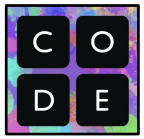
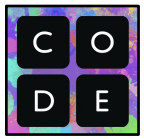
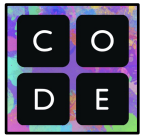
Computer Science with Embedded Robotics Progression Plan

Pre Prep

Year	Michaelmas Term		Lent Term		Summer Term	
1	CS UNPLUGGED Computer Science without a computer			SCRATCH JR	C O D E	
	Unplugged Coding • Programming concepts offline • Sequencing • Algorithms • Debugging	**BeeBots** • Directions • Sequencing and debugging • Algorithms	**Wonder Workshop Dot Robots** • Blockly App • Creating music • Sequences • Loops • Debugging	**Scratch Jr** • Animations • Sequencing • Algorithms • Debugging • Block based programming	**Course A** • Block programming • Sequencing • Debugging	**Rugged Robots** • Offroad terrain adventures • Algorithms • Loops • Obstacle detections
2	C O D E		SCRATCH JR	C O D E		
	Course B • Block programming • Sequencing • Debugging	**Wonder Workshop Dot Robots** • Blockly App • Sequences • Loops • Events • Conditionals	**Scratch Jr** • Designed a quiz • Sequencing • Algorithms • Debugging	**Course B** • Block programming • Sequencing • Debugging	**Wonder Workshop Dash Robots** • Blockly App • Sequences • Loops • Events • Conditionals	

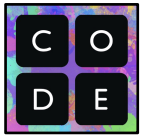
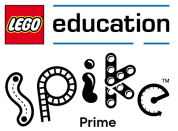
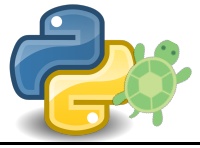
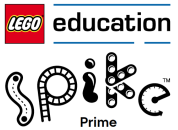
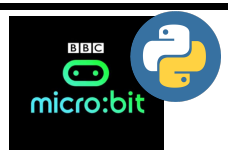
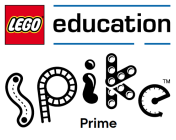
Computer Science with Embedded Robotics Progression Plan

Lower Prep

Year	Michaelmas Term			Lent Term	Summer Term
3					
	Course C - Independent Prep • Block programming • Sequencing & debugging • Algorithms • Creating art with code • Binary • Loops and events	**Logo** • Introduction to textual programming • Loops • Subroutines • Sequencing • Pattern recognition	**Wonder Workshop Dash Robots** • Problem Solving through challenges and puzzles • Algorithmic thinking, such as pattern recognition • Debugging skill	**Micro:Bit** • Sequencing • Repetition in animation	**Dinosaur animation** • Creating Sprites • Sprite costume concepts • Basic block coding • Input and Output
4					
	Course D - Independent Prep • Sequencing & debugging • Events • Loops & nested loops • If/Else conditionals • While and until loops • Binary	**Sphero Minis** • Connectivity via Bluetooth • Basic control • Abstract hardware control via drawing • Basic block coding for human computer interactions	**Lego Wedo** • Robot Explorers building and customization • Algorithm design for a specific problems • Sequencing • Repetitions	**Scratch** • Sprites and Backdrops • Variables, Sequencings, Repetitions & Debugging • If/Else conditionals • Collision events	**Micro:Bit** • Algorithms • Conditionals • Input and output • Variables • Use of random number generator
5					
	Course E - Independent Prep • Sequencing • Debugging • Inputs, Sprites and behaviours • Loops and nested loops • Conditionals (if, else)	**Lego Wedo:** • Sequencing • Debugging • Loops		**Micro:Bit** • algorithms • Sequencing • Conditionals • Debugging • digital music basics	**Scratch** • Conditionals • Input and output • Variables • Logical operators

Computer Science with Embedded Robotics Progression Plan

Upper Prep

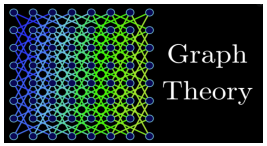
Year	Michaelmas Term			Lent Term		Summer Term	
6							
	Course F: Independent Prep • Sprites and behaviours • Inputs and outputs • Loops / nested loops • Variables • Functions • Artificial Intelligence concepts • The Internet			**Micro:Bit** • Algorithms • Debugging • Sensors • Input and Output • Conditionals • Loops		**Sphero Bolt** • Game Challenge	**Lego Spike Prime** • Group Project
7							
	Micro:Bit • Building blocks kit	**Flowol** • Algorithms • Flowcharts • Loops • Subroutines	**Python Turtle** • Concept of modules • Move commands • For / nested loops • Variables • Lists • Subroutines	**Sphero Bolt**	**App Development** • Unplugged • Design	**HTML and CSS** • Skills review • Multi page website • Forms • Incorporating Javascript	**Lego Spike Prime** • Drawing with Spike
8							
	Flowol • Algorithms • Flowcharts • Sub routines	**Python (text)** • Text editor • Compiling • Debugging • Nested loops • Inputs and Outputs • Conditionals	**App Creation**	**Micro:Bit (Python editor)** • Basics • Coding external coloured LEDs	**Understanding Computers** • Parts of a Computer • Binary	**Lego Spike Prime** • Sensors • Motors	**Tello Drones** (academic year 2022-2023)

Computer Science with Embedded Robotics Progression Plan

Senior

Year	Michaelmas Term		Lent Term		Summer Term	
9						
	Python Turtle: • Variables, their scopes & data types • one dimensional array • functions with and with parameters • conditionals • sequencing • iteration • pattern recognition • random number generator	**Game making with Pygame:** • Variables, their scopes & data types • one dimensional array • functions • conditionals, sequencing, iteration, pattern recognition • random number generator • events and event handling	**AI and machine learning:** • What is AI? • How machine learning is achieved? • Ethics of AI • Image recognition • Simple chatbot implementation in Python • Intelligence, Turing test and singularity	**Cryptography:** • Plaintext, cyphertext and key • Encrypt and decrypt with Caesar cypher using Python • Limitations of modern cyphers • Cryptanalyses • Cyber security and PKI	**Rover**: • Input and output • Sensors, motors and feedback loops • Events and event handling • Logical decision using environment “awareness” • Autonomous Robotics Programming using advanced programming constructs	**Phidgets**: • Input and output • Physical port connection • Sensors and feedback loops • Events and event handling • Elements of IoTs • Programming basic IoTs using advanced programming constructs
IGCSE Over two years new spec	Unit 7 : algorithm design Unit 8: programming and logic					
	Unit 8 Programming + Unit 7 Algorithm design • Python programming • flowchart • pseudocode • practical project	Unit 1 Data representation Unit 2 Data transmission	Unit 3 Hardware Unit 4 Software	Unit 5 Internet Unit 6 Emerging technology	Unit 10 Boolean logic Unit 9 Databases	revision

Version 3 - August 2021

12/13 Over two years	**Topic 4**: Computational thinking, problem-solving and programming (45 hours) Additional subject content introduced by the annually issued case study(30 hours) Option C: Web science(30/45 hours) Practical application of skills through the development of a product and associated documentation(30 hours) Group 4 project (10 hours)    Genetic Algorithm		
	Topic 1: System fundamentals (20 hours) **Topic 5:** Abstract data structures (23 hours)	**Topic 2:** Computer organization (6 hours) **Topic 6:** Resource management (8 hours)	**Topic 3**: Networks (9 hours) **Topic 7:** Control (14 hours)