



BASIC PROGRAMMING CONCEPTS (Code.org)

During these classes the students will go through a recap of the basic concepts of programming starting from sequencing and gradually moving to loops, conditionals, functions and variables in a block based environment. They will solve puzzles of varying complexities and create projects in Blockly programming language during these classes.

SESSION	CONCEPT	SKILLS
1	Command, Sequence, Algorithm	Sequencing, Step-wise thinking Putting commands in a sequence to solve puzzles.
2	Debugging	Problem solving, Resilience Identifying errors in the given code
3	Counting Loops	Pattern recognition, Decomposition Identifying patterns in code while solving puzzles
4	Nested Loops	Pattern abstraction, Decomposition Identifying repetitive blocks of code while solving puzzles to draw complex geometric shapes
5	Conditionals	Problem solving, Decision making Using conditional statements in code while solving complex puzzles
6	Formative Assessment	Assessment of learning
7	Functions	Logic, Abstraction Use existing function blocks to solve complex puzzles
8	Variables	Data manipulation Use variables in code to get differentiated outputs
9	Advance Loops	Pattern recognition, Decomposition Identifying patterns in code while solving complex puzzles
10	Project Work	



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
11	Algorithms	Step-wise thinking Exploring the python commands and python turtle programming interface.
12	Motion, Angles	Sequencing Write code in python to create lines, angles and hollow basic 2d shapes.
13	Shapes	Decomposition Write code in python to create color filled advance 2d shapes
14	Cartesian coordinate system	Numeracy Write code in python to create drawings at specific coordinates
15	Project Work	Pattern recognition, Decomposition Practice activities
16	Formative Assessment	Assessment of learning
17	Loops-I	Pattern recognition, Logic Explore the need of loops in code. Use basic loops to create art.
18	Practice activities	Perseverance, Problem solving Practice activities on loops
19	Nested Loops	Pattern recognition, Decomposition, Abstraction Write code using nested loops to create complex art patterns
20	Practice activities	Perseverance, Problem solving Practice activities on nested loops



21	Debugging in Loops	Problem solving, Perseverance, Algorithms Find and fix errors in code
22	Formative Assessment	Assessment of learning
23	User Input, variables, Data types	Numeracy, Logic Write code to create programs that behave according to the user inputs.
24	Conditionals	Decision making, Logic Write code using conditionals to give specific outputs
25	Strings	Logic Write code using string manipulation operations.
26	Practice Activities	Perseverance, Generalization Practice activities on strings, user input and conditionals.
27	Events-I	Logic, Abstraction Write code to control the turtle using key events
28	Events-II	Logic, Abstraction Write code to control the turtle using mouse events
29	Project Work	Algorithms, Logic Write code to create a simple turtle animation/ game
30	Course Review and feedback	



BASIC APP DEVELOPMENT

The students also explore the basics of UI/UX design and try their hand at designing and developing simple apps like language translator, text to speech convertor, color mixer etc. using Thunkable interface.

SESSION	CONCEPT	SKILLS
31	Application development basics	Exploration Familiarity with thunkable interface components.
32	Translator component	Creativity, Logic Use basic UI components and write code to create a language translation app
33	Image component	Creativity Use the image component to design the UI of the Encyclopaedia app
34	Screen navigation	Logic Do the UX coding for the Encyclopaedia app
35	Variables	Numeracy Use math blocks to create a basic calculator
36	Lists and List Viewer component	Creativity, Logic Use canvas UI to create a task manager
37	Combining components	Creativity Use basic UI components to design the Quiz App interface.
38	Conditionals, Variables	Logic, Numeracy Write the UX code of the Quiz 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	



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
41	Revisiting the Cartesian coordinate system	Exploration Explore the JavaScript platform, basic drawing commands
42	Shapes and Angles	Creativity, Decomposition Create art by superimposing shapes
43	Variables, Random numbers	Numeracy, Computation Use random numbers to get different outputs
44	Functions	Abstraction Define and use functions specific tasks in their code.
45	Draw Loop	Generalization, Pattern recognition Write code to create animated shapes
46	Objects, Properties	Abstraction, Creativity Manipulating sprite properties to create gif images
47	Counter Pattern	Numeracy, Decomposition Use the counter pattern to animate sprites
48	Formative Assessment	Assessment of Learning
49	Conditionals	Logic, Decision making Use conditionals to control the sprite's state
50	Events-I	Logic Use edge detection to restrict the sprite within the canvas
51	User Input-I	Logic, Generalization Use mouse events to create a simple clicker game



52	User input-II	Logic, Generalization Use key events to control the sprite using keyboard keys
53	Game Design	Algorithms, Decomposition Plan the interface, layout and create UI of the game
54	Game Development	Generalization, Persistence Complete the UX code for the game
55	Variables	Numeracy Add variables to store the game score
56	Debugging	Problem solving, Persistence Test and debug the game
57	Project-I	Step-wise thinking, Decomposition Plan the UI, levels, algorithm of their own game
58	Project-II	Logic, persistence Write code for the different levels of their game
59	Project-III	Problem solving, Persistence, Presentation Test, debug and present the game
60	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
61	Introduction to Artificial Intelligent systems	Exploration Explore various existing AI systems



62	What is Artificial intelligence	Analysing Build understanding on human vs artificial intelligence
63	The big ideas of AI- part 1	Exploration Explore the AI basics
64	The big ideas of AI- part 2	Exploration Explore the AI basics
65	Formative Assessment	Assessment of learning
66	Rule based models	Abstraction Create a rule based model of sentiment analysis in scratch
67	Rule based vs machine learning models	Analysing Discuss limitations of rule based models
68	Text recognition	Abstraction Train a model to recognise textual commands
69	Importance of data in machine learning	Analysing Test the machine learning model and improve the dataset to get accurate results
70	Text recognition	Analysing Train and test a supervised learning model for sentiment analysis
71	Text recognition	Creativity Use the above machine learning model to create a sentiments detector in Scratch.
72	Text recognition	Problem solving, Perseverance Train and test a supervised learning model for a digital assistant
73	Text recognition	Creativity, Logic Use the above machine learning model to create a digital assistant in Scratch.
74	Project Work	
75		



76	Color classification	Exploration Create a color classifier in teachable machines
77	Color classification	Analysing Analyse data to train a good color classifier machine model
78	Color classification	Creativity, Generalizing Use the above machine learning model to create a color identifying project in scratch
79	Image detection	Analysing Create an object classifier in teachable machines
80	Image detection	Creativity, Logic Create a project in scratch that identifies webcam pictures.
81	Project Work	
82	Face detection	Creativity, Logic Create a video filter in Scratch to turn the face into a cartoon
83	Face detection	Abstraction Create a video filter in Scratch to add a mask to your face
84	Face detection	Exploration, Generalizing Create a face detection model in teachable machine
85	Voice detection	Creativity, Logic Create an alien in scratch that recognises alien language
86	Voice detection	Generalizing, Creativity Create a voice activated digital assistant in Scratch
87	Voice detection	Generalizing, Analysing Create a voice activated game in scratch
88	Project Work	
89		



90

Course review and feedback

ADVANCED ANDROID APP DEVELOPMENT

The students also dive deeper into app development and create apps such as game apps, quiz apps etc.

SESSION	CONCEPT	SKILLS
91	The Canvas Component	Creativity, Step by step thinking Plan and design the interface of a drawing app
92	Lists, List Viewer Component	Numeracy Add a random Word picker to the drawing app
93	The Player Component	Creativity Design the UI of the music player app
94	The slider component	Logic Create the UX code for the music player with sliding volume control
95	Slider component	Creativity, Step by step thinking Plan and design the interface of the color changer app
96	Game Design- I	Algorithms, Creativity Plan the steps, interface of their own game app.
97	Game Design- II	Logic, Pattern recognition, Decomposition Design the interface of their game app
98	Game Design- III	Problem solving, Persistence Test, debug their game app
99	Project Work	
100	Course review and feedback	



WEB DEVELOPMENT AND CYBER SECURITY

During these classes students will explore different websites to understand the elements, 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 explore the safe techniques to be followed while working on the internet.

SESSION	CONCEPT	SKILLS
101	Exploring websites	Exploration, Observation Observe various websites to study website elements and designs
102	Introduction to HTML	Structuring Website content & structure, HTML structure and element , Planning & Building a structure, Heading tags
103	Common Tags in HTML	Scripting Paragraph tags, Creating horizontal rules & line breaks
104	Div Tag and Creating ID & Classes	Classification HTML division tags and creating HTML ID & CLASS
105	CSS: Working with text - Part 1	Classification and Targeting Introduction to CSS, CSS syntax, Understanding CSS properties
106	CSS: Working with text - Part 2	Creativity, Design Using CSS properties for styling text content
107	Links & CSS: Links - Part 1	Exploration, Scripting Web navigation, Examples of web navigation, Adding HTML links
108	Links & CSS: Links - Part 2	Creativity, Design CSS: Styling Links
109	Adding & Styling Images - Part 1	Creativity, Generalization Adding Images in HTML, Image usability guide
110	Adding & Styling Images - Part 2	Classification and Targeting Creating image with link, Styling link using CSS properties
111	Assessment	Assessment of learning



112	Working with Lists - Part 1	Classification and Ordering Introduction to list, HTML list , Creating ordered & unordered list
113	Working with Lists - Part 2	Formatting Styling list using CSS properties
114	Working with Tables - Part 1	Nested Lay outing Introduction to tables, HTML tables, Creating HTML table
115	Working with Tables - Part 2	Design Styling tables using CSS properties
116	Working with Forms - Part 1	Event Based Programming Introduction to web forms, HTML forms, Creating HTML forms Basic
117	Working with Forms - Part 2	Event Based Programming Web form Examples, Creating HTML form advance
118	Working with Forms - Part 3	Design, Creative Thinking Styling Form using CSS properties
119	Assessment	Assessment of learning
120	Creating a Web Gallery in HTML- Part 1	Design, Visualization Introduction to gallery & Web Gallery, Creating Image Gallery
121	Creating a Web Gallery in HTML- Part 2	Design, Formatting Adding Captions to the images and styling web gallery using CSS properties
122	Adding Multi Media in HTML- Part 1	Exploration Introduction to Multimedia and multimedia formats for audio & video, Adding video to web page
123	Adding Multi Media in HTML- Part 2	Styling Adding audio to web page and adding YouTube videos to webpage and styling the content using CSS properties
124	Adding Transformation to web elements	Visualization, Creativity Introduction to transformation, using 2D and 3D CSS property to rotate, scale, skew, or translate an element.



125	Adding Transition to web elements	Visualization, Creativity Introduction to Transition, Using CSS transition properties to control the duration of effect
126	Adding Animations to web pages - Part 1	Spatial Visualization Introduction to animation, CSS animations, Learning about key frames and animation properties
127	Adding Animations to web pages - Part 2	Spatial Visualization Adding animation properties to elements of web page
128	Adding Animations to web pages - Part 3	Creating animation buttons, text color animation and text reveal effect.
129	Pagination & Footer in web pages	Formatting Introduction to Pagination, creating and styling pagination, adding footer to web page.
130	Assessment	Assessment of learning
131	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
132	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.
133	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.
134	Password Power up	Critical Thinking, Logic Building powerful password & how to handle safely advanced tech
135	Binary Code	Computation, Numeracy Introduction to Binary code and the study of binary representation systems.
136	Exploring Encryption & Decryption 1	Computation, Numeracy Pigpen Ciphers - Encoding & Decoding
137	Exploring Encryption & Decryption 2	Computation, Numeracy Caesar Cipher - Encoding & Decoding



138	Phishing for Scams	Exploration, Analyse What is clickbait, and how can you avoid it? , How can you protect yourself from phishing?
139	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
140	Course review and feedback	

3D ANIMATION AND GAME DESIGN

During these classes, the students will learn the basics of 3D designing in the Roblox studio. They will learn to create 3D objects and scenes. They will also learn the basic commands of LUA programming script to create different animations and a maze game.

SESSION	CONCEPT	SKILLS
141	Digital Citizenship	Exploration Cyber security, Software Set-up
142	Introduction to Roblox Studio	Exploration, Visualization Getting familiar to the 3D Game designing platform
143	Working with 3D Parts	Creativity, Spatial Visualization Putting 3D parts together to build an obstacle course
144		
145	Creating game levels	Creativity, Logic Creating multiple check points that serve as the milestones for the player
146	LUA Coding fundamentals	Computational Thinking Learning how to code using Lua programming language : Loops, Functions, Variables
147		
148	Developing the Game theme	Creativity, Imagination Adding an ambience to the game
149		



150	Deadly Lava	Creativity, Logic Making the game adventurous by introducing Lava lands and touch events
151	Getting Started with building a Maze	Step wise Thinking Planning of a 3D Maze game
152	Create a score system	Numeracy, Critical thinking Adding collectable items, enemies and score board to the game
153		
154	Build the Maze	Persistence, Problem Solving Completing the construction of the Maze as per the plan
155		
156	Finish Line	Persistence, Generalization Building the destination for the Maze
157		
158	Blocked Door	Logic, Computation Making the game more adventurous by adding an obstacle door to reach the destination. Making use of coding a closed door which opens only if the player satisfies certain conditions.
159	Introduction to World Building	Exploration Getting familiar with the components of 3D scene building
160		
161	Plan and Get started	Imagination, Step-wise Thinking Plan an adventure game and the scenes that are involved
162	Visual Effects	Creativity, Exploration Working with shadows and lights , Learning to blur / deepen / sharpen the visual effects
163	Building a fireplace	Visualization, Generalization Use of 3D game designing techniques to build a fireplace
164		
165	Beautification	Creativity, Decomposition Learning about Decals and Textures : Adding details to the game ambience like Trees , Chairs, Tables, Lamps, Wallpapers
166		



167	Completion	Persistence Working with sound effects
168		
169	Basics of Roblox Animation	Exploration What is animation? Introduction to the basics of 3D Animations in Roblox
170		
171	Creating animations	Creativity, Step-wise Thinking Plan and build your first animation in Roblox. Ex: A human performing an action of swimming/dancing/walking etc.
172		
173	Export and play	Generalization, Problem-solving Learn how to export your animation to the game. Modify your game theme, Export and play
174		
175	Scripting Game Mechanics	Computational thinking, Logic Application of Lua Coding to achieve game outcomes
176		
177	Connecting the dots	Generalization, Logic, Critical Thinking Weaving together the game parts to finish the game
178		
179	Game assessment and feedback	Problem-solving, Persistence Game feedback and modification
180	Publish the game	Publish and Play

INTRODUCTION TO DATA SCIENCE

During these classes, students will explore and understand different types of data and their real life applications, They will be introduced to the working of google sheets and will learn how to run basics math operations to analyse data and represent it using different types of charts and infographics. During the data analysis module they will learn the python panda library commands to create tables, insert data in them and print it. They will also learn how to read data from the CSV file and filter it, use data frames to analyse data.

SESSION	CONCEPT	SKILLS
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181	Data and Data Science	Exploration Exploring what is data, information and data science
182	Areas of Data Science	Exploration, Observation Exploring areas where data science is used in everyday life
183	Introduction to Data Visualization	Visualization, Analysis Context for data visualization
184	Data Visualization rules	Analysis Rule of 2 for data visualization
185	Introduction to Google sheets	Exploration Entering, formatting and saving data into google sheets
186	Data analytics - I	Numeracy, Decomposition Doing basic math operations to run analytics on data
187	Data Analytics - II	Numeracy, Decomposition Sorting and searching data in a table
188	Assessment	Assessment of learning
189	Data Representation - I	Representation, Generalization Representing data using charts - Part 1
190	Data Representation - II	Representation, Generalization Representing data using charts - Part 2
191	Data Visualization techniques	Visualization, Representation Map visualization of data in google sheet
192	Data clean up	Numeracy, Logic Clean up of data
193	Data Visualization-Types	Visualization, Abstraction Types of data for data visualization
194	Data Representation- III	Generalization Use of infographics/info grams for data representation
195	Assessment	Assessment of learning
196	Python concepts recap	Computation Recap of use of variables, loops in python



197	Introduction to Panda library	Computation, Numeracy How to create data with pandas: create table, insert data and print table data
198	Introduction to Random function	Computation Use of Random function
199	The CSV file format	Numeracy Introduction to the CSV file format
200	Data frames and CSV files-I	Generalization, Decomposition Reading data from CSV file to data frame and do filtering
201	Data frames and CSV files-II	Generalization, Decomposition Reading data from CSV file to data frame and do filtering (cont.)
202	Assessment	Assessment of learning
203	Python Data Types	Numeracy Data types in Python
204	Introduction to statistical concepts	Computation Introduction to statistical concepts- Mean, Median, Mode
205	Introduction to data frame commands- I	Computation Explore top 5 Data frames - Head, Length, columns, shape, describe
206	Introduction to data frame commands- II	Computation Explore top 5 Data frames - Head, Length, columns, shape, describe
207	Data analysis using data frames- I	Analysis, Generalization How to analyse data using data frame
208	Data analysis using data frames- II	Analysis, Generalization How to analyse data using data frame (cont.)
209	Data frames and charts	Analysis Data frames and charts
210	Assessment	Assessment of learning