

Course	Topic #	Topic Title
● <b>Course 1: Introduction to Robotics</b>		1 What is Robotics?
		2 History and Applications of Robots
		3 Types of Robots
		4 Basic Robot Components
		5 Power Sources in Robotics
		6 Simple Machines & Mechanisms
		7 Basics of Electricity in Robotics
		8 Safety and Ethics in Robotics
		9 Building a Simple Line-Following Robot
		10 Careers in Robotics

● Course 2: Robotics Hardware Fundamentals		1	Understanding Microcontrollers
		2	Motors and Servos
		3	Common Sensors (Light, Ultrasonic, Infrared)
		4	Power Supply & Battery Management
		5	Breadboard & Circuit Prototyping
		6	Reading Circuit Diagrams
		7	Communication Interfaces (Bluetooth, Wi-Fi)
		8	Soldering Basics
		9	Building a Sensor-based Obstacle Avoidance Robot
		10	Troubleshooting Hardware

● Course 3: Programming for Robotics		1 Introduction to Programming Languages for Robots
		2 Block-based Programming Basics
		3 Arduino IDE Setup
		4 Writing & Uploading Programs to Microcontrollers
		5 Controlling Motors & Sensors with Code
		6 Understanding Loops & Conditionals
		7 Feedback & PID Control
		8 Wireless Robot Control with Apps
		9 Data Logging & Debugging
		10 Introduction to ROS Concepts

● Course 4: Mechanical Design for Robots		1 Introduction to CAD Software
		2 Mechanical Design Principles
		3 Material Selection for Robot Parts
		4 Gears, Pulleys, and Linkages
		5 3D Printing Basics
		6 Printing and Assembling Robot Frames
		7 Testing Strength and Durability
		8 Building a Robotic Arm Frame
		9 Rapid Prototyping Techniques
		10 Final Project: Design a Robot Chassis

● Course 5: Electronics & Sensors		1 Basic Electronics for Robotics
		2 Using Resistors, Capacitors, and Diodes
		3 Microcontroller Pin Mapping
		4 Integrating Multiple Sensors
		5 Analog vs Digital Signals
		6 Using ADC/DAC in Robotics
		7 Communication Protocols (I2C, SPI, UART)
		8 Building a Sensor Network
		9 Calibrating Sensors for Accuracy
		10 Final Project: Multi-Sensor Robot

● Course 6: Autonomous Mobile Robots		1 Introduction to Autonomous Robots
		2 Navigation Basics
		3 Line-following Algorithms
		4 Obstacle Detection and Avoidance
		5 Map Building (Basics of SLAM)
		6 Path Planning Algorithms
		7 Using Encoders for Position Tracking
		8 Sensor Fusion Concepts
		9 Building an Autonomous Car Robot
		10 Testing & Tuning

● Course 7: Robot Control Systems		1 Introduction to Control Systems
		2 Open-loop vs Closed-loop Control
		3 PID Control Theory
		4 Implementing PID in Arduino
		5 Motor Speed Control
		6 Position and Angle Control
		7 Remote & Wireless Control Methods
		8 Data Feedback from Sensors
		9 Building a Self-Balancing Robot
		10 Troubleshooting Control Systems

■ Course 8: Human-Robot Interaction

- 1 Voice Control Basics
- 2 Gesture Recognition for Robots
- 3 Using Smartphones to Control Robots
- 4 Building a Voice-controlled Robot
- 5 Integrating Touch Screens
- 6 Remote Monitoring of Robots
- 7 Safety Protocols in HRI
- 8 User-friendly Robot Interfaces
- 9 Testing HRI Systems
- 10 Final Project: Voice & Gesture Robot

■ Course 9: AI & Computer Vision in Robotics		1 Introduction to AI for Robots
		2 Machine Learning Basics
		3 Computer Vision Concepts
		4 Using Cameras on Robots
		5 Object Detection with OpenCV
		6 Face Tracking Robots
		7 Autonomous Decision-making
		8 Training Simple Models for Robots
		9 Building a Vision-based Robot
		10 Preparing AI Robots for Competitio

<b>■ Course 10: Robotics Projects &amp; Entrepreneurship</b>		1 How to Plan a Robotics Project
		2 Budgeting and Sourcing Components
		3 Building a Team for Robotics Projects
		4 Documentation and Reporting
		5 Safety & Quality Standards
		6 Preparing for Robotics Competitions
		7 Presenting Robotics Projects
		8 Patents & Intellectual Property in Robotics
		9 Careers & Business Opportunities in Robotics
		10 Capstone Project: Build & Showcase a Custom Robot