FUTURE PROOF LEARNING - NEP ALIGNED
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# CERTIFICATE IN ROBOTICS

**DURATION: 90 Hours**
**CREDITS: 3**

## COURSE SYLLABUS

# Objective

Robotics is a branch of engineering that involves the conception, design, manufacture and operation of robots. The objective of this course is to provide foundational understanding of Robotics Engineering. Also, can serve as a good starting point for individuals interested in exploring the field of robotics or as a supplementary learning opportunity for those already working in related areas.

# Exit Profile

- Electronic programming
- Problem-Solving Abilities
- Creativity and Innovation
- Machine and high-level language
- Circuit Designing

# Career Path

- Practical Engineering Skills
- Robotics Technician
- Robotic Programmer
- Automation Engineer
- Robotics Educator/Trainer
- Sales Engineer

# Course Outline

| Course Name: | CERTIFICATE IN ROBOTICS | Duration: 90 H | |
|---|---|---|---|
| Module | Topic | Duration | Total Duration |
| Module - I | DEFINITION, HISTORY, TYPES, ADVANTAGES | 5 | 30 H |
| | ELECTRICITY, CONDUCTORS, AC/DC, COMPONENTS | 5 | |
| | LED CIRCUIT, VOLTAGE, OHM'S LAW, SERIES/PARALLEL CIRCUITS | 5 | |
| | CIRCUIT SIMULATION, SOFTWARE USE | 8 | |
| | BREADBOARD TYPES & PATTERNS | 7 | |
| Module - II | INTRODUCTION TO PROGRAMMING, MACHINE VS HIGH-LEVEL LANGUAGES | 10 | 60 H |
| | TYPES OF ARDUINO BOARDS, DIGITAL VS ANALOG SIGNALS | 10 | |
| | IDE SETUP, CODE COMPILATION, SKETCHING | 10 | |
| | CONNECTING ARDUINO, BOARD CONFIGURATION | 6 | |
| | IF, ELSE, SWITCH, LOOPS, FUNCTIONS | 8 | |
| | TRAFFIC LIGHT SYSTEM | 6 | |
| | LDR, PIR, ULTRASONIC, RELAY, LCD 16X2 | 10 | |

# Course in Detail

## MODULE - 1

### INTRODUCTION TO ROBOTICS & BASIC ELECTRONICS

**Definition & Evolution of Robotics**

- History & Milestones in Robotics
- Applications in Various Industries
- Future Trends in Robotics

**Electrical Fundamentals for Robotics**

- Basics of Electricity: Voltage, Current, Resistance
- Conductors, Insulators & Semiconductors
- Difference Between AC & DC

**Electronic Components & Circuit Basics**

- Resistors, Capacitors, Diodes, Transistors
- LEDs & Their Function in Circuits
- Understanding Ohm's Law
- Series vs Parallel Circuits

**Circuit Simulation & Prototyping**

- Introduction to Circuit Simulation Software (TinkerCAD, Proteus, etc.)
- Hands-on LED Circuit Design & Testing
- Introduction to Breadboards – Types & Wiring Patterns

**Breadboard Types & Patterns**

- Solderless Breadboards
- Solderable Breadboards (Protoboards)
- Printed Circuit Boards (PCBs)
- Breadboard Patterns (Internal Connections & Grid Systems)

## MODULE - 2

### PROGRAMMING & ARDUINO DEVELOPMENT

**Introduction to Programming Concepts**

- What is Programming? Machine vs High-Level Languages
- Basics of C/C++ for Embedded Systems
- Variables, Data Types, Operators

**Getting Started with Arduino**

- Understanding Arduino Boards & Their Types (Uno, Mega, Nano)
- Digital vs Analog Signals in Arduino

- Setting Up the Arduino IDE & Writing First Code
- Uploading and Debugging Code

**Control Structures in Arduino Programming**

- Using If, Else, Switch Statements
- Implementing Loops: For, While, Do-While
- Writing & Calling Functions

**Hands-on Arduino Projects**

- Traffic Light System – Implementing LED Control with Timers
- Sensor Interfacing – LDR (Light Sensor), PIR (Motion Sensor), Ultrasonic Sensor
- Actuator Control – Relay Modules & Output Control
- LCD 16x2 Display – Displaying Data from Sensors