

BASIC PROGRAMMING CONCEPTS

During these classes, students will explore the basic programming language concepts of sequencing, debugging and repeat loops using thematic puzzles. They will apply their learning to create projects based on the same concepts using Blockly programming language.

SESSION	CONCEPT	SKILLS
1	Command, Sequence	Sequencing Putting commands in a sequence to solve puzzles.
2	Algorithms	Step-wise thinking Planning steps of instruction before writing code
3	Sequential Coding	Decomposition Breaking down task into small steps and write code to draw simple art.
4	Debugging	Problem solving, Resilience Identifying errors in the given code
5	Formative Assessment	Assessment of learning
6	Counting Loops-I	Pattern recognition, Decomposition Identifying patterns in code while solving puzzles
7	Counting Loops-II	Pattern abstraction, Decomposition Identifying repetitive blocks of code while drawing simple geometric shapes
8	Conditionals	Problem solving, Decision making Using conditional statements in code while solving complex puzzles
9	Conditional Loops	Pattern abstraction, Decision making Using loops and conditionals while making a simple animation.
10	Formative Assessment	Assessment of learning



ADVANCED PROGRAMMING CONCEPTS

During these classes, the students will explore the advance programming concepts such as conditionals, loops, functions, variables and events. They will solve different puzzles of varying complexities to get a deep understanding of these concepts and will apply their learning to create various projects such as animations, simple games and geometric patterns. Blockly programming language will be used in all the projects and puzzles.

SESSION	CONCEPT	SKILLS
11	Nested Loops-I	Pattern recognition, Decomposition Identifying patterns in code while solving complex puzzles.
12	Nested Loops-II	Pattern abstraction, Decomposition Identifying repetitive blocks of code while solving puzzles to draw complex geometric shapes
13	Nested Conditionals-I	Pattern recognition, Condition evaluation Using nested conditional to write code to create rangoli patterns.
14	Nested Conditionals-II	Pattern abstraction, Creativity Using nested conditional to write code to create complex snowflake patterns.
15	Formative Assessment	Assessment of learning
16	Basics Events	Logic Use events and create interactive animation.
17	Storyboarding	Creativity Use events to create an animated story
18	Events & Loops	Logic, Creativity Use events and loops to create an interactive animation
19	Events & Conditionals	Logic, Creativity, Problem solving Use existing templates to create simple interactive game
20	Formative Assessment	Assessment of learning
21	Functions - I	Logic, Abstraction Use existing function blocks to solve complex puzzles

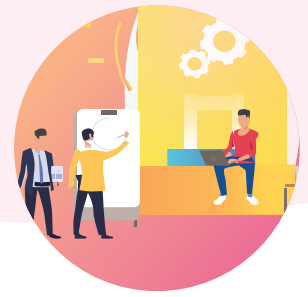


22	Functions - II	Abstraction Edit existing functions and write code to accomplish specified tasks.
23	Functions-III	Abstraction, Creativity Define functions and write code to create art forms
24	Formative Assessment	Assessment of learning
25	Variables-I	Data manipulation, Comparison Use variables in code to get differentiated outputs
26	Variables-II	Data manipulation Store data from user input to personalize interaction
27	Functions and variables	Logic, Data manipulation Use variables and functions to create complex animation
28	Project Work	Animated story / Modern Art
29	Project Work (cont.)	Animated story / Modern Art
30	Course review and feedback	

BASIC ANDROID APP DEVELOPMENT

During these classes, the students will explore the basics of UI/UX design and try their hand at designing and developing simple apps like language translator, color mixer using Thinkable interface.

SESSION	CONCEPT	SKILLS
31	Application development basics	Exploration Familiarity with thinkable interface components.
32	Text to Speech Component	Creativity, Logic Use basic UI components and write code to create a reading app.
33	Translator component	Creativity, Logic Use basic UI components and write code to create a language translation app



34	Image component	Creativity Use the image component to design the UI of the Scrapbook/ Encyclopaedia app
35	Screen navigation	Logic Do the UX coding for the Scrapbook app
36	Variables	Numeracy Use math blocks to create a digital counter
37	Variables, Use of math blocks	Numeracy, Logic Use math blocks to create a basic calculator
38	Canvas component	Creativity, Logic Use canvas UI to create a doodle app
39	Project Work	Perseverance Fine-tuning the UI and UX coding for publishing the app on play store/app store
40	Course review and feedback	

ARTIFICIAL INTELLIGENCE AND SCRATCH

During these classes, students are given a quick overview of Scratch programming interface using a movie making project and a game project. They are then introduced to the basics of Artificial intelligence concepts and terms. The students then learn to train machine models to recognize text, voice and image commands and use the same models to create projects in Scratch platform.

SESSION	CONCEPT	SKILLS
41	Revisiting Cartesian coordinate system	Numeracy Understand scratch interface and program sprite to move in positive and negative direction.
42	Objects and properties	Pattern abstraction, Decomposition Animate a scene by changing sprite costume and background.
43	Rotation and angles	Numeracy Program sprites to move in positive and negative directions, rotate at different angles.



44	Communication between Objects	Pattern recognition Use the broadcast method to make an interactive animation between multiple sprites.
45	Boolean logic	Decision making Use conditions to restrict the movement of sprites within the canvas
46	Revisiting events	Generalization Use the mouse and key events to control the sprite's state
47	Sensing events	Perseverance, Logic Create and test the code for change of variable count on touch detection.
48	Game design process	Step by step thinking Plan the steps of game design process
49	Project Work	Logic Design and code the game interface
50	Project Work (Cond)	Presentation, Problem solving Code, test, debug and test the game
51	Artificial Intelligent systems	Exploration Explore various existing AI systems
52	Artificial intelligence- The concept	Analysing Build understanding on human vs artificial intelligence
53	The big ideas of AI- part I	Exploration Explore the AI basics
54	The big ideas of AI- part II	Exploration Explore the AI basics
55	Formative Assessment	Assessment of learning
56	Rule based models	Abstraction Create a rule based model of sentiment analysis in scratch
57	Rule based vs machine learning models	Analysing Discuss limitations of rule based models
58	Text recognition	Abstraction Train a model to recognise textual commands



59	Importance of data in machine learning	Analysing Test the machine learning model and improve the dataset to get accurate results
60	Text recognition	Analysing Train and test a supervised learning model for sentiment analysis
61	Text recognition	Creativity Use the above machine learning model to create a sentiments detector in Scratch.
62	Text recognition	Problem solving, Perseverance Train and test a supervised learning model for a digital assistant
63	Text recognition	Creativity, Logic Use the above machine learning model to create a digital assistant in Scratch.
64	Project Work	
65		
66	Colour classification	Exploration Create a colour classifier in teachable machines
67	Colour classification	Analysing Analyse data to train a good colour classifier machine model
68	Colour classification	Creativity, Generalizing Use the above machine learning model to create a colour identifying project in scratch
69	Image detection	Analysing Create an object classifier in teachable machines
70	Image detection	Creativity, Logic Create a project in scratch that identifies webcam pictures.
71	Project Work	
72	Face detection	Creativity, Logic Create a video filter in Scratch to turn the face into a cartoon



73	Face detection	Abstraction Create a video filter in Scratch to add a mask to your face
74	Face detection	Exploration, Generalizing Create a face detection model in teachable machine
75	Voice detection	Creativity, Logic Create an alien in scratch that recognises alien language
76	Voice detection	Generalizing, Creativity Create a voice activated digital assistant in Scratch
77	Voice detection	Generalizing, Analysing Create a voice activated game in scratch
78	Project Work	
79		
80	Course review and feedback	

ADVANCED ANDROID APP DEVELOPMENT

The students also dive deeper into app development and explore canvas component and how to implement APIs to create games, quiz apps etc.

SESSION	CONCEPT	SKILLS
81	List viewer component	Numeracy Explore the difference between lists and variables
82	Reinforcing concepts	Creativity, Step by step thinking Plan and design the interface of the quiz app
83	Math blocks	Logic Write UX code for the quiz app
84	Web viewer component	Explore the working of web viewer
85	Slider component	Creativity, Step by step thinking Plan and design the interface of the colour changer app



86	Reinforcing concepts	Logic Write the UX code for the colour changer app
87	Sound and Player component	Creativity, Step by step thinking Plan and design the interface of the piano app
88	Reinforcing concepts	Logic, Generalizing Write the UX code for the piano app
89	Project Work Fine-tuning the UI and UX coding for publishing the app on play store/app store	
90	Course review and feedback	

INTRODUCTION TO PYTHON PROGRAMMING

During these classes the students learn the basic concepts of python programming language. They start programming using blocks with python commands written on them and gradually shift to text based programming. All programs are written using the python turtle library.

SESSION	CONCEPT	SKILLS
91	Algorithms	Step-wise thinking Exploring the python commands and python turtle programming interface.
92	Motion, Angles	Sequencing Write code in python to create lines, angles and hollow basic 2D shapes
93	Shapes	Decomposition Write code in python to create color filled advance 2D shapes
94	Cartesian coordinate system	Numeracy Write code in python to create drawings at specific coordinates
95	Project Work	Pattern recognition, Decomposition Practice activities
96	Formative Assessment	Assessment of learning



97	Loops-I	Pattern recognition, Logic Explore the need of loops in code. Use basic loops to create art.
98	Practice activities	Perseverance, Problem-solving Practice activities on loops
99	Nested Loops	Pattern recognition, Decomposition, Abstraction Write code using nested loops to create complex art patterns
100	Practice activities	Perseverance, Problem-solving Practice activities on nested loops
101	Debugging in Loops	Problem-solving, Perseverance, Algorithms Find and fix errors in code
102	Formative Assessment	Assessment of learning
103	User Input, variables, Data types	Numeracy, Logic Write code to create programs that behave according to the user inputs.
104	Conditionals	Decision making, Logic Write code using conditionals to give specific outputs
105	Strings	Logic Write code using string manipulation operations.
106	Practice Activities	Perseverance, Generalization Practice activities on strings, user input and conditionals.
107	Events-I	Logic, Abstraction Write code to control the turtle using key events
108	Events-II	Logic, Abstraction Write code to control the turtle using mouse events
109	Project Work	Algorithms, Logic Write code to create a simple turtle animation/ game
110	Course Review and feedback	



2D ANIMATION AND GAME DESIGN USING JAVASCRIPT

During these classes, the students will explore the drawing commands of JavaScript in the block based environment and create beautiful landscapes and drawings. They will then learn how to create sprites, manipulate their properties and use events to create animations and interactive games.

SESSION	CONCEPT	SKILLS
111	Revisiting the Cartesian coordinate system	Exploration Explore the JavaScript platform, basic drawing commands
112	Shapes and Angles	Creativity, Decomposition Create art by superimposing shapes
113	Variables, Random numbers	Numeracy, Computation Use random numbers to get different outputs
114	Functions	Abstraction Define and use functions specific tasks in their code.
115	Draw Loop	Generalization, Pattern recognition Write code to create animated shapes
116	Objects, Properties	Abstraction, Creativity Manipulating sprite properties to create gif images
117	Counter Pattern	Numeracy, Decomposition Use the counter pattern to animate sprites
118	Formative Assessment	Assessment of Learning
119	Conditionals	Logic, Decision making Use conditionals to control the sprite's state
120	Events-I	Logic Use edge detection to restrict the sprite within the canvas
121	User Input-I	Logic, Generalization Use mouse events to create a simple clicker game
122	User input-II	Logic, Generalization Use key events to control the sprite using keyboard keys
123	Game Design	Algorithms, Decomposition Plan the interface, layout and create UI of the game

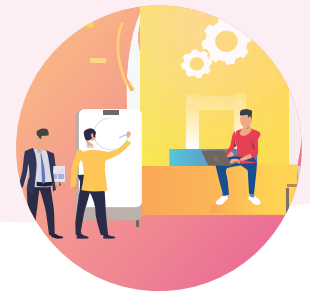


124	Game Development	Generalization, Persistence Complete the UX code for the game
125	Variables	Numeracy Add variables to store the game score
126	Debugging	Problem-solving, Persistence Test and debug the game
127	Project-I	Step-wise thinking, Decomposition Plan the UI, levels, algorithm of their own game
128	Project-II	Logic, persistence Write code for the different levels of their game
129	Project-III	Problem-solving, Persistence, Presentation Test, debug and present the game
130	Course review and feedback	

WEB DEVELOPMENT AND CYBER SECURITY

During these classes students will explore different websites to understand the elements and design of websites. They will then create their own website using HTML commands and style it using CSS. Their website will be hosted on the PurpleTutor domain. During the cybersecurity module, the students will learn various safety protocols and practices to be followed while working on the internet.

SESSION	CONCEPT	SKILLS
131	Exploring websites	Exploration, Observation Observe various websites to study website elements and designs
132	Introduction to HTML	Structuring Website content & structure, HTML structure and element , Planning & Building a structure, Heading tags
133	Common Tags in HTML	Scripting Paragraph tags, Creating horizontal rules & line breaks
134	Div Tag and Creating ID & Classes	Classification HTML division tags and creating HTML ID & CLASS



135	CSS: Working with text - Part 1	Classification and Targeting Introduction to CSS, CSS syntax, Understanding CSS properties
136	CSS: Working with text - Part 2	Creativity, Design Using CSS properties for styling text content
137	Links & CSS: Links - Part 1	Exploration, Scripting Web navigation, Examples of web navigation, Adding HTML links
138	Links & CSS: Links - Part 2	Creativity, Design CSS: Styling Links
139	Adding & Styling Images - Part 1	Creativity, Generalization Adding Images in HTML, Image usability guide
140	Adding & Styling Images - Part 2	Classification and Targeting Creating image with link, Styling link using CSS properties
141	Assessment	Assessment of learning
142	Working with Lists - Part 1	Classification and Ordering Introduction to list, HTML list , Creating ordered & unordered list
143	Working with Lists - Part 2	Formatting Styling list using CSS properties
144	Working with Tables - Part 1	Nested Layouting Introduction to tables, HTML tables, Creating HTML table
145	Working with Tables - Part 2	Design Styling tables using CSS properties
146	Working with Forms - Part 1	Event Based Programming Introduction to web forms, HTML forms, Creating HTML forms Basic
147	Working with Forms - Part 2	Event Based Programming Web form Examples, Creating HTML form advance
148	Working with Forms - Part 3	Design, Creative Thinking Styling Form using CSS properties
149	Assessment	Assessment of learning



150	Creating a Web Gallery in HTML- Part 1	Design, Visualization Introduction to gallery & Web Gallery, Creating Image Gallery
151	Creating a Web Gallery in HTML- Part 2	Design, Formatting Adding Captions to the images and styling web gallery using CSS properties
152	Adding Multi Media in HTML- Part1	Exploration Introduction to Multimedia and multimedia formats for audio & video, Adding video to web page
153	Adding Multi Media in HTML- Part1	Styling Adding audio to web page and adding YouTube videos to webpage and styling the content using CSS properties
154	Adding Transformation to web elements	Visualization, Creativity Introduction to transformation, using 2D and 3D CSS property to rotate, scale, skew, or translate an element.
155	Adding Transition to web elements	Visualization, Creativity Introduction to Transition, Using CSS transition properties to control the duration of effect
156	Adding Animations to web pages - Part 1	Spatial Visualization Introduction to animation, CSS animations, Learning about key frames and animation properties
157	Adding Animations to web pages - Part 2	Spatial Visualization Adding animation properties to elements of web page
158	Adding Animations to web pages - Part 3	Creating animation buttons, text color animation and text reveal effect.
159	Pagination & Footer in web pages	Formatting Introduction to Pagination, creating and styling pagination, adding footer to web page.
160	Assessment	Assessment of learning
161	My online Neighbourhood	Exploration Introduction to online Neighbourhood, Steps to be responsible digital citizen when online, Internet Traffic light that awares of kind of good and bad websites



162	Online Community and Social media life	Generalization, Collaboration What is Online community and how are we connected via Social Media. Keeping social life healthy and safe.
163	Private and Personal Information	Critical thinking, Analysing What does private & personal information mean? How to protect self-privacy and understand what should be shared online.
164	Password Power up	Critical Thinking, Logic Building powerful password & how to handle safely advanced tech
165	Binary Code	Computation, Numeracy Introduction to Binary code and the study of binary representation systems.
166	Exploring Encryption & Decryption 1	Computation, Numeracy Pigpen Ciphers - Encoding & Decoding
167	Exploring Encryption & Decryption 2	Computation, Numeracy Caesar Cipher - Encoding & Decoding
168	Phishing for Scams	Exploration, Analyse What is clickbait, and how can you avoid it? , How can you protect yourself from phishing?
169	Internet and Cybersecurity Dilemmas	Exploration, Analyse Discover How Networks Work, Find Out What Protocols Are And How to Create One, Find Out What Malware Is
170		Course review and feedback



INTRODUCTION TO DATA SCIENCE		
SESSION	CONCEPT	SKILLS
171	Data and Data Science	Exploration Exploring what is data, information and data science
172	Areas of Data Science	Exploration, Observation Exploring areas where data science is used in everyday life
173	Introduction to Data Visualization	Visualization, Analysis Context for data visualization
174	Data Visualization rules	Analysis Rule of 2 for data visualization
175	Introduction to Google sheets	Exploration Entering, formatting and saving data into google sheets
176	Data Analytics - I	Numeracy, Decomposition Doing basic math operations to run analytics on data
177	Data Analytics - II	Numeracy, Decomposition Sorting and searching data in a table
178	Assessment	Assessment of learning
179	Data Representation - I	Representation, Generalization Representing data using charts - Part 1
180	Data Representation - II	Representation, Generalization Representing data using charts - Part 2
181	Data Visualization techniques	Visualization, Representation Map visualization of data in google sheet
182	Data clean up	Numeracy, Logic Clean up of data



183	Data Visualization- Types	Visualization, Abstraction Types of data for data visualization
184	Data Representation- III	Generalization Use of infographics/info grams for data representation
185	Assessment	Assessment of learning
186	Python concepts recap	Computation Recap of use of variables, loops in python
187	Introduction to Panda library	Computation, Numeracy How to create data with pandas: create table, insert data and print table data
188	Introduction to Random function	Computation Use of Random function
189	The CSV file format	Numeracy Introduction to the CSV file format
190	Data frames and CSV files-I	Generalization, Decomposition Reading data from CSV file to data frame and do filtering
191	Data frames and CSV files-II	Generalization, Decomposition Reading data from CSV file to data frame and do filtering(cont.)
192	Assessment	Assessment of learning
193	Python Data Types	Numeracy Data types in Python
194	Introduction to statistical concepts	Computation Introduction to statistical concepts- Mean, Median, Mode
195	Introduction to data frame commands- I	Computation Explore top 5 Data frames - Head, Length, columns, shape, describe
196	Introduction to data frame commands- II	Computation Explore top 5 Data frames - Head, Length, columns, shape, describe
197	Data analysis using Data frames - I	Analysis, Generalization How to analyse data using data frame



198	Data analysis using Data frames - II	Analysis, Generalization How to analyse data using data frame (cont.)
199	Data frames and charts	Analysis Data frames and charts
200	Assessment	Assessment of learning