

No	Topic	Subtopic	Details
1	Getting Started with CPX and CircuitPython	1.1 Recap the CPX	Recap of the CPX board and its features.
		1.2 Installing and using CircuitPython	How to install CircuitPython on CPX and upload sample code.
		1.3 Exploring the Mu editor and Python code structure	Writing and running Python scripts using Mu editor.
		1.4 Basic electronics	Fundamental concepts of voltage, current, inputs and outputs.
2	Python and CircuitPython Fundamentals	2.1 Python basics	Datatypes, variables, basic I/O, type conversion, adding comments and logs to code.
		2.2 Control structures	Conditional statements, loops (for, while), arithmetic and logical operators, negation.
		2.3 Functions and code blocks	Defining functions, parameters, return values.
		2.4 Importing functions from another file	Saving functions in a separate file and importing them into code.py.
		2.5 Exception handling	Using try & except blocks to handle exceptions in code
3	Built-in Sensors & Outputs on CPX	3.1 Light sensor (photoresistor)	Detect brightness and trigger outputs based on light levels.
		3.2 Temperature sensor	Read ambient temperature and program conditional actions.
		3.3 Sound sensor (microphone)	Use sound input to trigger lights or motors.
		3.4 Motion sensor (accelerometer)	Detect movement and orientation to control behaviors.
		3.5 Touch pads (capacitive touch)	Trigger inputs by touching conductive surfaces.
		3.6 Push buttons (A & B)	User input for interaction, control modes, or starting actions.
		3.7 Slide switch	Use as a manual mode selector.
		3.8 NeoPixel RGB LEDs	Program colorful feedback and animations.
		3.9 Built-in speaker	Output tones and sound alerts based on sensor input.
4	External Sensors & Actuators with CPX	4.1 Connecting External Components	Explain how to connect sensors and actuators to CPX using alligator clips; clarify analog vs digital signals.
		4.2 IR Tracking / Avoid Sensor	Introduce as a simple digital sensor; detect lines (black/white) or obstacles.
		4.3 Servo Motor	Introduce as a simple actuator to demonstrate controlled motion.
5	Getting Started with Crickit	5.1 Introduction to Crickit	Overview of the Crickit board, its purpose, and how it integrates with CPX for robotics projects.
		5.2 Crickit Hardware Components	Breakdown of key components: motor ports, servo ports, sensor ports, drive port, power inputs.
		5.3 Setting Up Crickit with CPX	How to connect Crickit to CPX and prepare it for CircuitPython.
		5.4 Powering Crickit	How Crickit is powered and connection to external power sources for high-current devices.
		5.5 Programming Crickit in CircuitPython	Basic CircuitPython code to control motors, servos, read sensors, and use Crickit functions.
6	External Sensors with Crickit	5.6 Using servo, DC, drive, signal I/O and other ports in Crickit	Connect actuators and sensors to Crickit ports.
		6.1 Ultrasonic Distance Sensor	Detect distances for collision avoidance or object tracking.
		6.2 IR Tracking/Avoidance Sensor	Follow lines or avoid obstacles.
		6.3 Joystick Module	Control servos motors or other devices using Joystick
		6.4 Inductive Proximity Sensor	Magnetic proximity detection.
		6.5 Moisture Sensor	Measure moisture conditions.
		6.6 Color Sensor	Detect colors for sorting or visual feedback.
		6.7 Rain Sensor	Detect rain drops.
		6.8 Photoresistor (external)	Light-sensor-based control.
7	Actuators and Outputs	6.9 Force Sensitive Resistor (FSR)	Detect pressure or force applied.
		7.1 Servo Motors	Precisely control angles - ideal for arms and joints.
		7.2 DC Motors	Drive continuous rotation - used for wheels or fans.
		7.3 Stepper Motor	Controlled multi-step rotation.
		7.4 Speakers	Play tones and sound notifications.
		7.5.1 Motion Types - Linear	Straight-line movement using rack & pinion, gears, sliders.
		7.5.2 Motion Types - Rotational	Circular path movement using motors.
		7.5.3 Motion Types - Gripper	Open/close or grip mechanisms using servo motors.
		7.5.4 Motion Types - 2DOF Arm	2-degree-of-freedom motion using servos.
		7.6.1 External Power for Actuators - Need	Understand why external power is required for high-current devices.
		7.6.2 External Power - Relays	Using relays for control.
		7.6.3 External Power - Wiring & Safety	Safe wiring and distribution practices.
		7.7 Water pump	Powering a water pump.
8	Project	8.1 Identifying Problems to Automate	Think of everyday tasks or fun challenges that could be solved with a robot.
		8.2 Designing the Robot	Plan and design the robot: movement, sensors, motors, power, and chassis materials.
		8.3 Exploring Sensors and Actuators	Choose the right sensors (ultrasonic, motion, light) and actuators (motors, servos) for tasks.
		8.4 Programming the Robot and Testing It	Write code, test in different situations, and troubleshoot issues.
9	Additional Modules	9.1 Learning to connect new sensors/actuators	Try to connect any sensor or actuator (color sensor, speaker)