	Duration	Witch Room	Learn how to use HTML, CSS, and JavaScript to create an “item collection” game.	6 hours
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Potion-Matching Memory Game	Build a card-matching game while learning how to create the layout and interaction using HTML and JavaScript.	4 hours
Flying Broom Game	Build a “click and collect” game by learning how to position objects and code the interactions using HTML, CSS and JavaScript.	4 hours
Spellcasting Game	Learn how to use HTML and JavaScript to create this “text-based combat” game.	4 hours
Potion-Maker Game	Learn how to position items and images by using HTML and JavaScript in order to create this “drag and drop” combination game.	7 hours

Course Name	Description															
<div>Code the Future with Artificial Intelligence</div> <div>Advanced</div>	<p>From self-driving cars to entertainment recommendations, AI is a part of our future. There is no better time to start learning how AI works.</p> <p>Students will use Machine Learning and code to develop and train their own vision recognition system and explore how Machine Learning can be applied to art, music, games and digital assistants by making and programming AI projects.</p> <p>Students will also explore similarities between AI and how our own minds by studying the effects of bias and categorization of data.</p> <div><div></div><div><b>Explore</b> the AI technology behind modern vision recognition systems, digital assistants, chatbots and other AI tools.</div></div> <div><div></div><div><b>Learn</b> to design and program AI tools using JavaScript and HTML.</div></div> <div><div></div><div><b>Create</b> a fully-responsive vision classifying tool, a chatbot and a smart assistant.</div></div> <table><tr><th>Project</th><th>Description</th><th>Duration</th></tr><tr><td>Webcam Image Classification</td><td>Explore an AI tool that uses your webcam to classify images.</td><td>3 hours</td></tr><tr><td>Card Sorting Activity</td><td>Sort objects into different groups based on the label provided.</td><td>3 hours</td></tr><tr><td>Machine Learning - Image Classification</td><td>Explore uploading images to an AI tool that can be trained to identify labels and classes.</td><td>4 hours</td></tr><tr><td>Image Upload Classifier - Coding Project</td><td>Learn to build an image classifier AI project using HTML and JavaScript along with the ML5 library for Machine Learning.</td><td>4 hours</td></tr></table>	Project	Description	Duration	Webcam Image Classification	Explore an AI tool that uses your webcam to classify images.	3 hours	Card Sorting Activity	Sort objects into different groups based on the label provided.	3 hours	Machine Learning - Image Classification	Explore uploading images to an AI tool that can be trained to identify labels and classes.	4 hours	Image Upload Classifier - Coding Project	Learn to build an image classifier AI project using HTML and JavaScript along with the ML5 library for Machine Learning.	4 hours
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Webcam Live Classifier	Explore using live webcam data to capture images for an AI tool that can be trained to identify labels and classes.	4 hours
Webcam Live Classifier - Coding Project	Learn to build a webcam image classifier AI project using HTML and JavaScript along with the ML5 library for Machine Learning.	4 hours
Adjustable Accuracy Webcam Classifier	Explore how the KNN AI algorithm can be adjusted to fine-tune the results of the classifier.	4 hours
Responsive Instrument	Train a machine learning tool to recognize three classes of objects using your webcam. Each class will play a sound when classified.	3 hours
Music Generator	Using HTML and JavaScript, learn to build an AI tool that can recognize three classes of objects using your webcam. Each class will play a sound when classified that you can customize.	3 hours
AI Chess Player	Learn how to build an AI chess game using HTML and JavaScript. Then see if you can win against the AI!	2 hours
AI Digital Assistant	Create a JavaScript program that collects information from the user and uses it to have a dynamic conversation.	2 hours
AI - Animal Rescue	Build a path-finding AI that can determine the fastest path to a location, using HTML and JavaScript.	2 hours
AI - Navigation Algorithm	Learn how to code an algorithm that is needed for an AI powered self driving car.	2 hours
AI - Auto Navigation	Build and test an AI self-driving car using HTML and JavaScript.	2 hours
AI - Find the Finish Line	Build a self-driving car course and test the ability of the AI to complete the course.	2 hours



## Course Name

## Description

### Mobile Game Developer Intermediate

In this intermediate course, students will learn to use HTML, CSS, and JavaScript to build games that can be played on both desktop and mobile devices.

This course is designed for students who have had prior experience with HTML, CSS, and JavaScript. Using the BSD Online learning platform, students will build a total of five different games — a platformer, a trac game, a nonogram puzzle game, a battle game, and a jumping game.

Students will develop fundamental skills in programming, learn about game development and design, and explore how to add further customizations to their projects. They will end the course with a tech portfolio of the projects they've created, and will be able to use their new skills to move onto more complex projects in the future.



**Explore** Students will further develop their understanding of HTML, CSS, and JavaScript by working through a progression of five game projects.



**Learn** Teachers will lead students through guided projects that teach the fundamentals of game development to create a series of projects on BSD Online. After completing the guided projects, students will also learn how to add further customizations to their projects in sandbox.



**Create** Students will create five unique projects throughout this course:

Project	Description	Duration
Platformer	Students will learn how to use HTML, CSS, and JavaScript to create a side-scrolling platformer where players jump to collect coins and avoid crashing into walls.	5 hours
Traffic Looper	Students will learn how to use HTML, CSS, and JavaScript to create a traffic game where players must complete successful loops around a track and control the speed of a car to avoid crashing into motorcycles.	5 hours
Nonogram	Students will learn how to use HTML and JavaScript to create a nonogram puzzle game where players must use the clues to reveal a hidden image.	5 hours
Dungeon Battle	Students will learn how to use HTML, CSS, and JavaScript to create a battle game where players must successfully defeat enemy monsters.	5 hours
Wall Jumper	Students will learn how to use HTML, CSS, and JavaScript to create a game where players jump to dodge falling rocks.	5 hours

## Course Name

## Description

### Video Game Design with Phaser

Intermediate

Start programming games like a professional with this course. Using the popular desktop and mobile gaming framework, PhaserJS, students will learn how to create a platformer game, a side-scroller game and mini-games.

Engaging their creativity and design thinking skills, they will create, customize and enhance their games by adding their own set of characters, environments, gravity and world physics.

Using Design Thinking methodology, students will gather feedback from classmates and iterate to improve their games.



**Explore** JavaScript-based video game development and play-test example games to understand best approaches for 2D game design.









**Learn** Platformer and side-scroller game design with Phaser and gain real-world game development skills. Learn advanced JavaScript concepts by programming game physics and multiple game levels.




**Create** a side-scroller 2D game that contains custom characters, backgrounds, levels and more. Once the game is completed, it can be shared online with friends.

Project	Description	Duration
The Linked Game (3 parts)	Learn how to use HTML and the JavaScript framework called Phaser to make an interactive puzzle-style game.	5 hours
Basketball Jam (7 parts)	Build an interactive two player basketball game where you can shoot a ball and play against another character using HTML and the JavaScript framework called Phaser.	10 hours
Burger Maker (6 parts)	Using HTML and the JavaScript framework called Phaser, build an interactive burger maker game where the player must prepare burgers with the right ingredients.	8 hours
Endless Runner	Customize the player, obstacles and scene of a side-scrolling video game using the Phaser framework. Students can design and customize their own elements.	2 hours

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<div>Build your Tech Startup</div> <div>Beginner</div>	<p>For aspiring technologists, this start-up course teaches students about cutting-edge new technologies to help them innovate a fresh new tech startup idea.</p> <p>Starting with fundamentals of technology, students will learn how programming works using HTML, CSS and JavaScript.</p> <p>Following this, students will identify a real-world problem that they would like to solve. Through design thinking activities and their newly acquired coding skills, they will design and prototype a working tech solution. Working independently or in small teams, students will then develop a business plan, company brand, and digital online presence.</p> <p>At the end of the course, students will have created a tech prototype, a business plan presented as a website and a business blog.</p> <div><div></div><div><b>Explore</b> new technologies that entrepreneurs use to develop business ideas using the same technologies that empower the major tech companies of today.</div></div> <div><div></div><div><b>Learn</b> the tools that entrepreneurs use to launch businesses, like design thinking, advertising, coding, marketing and brand development.</div></div> <div><div></div><div><b>Create</b> a single-page website to learn HTML, CSS and JavaScript, then prototype a business website and a digital portfolio that can be shared online. Use what you learn to launch your own business.</div></div> <table><tr><th>Project</th><th>Description</th><th>Duration</th></tr><tr><td>Technology of the Future</td><td>Students will explore emerging technologies like AI, VR and Robotics to help them think of technology themes that could be applied to a business startup idea.</td><td>2 hours</td></tr><tr><td>Business Brainstorm</td><td>Students will explore business ideas and begin to develop their own startup by planning out the necessary elements on a webpage.</td><td>4 hours</td></tr><tr><td>Business Branding</td><td>Students will develop a brand profile for their business startup, including a business logo, mission statement, slogan and a color palette.</td><td>4 hours</td></tr><tr><td>Business Website</td><td>Students will develop a multi-page website for their startup that includes the element from the Business Branding project.</td><td>5 hours</td></tr><tr><td>Business Advertising</td><td>Students will learn about business marketing practices and make a blog advertisement that can be shared on the Multi-page Website.</td><td>5 hours</td></tr><tr><td>Business Pitch</td><td>Students will learn about how to present a startup pitch and deliver a final presentation of their business idea, website and blog.</td><td>5 hours</td></tr></table>	Project	Description	Duration	Technology of the Future	Students will explore emerging technologies like AI, VR and Robotics to help them think of technology themes that could be applied to a business startup idea.	2 hours	Business Brainstorm	Students will explore business ideas and begin to develop their own startup by planning out the necessary elements on a webpage.	4 hours	Business Branding	Students will develop a brand profile for their business startup, including a business logo, mission statement, slogan and a color palette.	4 hours	Business Website	Students will develop a multi-page website for their startup that includes the element from the Business Branding project.	5 hours	Business Advertising	Students will learn about business marketing practices and make a blog advertisement that can be shared on the Multi-page Website.	5 hours	Business Pitch	Students will learn about how to present a startup pitch and deliver a final presentation of their business idea, website and blog.	5 hours
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<div>Code Your Own World with VR</div> <div>Advanced</div>	<p>From forests to Mars, students will bring their imaginations to life by coding their own virtual reality world.</p> <p>Developed with HTML, JavaScript, and A-Frame, they will code and add their own customized textures, elements and interactions to complete their realistic simulated 3D environments.</p> <p>Students will also be able to easily share their work with friends and families, as well as immerse themselves into their creations.</p> <div><div></div><div><b>Explore</b> how developers assemble and approach the design of virtual reality worlds and explore how professionals consider elements like, placement, backgrounds, settings and genres.</div></div> <div><div></div><div><b>Learn</b> the fundamentals of A-Frame along with HTML, CSS and JavaScript to customize textures, elements and virtual interactions. A-Frame is a professional framework for designing and coding virtual experiences.</div></div> <div><div></div><div><b>Create</b> VR scenes with custom themes, animations, gaze controls, and textures. Students will work through a progression of 13 projects, with each one teaching a specific feature of the A-Frame framework. As a final capstone project, students will then apply what they have learned in the guided projects to create a custom scene of their own in the sandbox.</div></div> <table><tr><th>Project</th><th>Description</th><th>Duration</th></tr><tr><td>Set up A-Frame</td><td>Students will be introduced to the syntax for A-Frame and learn how to import the A-Frame framework into a project. Students will then create a simple 3D scene and populate it with geometric shapes.</td><td>2 hours</td></tr><tr><td>A-Frame Modeling</td><td>Students will learn to create complex shapes by combining and manipulating simpler shapes to create the double-helix structure of a DNA molecule.</td><td>1 hour</td></tr><tr><td>A-Frame Image Textures</td><td>Students will learn how to apply images as textures to make 3D objects look more realistic.</td><td>1 hour</td></tr><tr><td>A-Frame Lighting and Fog</td><td>Students will learn how to add different types of lighting to a scene to create ambiance.</td><td>2 hours</td></tr><tr><td>Import Third-Party Models into A-Frame</td><td>Students will learn about the asset management system in A-Frame to import a third-party 3D model from Sketchfab.</td><td>2 hours</td></tr><tr><td>A-Frame Animations</td><td>Students will learn and apply the concept of animation keyframes to animate a car driving around a city street.</td><td>2 hours</td></tr><tr><td>A-Frame Path Animations</td><td>Students will learn how to animate objects that follow a predetermined path using curves and control points to animate a roller coaster art moving along a track.</td><td>2 hours</td></tr></table>	Project	Description	Duration	Set up A-Frame	Students will be introduced to the syntax for A-Frame and learn how to import the A-Frame framework into a project. Students will then create a simple 3D scene and populate it with geometric shapes.	2 hours	A-Frame Modeling	Students will learn to create complex shapes by combining and manipulating simpler shapes to create the double-helix structure of a DNA molecule.	1 hour	A-Frame Image Textures	Students will learn how to apply images as textures to make 3D objects look more realistic.	1 hour	A-Frame Lighting and Fog	Students will learn how to add different types of lighting to a scene to create ambiance.	2 hours	Import Third-Party Models into A-Frame	Students will learn about the asset management system in A-Frame to import a third-party 3D model from Sketchfab.	2 hours	A-Frame Animations	Students will learn and apply the concept of animation keyframes to animate a car driving around a city street.	2 hours	A-Frame Path Animations	Students will learn how to animate objects that follow a predetermined path using curves and control points to animate a roller coaster art moving along a track.	2 hours
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A-Frame Physics	Students will learn how to simulate physics in a scene by creating an animated scene of various sports balls rolling and bouncing off a flight of stairs.	1 hour
A-Frame Collision Detection	Students will learn how to program collision detection objects by creating an animated scene of a car that can collect coins.	2 hours
A-Frame Custom Components	Students will learn how to make the code base of an A-Frame scene more readable and efficient by separating A-Frame code into HTML and JavaScript to create the animated blades of a windmill fan.	2 hours
A-Frame Gaze Interactions	Students will learn about VR gaze controls and interactions by creating a 3D button that is clickable by looking at it.	1 hour
A-Frame VR Tour	Students will learn how to instantly change the position of the viewer by creating a scene with multiple waypoints to which the viewer can teleport to by looking at it.	1 hour
A-Frame Sound Effects	Students will learn how to add audio to an A-Frame scene to play a series of sound effects.	2 hours
Final Project: Diorama	<p>Students will apply what they have learned in the 13 projects to create a VR scene of their own as the final project of this course.</p> <p>For this project, students will not use a guided project. Instead, they will be creating their diorama from a sandbox on BSD Online.</p> <p>OPTIONAL: Students can present their VR diorama at the end of the course.</p>	4 hours

Course Name	Description
<b>Remake Classic Games with Scratch</b> Beginner	<p>Get a great introduction to programming with the new and improved version of Scratch.</p> <p>Students will learn the basics of game design and character animation in a well-structured and easy-to-learn environment as they reimagine classic arcade games, such as Tetris and Flappy Bird. What's more, they will learn to make art with code using the new code blocks in Scratch.</p> <p>No previous experience is required for this course.</p> <div>  <b>Explore</b> how popular arcade games became famous, how they are programmed and how to recreate them with Scratch.         </div>



**Learn** about the essentials of game design and character animation using Scratch. With inspiration from classic games, make your own updated versions.






**Create** a variety of 2D arcade games with animated characters, including coin collectors, maze hunters and side scrollers.




All projects are 1 hour in duration

Project	Description
Maze Game	Design a simple maze game and learn about sprite control.
Animations	Learn to animate characters and sprites that can be added to any game.
Ball Shooter	Build and customize a ball-shooting game that keeps score.
Character Adventure	Make an animated character adventure game.
Geometric Art	Design geometric art with the Scratch pen tool.
Pong	Learn how to build and play the classic game of pong.
Coin Collector	Make a coin collecting game with custom sprites.
Racing Game	Build a racing game with multiple variables.
Tetris	Remix a version of the classic hit game, Tetris.
Classic Game Maker	Build your own custom game in the style of the classics.
Flappy Parrot	Learn about the program and controls of the game and then remix a version.
Space Shooter	Build a space themed projectile game.
Snowball Physics	Make a game that simulates gravity for perfect snowball throwing.
Splash Screens	Learn to build an intro splash screen for your game.
Action and Adventure Game Maker	Make a custom Action and Adventure game.

Project	Description
Catch the Ghost	Remix a version of a ghost catching game and add your own sprites.
Text Input Game	Build a game that uses text-input to play and receive commands.
Boat Race	Make a boat race game that follows the mouse pointer.
Multi-level Game	Make a game that has multiple levels of difficulty.
Football Goalie	Remix a version of a football goalie game and customize it with new sprites.
Sprint Game	Build a sprint game that requires keyboard input for controlling speed.
Archery	Make an archery shooting game that follows a random sprite on a target.
Table Football Game	Build a table football game for two players.

Course Name	Description						
<b>3D Game Design and Development with Roblox</b> Beginner	<p>Students will use the world-famous gaming platform, Roblox Studio, to design and develop their own games. They will use programming logic like function, loops, and conditions to customize and develop an engaging story that captures the player's interest, and design heroes that take on the interactive world.</p> <p>Students will work on their game design skills and learn to think creatively about designing worlds, creating themes and setting objectives and goals, mimicking how professional developers.</p> <p>  <b>Explore</b> how other creators have developed advanced games using Roblox and see how Roblox games are made from start to finish.           </p> <p>  <b>Learn</b> to design and develop fully interactive 3D games using Roblox Studio and Lua programming.           </p> <p>  <b>Create</b> a custom 3D game using Roblox. Develop unique characters and scenes that can be shared and played by friends.           </p> <p><b>All projects are 1 hour in duration</b></p> <table> <tr> <th>Project</th><th>Description</th></tr> <tr> <td>Fundamentals</td><td>Explore the fundamental concepts of building games using Roblox Studio and plan out a 3D adventure game.</td></tr> <tr> <td>Effects &amp; Advanced Functionality</td><td>Learn how to add animated visual effects and create game checkpoints that will be added to the 3D adventure game.</td></tr> </table>	Project	Description	Fundamentals	Explore the fundamental concepts of building games using Roblox Studio and plan out a 3D adventure game.	Effects & Advanced Functionality	Learn how to add animated visual effects and create game checkpoints that will be added to the 3D adventure game.
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Environmental Design	Learn how to model and customize environmental features in Roblox Studio while designing a 3D adventure game.
Lua and Game Programming	Learn how to program using the Lua coding language to add interactivity to the 3D adventure game.
Cool Tricks with Scripting	Learn about variables, functions, and conditional statements using Lua to further customize the 3D adventure game.

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<b>First Steps in Python</b> Beginner Available in June	<p>In this introductory course for beginners, students will learn the basics of coding in Python. The course will focus on learning Python syntax, structure and parameters and then use the knowledge and skills to build two projects</p> <p>Using the BSD Online learning platform, students will be guided through learning about Python basics like, variables, data types, conditional logic, math operators and loops. The first part of the course is designed to be self-guided with activities and practice with syntax and using the console. Then students will build a birth-date-to-now calculator and an encoder/decoder.</p> <p>They will end the course with a tech portfolio of the projects they've created throughout the course, and will be able to use their new skills to move onto more complex projects in the future.</p> <div>  <b>Explore</b> Students will develop a fundamental understanding of the basic programming concepts in Python by working through a progression of 18 lessons and two projects.         </div> <div>  <b>Learn</b> Students will be self-guided through a series of lessons and guided projects that teach the fundamentals of Python. After completing the lessons and guided projects, students will also learn how to add further customizations to their projects in sandbox.         </div> <div>  <b>Create</b> Students will create 4 unique projects that put their Python skills to use: Rock-paper-scissors App. Countdown Timer, Birth-date-to-now Calculator, Secret Message Encoder/decoder.         </div> <p><b>All projects are 1 hour in duration</b></p> <table> <tr> <th>Project</th><th>Description</th></tr> <tr> <td>Intro, Comment and Variables</td><td>Learn about the python environment, basic syntax and about code comments.</td></tr> <tr> <td>Data Types</td><td>In Python, students will learn about the various data types and their function.</td></tr> <tr> <td>String Functions</td><td>Learn about the function and use of many different types of "strings" and how they are used in Python.</td></tr> <tr> <td>Math Operator</td><td>Learn how to program and use math operators to perform basic arithmetic and assignments.</td></tr> </table>	Project	Description	Intro, Comment and Variables	Learn about the python environment, basic syntax and about code comments.	Data Types	In Python, students will learn about the various data types and their function.	String Functions	Learn about the function and use of many different types of "strings" and how they are used in Python.	Math Operator	Learn how to program and use math operators to perform basic arithmetic and assignments.
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Project	Description
Conditional statements	Learn to write Python programs using all of the conditional statements and logic operators.
Project 1	Students will make a Rock, Paper Scissors app using conditional logic.
Loops	Learn how to use loops in Python and write example programs.
Project 2	Make a countdown timer using your knowledge of loops.
List	Learn about the use and function of lists and how to incorporate them into your programs.
2D List & Nested Loop	Make a 2D list and learn how nested loops can be used effectively.
Functions	Define a function and learn to use a function and its parameters.
Functions (recursion)	Learn about the special use of recursion in functions.
Tuples	Learn to create, access, update and use “tuples” in Python.
Sets	Learn to create, access, update and use “sets” in Python.
Dictionary	Learn to create, access, update and use “dictionary” in Python.
Project 3	Build a console based application - let the user input their birth date and print out how long they have been living on the planet Earth (years, months, days)
HTML Elements with Brython	Create and use HTML elements with Python.
Styling Elements	Learn to change the background-color, font and CSS elements.
Event Handling	Learn about “events” to add interactivity to a program or project.
Project 4	Build a GUI based secret message encoder and decoder application.
Teacher PD Project	Learn the basics of Python, how Python is used in the browser and other environments and how Python requires the use of the Console.